



XBee Hive Gateway

Digi XBee Hive Gateway

User Guide

Firmware version 25.8

Revision history—90002613

Note For the latest release notes pertaining to the Digi XBee Hive Gateway, see the [Hive for Wi-SUN release notes](#).

Revision	Date	Description
A	January 2026	Initial release.
B	March 2026	Adding 868 and 900 XBee programming information to Get started (Program an XBee profile and Join nodes to the XBee Hive network). Added link for Hive release notes.
C	April 2026	Updated instructions for Using Python libraries (Bleak & Bless) and Configure scripts to run automatically Replaced XREF reference in Using Python libraries (Bleak & Bless) to link to correct page. Removed python-container-info reference from HTML version of Digi XBee Hive Gateway documentation.

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- Product name and model
- Product serial number (s)
- Firmware version
- Operating system/browser (if applicable)

Logs (from time of reported issue)

Trace (if possible)

Description of issue

Steps to reproduce

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Safety instructions

XBee adapter, gateways, and routers

- The XBee Adapter, Gateway, or Router products cannot be guaranteed operation due to the radio link and so should not be used for interlocks in safety critical devices such as machines or automotive applications.
- The XBee Adapter, Gateway, or Router products have not been approved for use in (this list is not exhaustive):
 - medical devices
 - nuclear applications
 - explosive or flammable atmospheres
- There are no user serviceable components inside the XBee Adapter, Gateway, or Router product. Do not remove the product covers or modify the Gateway or Router in any way. Modifications may exclude the product from any warranty and can cause the gateway or router to operate outside of regulatory compliance for a given country, leading to the possible illegal operation of the product.
- Use industry standard ESD protection when handling the XBee Adapter, Gateway, or Router product.
- Take care while handling to avoid electrical damage to the PCB and components.
- Do not expose the XBee Adapter, Gateway, or Router products to water or moisture.
- Use this product with the antennas specified in the XBee Adapter, Gateway, or Router product user guides.
- The end user must be told how to remove power from the XBee Adapter, Gateway, or Router product or to locate the antennas 20 cm from humans or animals.

Инструкции за безопасност

XBee адаптер, шлюзове и рутери

- Продуктите XBee Adapter, Gateway или Router не могат да бъдат гарантирани за работа поради радиовръзката и затова не трябва да се използват за блокировки в устройства, които са важни за безопасността, като машини или автомобилни приложения.
- Продуктите XBee Adapter, Gateway или Router не са одобрени за използване в (този списък не е изчерпателен):
 - медицински изделия
 - ядрени приложения
 - експлозивна или запалима атмосфера
- В продукта XBee Adapter, Gateway или Router няма компоненти, които могат да бъдат обслужвани от потребителя. Не сваляйте капаците на продукта и не модифицирайте по никакъв начин шлюза или рутера. Модификациите могат да изключат продукта от гаранция и могат да доведат до работа на шлюза или рутера извън регулаторното съответствие за дадена държава, което води до възможна незаконна работа на

продукта.

- Използвайте стандартна ESD защита, когато работите с XBee адаптер, шлюз или рутер.
- Внимавайте, докато боравите, за да избегнете електрически повреди на печатната платка и компонентите.
- Не излагайте продуктите XBee Adapter, Gateway или Router на вода или влага.
- Използвайте този продукт с антените, посочени в ръководствата за потребителя на XBee Adapter, Gateway или Router.
- Крайният потребител трябва да бъде казано как да премахне захранването от XBee Adapter, Gateway или Router продукта или да разположи антените на 20 cm от хора или животни.

Sigurnosne upute

XBee adapter, pristupnici i usmjerivači

- Ne može se jamčiti rad proizvoda XBee Adapter, Gateway ili Router zbog radio veze i stoga se ne bi trebali koristiti za blokade u sigurnosnim kritičnim uređajima kao što su strojevi ili automobilske aplikacije.
- XBee Adapter, Gateway ili Router proizvodi nisu odobreni za upotrebu u (ovaj popis nije konačan):
 - medicinskih uređaja
 - nuklearne primjene
 - eksplozivne ili zapaljive atmosfere
- Unutar proizvoda XBee Adapter, Gateway ili Router nema komponenti koje može servisirati korisnik. Nemojte skidati poklopce proizvoda niti na bilo koji način mijenjati pristupnik ili usmjerivač. Izmjene mogu isključiti proizvod iz bilo kakvog jamstva i mogu uzrokovati rad pristupnika ili usmjerivača izvan usklađenosti s propisima za određenu zemlju, što može dovesti do mogućeg nezakonitog rada proizvoda.
- Koristite standardnu ESD zaštitu pri rukovanju proizvodom XBee Adapter, Gateway ili Router.
- Budite oprezni tijekom rukovanja kako biste izbjegli električna oštećenja PCB-a i komponenti.
- Ne izlažite XBee Adapter, Gateway ili Router proizvode vodi ili vlazi.
- Koristite ovaj proizvod s antenama navedenim u korisničkim vodičima proizvoda XBee Adapter, Gateway ili Router.
- Krajnjem korisniku se mora reći kako da isključi napajanje iz XBee adaptera, Gatewaya ili Routera proizvoda ili da locira antene 20 cm od ljudi ili životinja.

Bezpečnostní instrukce

XBee adaptér, brány a routery

- U produktů XBee Adapter, Gateway nebo Router nelze zaručit provoz kvůli rádiovému spojení, a proto by neměly být používány pro blokování v zařízeních kritických z hlediska

bezpečnosti, jako jsou stroje nebo automobilové aplikace.

- Produkty XBee Adapter, Gateway nebo Router nebyly schváleny pro použití v (tento seznam není vyčerpávající):
 - zdravotnické prostředky
 - jaderné aplikace
 - výbušné nebo hořlavé atmosféry
- Uvnitř produktu XBee Adapter, Gateway nebo Router nejsou žádné uživatelsky opravitelné součásti. Neodstraňujte kryty produktu ani žádným způsobem neupravujte bránu nebo směrovač. Úpravy mohou vyjmout produkt z jakékoli záruky a mohou způsobit, že brána nebo router bude fungovat mimo zákonnou shodu pro danou zemi, což povede k možnému nezákonnému provozu produktu.
- Při manipulaci s produktem XBee Adapter, Gateway nebo Router používejte standardní ochranu ESD.
- Při manipulaci buďte opatrní, aby nedošlo k elektrickému poškození desky plošných spojů a součástí.
- Nevystavujte produkty XBee Adapter, Gateway nebo Router vodě nebo vlhkosti.
- Používejte tento produkt s anténami uvedenými v uživatelské příručce produktu XBee Adapter, Gateway nebo Router.
- Koncový uživatel musí být informován, jak odpojit napájení XBee adaptéru, brány nebo routeru nebo jak umístit antény 20 cm od lidí nebo zvířat.

Sikkerhedsinstruktioner

XBee-adapter, gateways og routere

- XBee Adapter-, Gateway- eller Router-produkterne kan ikke garanteres drift på grund af radioforbindelsen og bør derfor ikke bruges til aflåsninger i sikkerhedskritiske enheder såsom maskiner eller bilapplikationer.
- XBee Adapter, Gateway eller Router-produkter er ikke blevet godkendt til brug i (denne liste er ikke udtømmende):
 - medicinsk udstyr
 - nukleare applikationer
 - eksplosive eller brandfarlige atmosfærer
- Der er ingen komponenter, der kan repareres af brugeren, inde i XBee Adapter-, Gateway- eller Router-produktet. Fjern ikke produktdækslerne, og modificer ikke gatewayen eller routeren på nogen måde. Ændringer kan udelukke produktet fra enhver garanti og kan få gatewayen eller routeren til at fungere uden for lovgivningsoverholdelse for et givet land, hvilket kan føre til en mulig ulovlig drift af produktet.
- Brug industristandard ESD-beskyttelse, når du håndterer XBee Adapter-, Gateway- eller Router-produktet.
- Vær forsigtig under håndteringen for at undgå elektrisk beskadigelse af printet og komponenterne.
- Udsæt ikke XBee Adapter, Gateway eller Router-produkter for vand eller fugt.

- Brug dette produkt med de antenner, der er specificeret i brugervejledningerne til XBee Adapter, Gateway eller Router.
- Slutbrugeren skal fortælles, hvordan man fjerner strømmen fra XBee Adapter-, Gateway- eller Router-produktet eller placerer antennerne 20 cm fra mennesker eller dyr.

Veiligheidsinstructies

XBee-adapter, gateways en routers

- De werking van de XBee-adapter-, gateway- of routerproducten kan niet worden gegarandeerd vanwege de radioverbinding en mogen daarom niet worden gebruikt voor vergrendelingen in veiligheidskritieke apparaten zoals machines of autotoepassingen.
- De XBee Adapter-, Gateway- of Router-producten zijn niet goedgekeurd voor gebruik in (deze lijst is niet uitputtend):
 - medische apparaten
 - nucleaire toepassingen
 - explosieve of ontvlambare atmosferen
- Er zijn geen door de gebruiker te onderhouden componenten in het XBee Adapter-, Gateway- of Routerproduct. Verwijder de productkappen niet en wijzig de gateway of router op geen enkele manier. Wijzigingen kunnen het product uitsluiten van elke garantie en kunnen ertoe leiden dat de gateway of router buiten de regelgeving voor een bepaald land werkt, wat kan leiden tot de mogelijke illegale werking van het product.
- Gebruik industriestandaard ESD-bescherming bij het hanteren van het XBee Adapter-, Gateway- of Routerproduct.
- Wees voorzichtig bij het hanteren om elektrische schade aan de printplaat en componenten te voorkomen.
- Stel de XBee Adapter-, Gateway- of Routerproducten niet bloot aan water of vocht.
- Gebruik dit product met de antennes die zijn gespecificeerd in de gebruikershandleidingen van de XBee Adapter, Gateway of Router.
- De eindgebruiker moet worden verteld hoe de voeding van de XBee Adapter, Gateway of Router moet worden uitgeschakeld of hoe de antennes op 20 cm van mensen of dieren moeten worden geplaatst.

Ohutusjuhised

XBee adapter, lüüsid ja ruuterid

- XBee adapteri, lüüsi või ruuteri toodete toimimist ei saa raadiolingi tõttu tagada ja seetõttu ei tohiks neid kasutada ohutuse seisukohalt oluliste seadmete (nt masinad või autorakendused) blokeerimiseks.
- XBee adapteri, lüüsi või ruuteri tooteid ei ole heaks kiidetud kasutamiseks järgmistes riikides (see loend ei ole ammendav):
 - meditsiiniseadmed
 - tuumarakendused
 - plahvatusohtlik või tuleohtlik keskkond

- XBee adapteris, lüüsis või ruuteris ei ole kasutaja poolt hooldatavaid komponente. Ärge eemaldage toote katet ega muutke lüüsi ega ruuterit mingil viisil. Muudatused võivad toote garantiist välja jätta ja põhjustada lüüsi või ruuteri toimimise väljaspool antud riigi regulatiivset vastavust, mis võib viia toote ebaseadusliku kasutamiseni.
- Kasutage XBee adapteri, lüüsi või ruuteri toote käsitlemisel tööstusharu standardset ESD-kaitset.
- Olge käsitlemisel ettevaatlik, et vältida PCB ja komponentide elektrikahjustusi.
- Ärge jätke XBee adapteri, lüüsi või ruuteri tooteid vee või niiskuse kätte.
- Kasutage seda toodet XBee adapteri, lüüsi või ruuteri toote kasutusjuhendis kirjeldatud antennidega.
- Lõppkasutajale tuleb öelda, kuidas eemaldada XBee adapteri, lüüsi või ruuteri toide või leida antennid inimestest või loomadest 20 cm kaugusel.

Turvallisuusohjeet

XBee-sovitin, yhdyskäytävät ja reitittimet

- XBee-sovitin-, yhdyskäytävä- tai reititintuotteiden toimintaa ei voida taata radiolinkin vuoksi, joten niitä ei tule käyttää turvallisuuden kannalta kriittisten laitteiden, kuten koneiden tai autosovelluksien, lukitsemiseen.
- XBee-sovitin-, yhdyskäytävä- tai reititintuotteita ei ole hyväksytty käytettäväksi (tämä luettelo ei ole tyhjentävä):
 - lääketieteelliset laitteet
 - ydinvoimasovellukset
 - räjähdysvaarallisiin tai syttyviin tiloihin
- XBee-sovitimen, yhdyskäytävän tai reitittimen sisällä ei ole käyttäjän huollettavia osia. Älä poista tuotteen kansia tai muokkaa yhdyskäytävää tai reititintä millään tavalla. Muutokset voivat sulkea tuotteen takuun ulkopuolelle ja saada yhdyskäytävän tai reitittimen toimimaan tietyn maan säännöstenmukaisuuden ulkopuolella, mikä voi johtaa tuotteen laittomaan käyttöön.
- Käytä alan standardia ESD-suojausta käsitellessäsi XBee-sovitinta, yhdyskäytävää tai reititintuotetta.
- Ole varovainen käsitellessäsi, jotta vältät piirilevyn ja komponenttien sähkövauriot.
- Älä altista XBee-sovitin-, yhdyskäytävä- tai reititintuotteita vedelle tai kosteudelle.
- Käytä tätä tuotetta XBee-sovitimen, yhdyskäytävän tai reitittimen tuotteen käyttöoppaissa määritettyjen antennien kanssa.
- Loppukäyttäjälle on kerrottava, kuinka XBee-sovitimen, yhdyskäytävän tai reitittimen virta katkaistaan tai antennit sijoitetaan 20 cm:n etäisyydelle ihmisistä tai eläimistä.

Consignes de sécurité

Adaptateur XBee, passerelles et routeurs

- Le fonctionnement des produits XBee Adapter, Gateway ou Router ne peut pas être garanti en raison de la liaison radio et ne doit donc pas être utilisé pour les verrouillages dans des

dispositifs critiques pour la sécurité tels que des machines ou des applications automobiles.

- Les produits XBee Adapter, Gateway ou Router n'ont pas été approuvés pour une utilisation dans (cette liste n'est pas exhaustive) :
 - dispositifs médicaux
 - applications nucléaires
 - atmosphères explosives ou inflammables
- Il n'y a aucun composant réparable par l'utilisateur à l'intérieur du produit XBee Adapter, Gateway ou Router. Ne retirez pas les capots du produit et ne modifiez en aucune façon la passerelle ou le routeur. Les modifications peuvent exclure le produit de toute garantie et peuvent entraîner le fonctionnement de la passerelle ou du routeur en dehors de la conformité réglementaire pour un pays donné, conduisant à un éventuel fonctionnement illégal du produit.
- Utilisez la protection ESD standard de l'industrie lors de la manipulation de l'adaptateur, de la passerelle ou du routeur XBee.
- Soyez prudent lors de la manipulation afin d'éviter des dommages électriques au circuit imprimé et aux composants.
- N'exposez pas les produits XBee Adapter, Gateway ou Router à l'eau ou à l'humidité.
- Utilisez ce produit avec les antennes spécifiées dans les guides d'utilisation des adaptateurs, passerelles ou routeurs XBee.
- L'utilisateur final doit savoir comment couper l'alimentation de l'adaptateur, de la passerelle ou du routeur XBee ou comment placer les antennes à 20 cm des humains ou des animaux.

Sicherheitshinweise

XBee-Adapter, Gateways und Router

- Der Betrieb der XBee Adapter-, Gateway- oder Router-Produkte kann aufgrund der Funkverbindung nicht garantiert werden und sollte daher nicht für Verriegelungen in sicherheitskritischen Geräten wie Maschinen oder Automobilanwendungen verwendet werden.
- Die XBee Adapter-, Gateway- oder Router-Produkte wurden nicht für die Verwendung zugelassen in (diese Liste ist nicht vollständig):
 - Medizinprodukte
 - nukleare Anwendungen
 - explosive oder brennbare Atmosphären
- Es gibt keine vom Benutzer zu wartenden Komponenten innerhalb des XBee Adapter-, Gateway- oder Router-Produkts. Entfernen Sie nicht die Produktabdeckungen und modifizieren Sie das Gateway oder den Router nicht in irgendeiner Weise. Modifikationen können das Produkt von jeglicher Garantie ausschließen und dazu führen, dass das Gateway oder der Router außerhalb der gesetzlichen Vorschriften für ein bestimmtes Land betrieben wird, was zu einem möglicherweise illegalen Betrieb des Produkts führen kann.
- Verwenden Sie bei der Handhabung des XBee Adapter-, Gateway- oder Router-Produkts ESD-Schutz nach Industriestandard.

- Seien Sie vorsichtig bei der Handhabung, um elektrische Schäden an der Leiterplatte und den Komponenten zu vermeiden.
- Setzen Sie die Produkte XBee Adapter, Gateway oder Router weder Wasser noch Feuchtigkeit aus.
- Verwenden Sie dieses Produkt mit den Antennen, die in den Produktbenutzerhandbüchern für XBee-Adapter, -Gateways oder -Router angegeben sind.
- Dem Endbenutzer muss mitgeteilt werden, wie er die Stromversorgung des XBee-Adapters, Gateways oder Router-Produkts unterbricht oder die Antennen 20 cm von Menschen oder Tieren entfernt aufstellt.

Οδηγίες ασφαλείας

Προσαρμογέας XBee, πύλες και δρομολογητές

- Τα προϊόντα XBee Adapter, Gateway ή Router δεν είναι εγγυημένα για τη λειτουργία τους λόγω της ραδιοζεύξης και επομένως δεν πρέπει να χρησιμοποιούνται για ασφάλειες σε κρίσιμες για την ασφάλεια συσκευές, όπως μηχανήματα ή εφαρμογές αυτοκινήτου.
- Τα προϊόντα XBee Adapter, Gateway ή Router δεν έχουν εγκριθεί για χρήση σε (αυτή η λίστα δεν είναι εξαντλητική):
 - ιατροτεχνολογικά προϊόντα
 - πυρηνικές εφαρμογές
 - εκρηκτικές ή εύφλεκτες ατμόσφαιρες
- Δεν υπάρχουν εξαρτήματα που να μπορούν να επισκευαστούν από το χρήστη μέσα στο προϊόν XBee Adapter, Gateway ή Router. Μην αφαιρείτε τα καλύμματα του προϊόντος και μην τροποποιείτε την πύλη ή το δρομολογητή με κανέναν τρόπο. Οι τροποποιήσεις ενδέχεται να αποκλείουν το προϊόν από οποιαδήποτε εγγύηση και μπορεί να προκαλέσουν τη λειτουργία της πύλης ή του δρομολογητή εκτός της συμμόρφωσης με τους κανονισμούς για μια δεδομένη χώρα, οδηγώντας σε πιθανή παράνομη λειτουργία του προϊόντος.
- Χρησιμοποιήστε βιομηχανική προστασία ESD όταν χειρίζεστε το προϊόν XBee Adapter, Gateway ή Router.
- Προσέχετε κατά το χειρισμό για να αποφύγετε ηλεκτρική βλάβη στο PCB και στα εξαρτήματα.
- Μην εκθέτετε τα προϊόντα XBee Adapter, Gateway ή Router σε νερό ή υγρασία.
- Χρησιμοποιήστε αυτό το προϊόν με τις κεραίες που καθορίζονται στους οδηγούς χρήσης του XBee Adapter, Gateway ή Router.
- Πρέπει να ενημερωθεί ο τελικός χρήστης πώς να αφαιρέσει το ρεύμα από τον προσαρμογέα XBee, το Gateway ή το προϊόν του δρομολογητή ή να εντοπίσει τις κεραίες σε απόσταση 20 cm από ανθρώπους ή ζώα.

Biztonsági utasítások

XBee adapter, átjárók és útválasztók

- Az XBee Adapter, Gateway vagy Router termékek működése nem garantálható a rádiókapcsolat miatt, ezért nem használhatók biztonsági szempontból kritikus eszközök,

például gépek vagy autóipari alkalmazások reteszelésére.

- Az XBee Adapter, Gateway vagy Router termékek nem engedélyezettek a következő országokban való használatra (ez a lista nem teljes):
 - orvosi eszközök
 - nukleáris alkalmazások
 - robbanásveszélyes vagy gyúlékony légkör
- Az XBee Adapter, Gateway vagy Router termékben nincsenek felhasználó által javítható alkatrészek. Ne távolítsa el a termék fedelét, és semmilyen módon ne módosítsa az átjárót vagy az útválasztót. A módosítások kizárhatják a termékre a jótállást, és az átjáró vagy az útválasztó az adott ország szabályozási megfelelőségén kívüli működését okozhatják, ami a termék esetleges illegális működéséhez vezethet.
- Az XBee Adapter, Gateway vagy Router termékek kezelésekor használjon ipari szabvány ESD védelmet.
- A kezelés során ügyeljen arra, hogy elkerülje a PCB és az alkatrészek elektromos károsodását.
- Ne tegye ki az XBee Adapter-, Gateway- vagy Router-termékeket víznek vagy nedvességnek.
- Használja ezt a terméket az XBee Adapter, Gateway vagy Router termék használati útmutatójában meghatározott antennákkal.
- A végfelhasználót tájékoztatni kell arról, hogyan távolítsa el az XBee Adapter, Gateway vagy Router termék áramellátását, vagy hogyan helyezze el az antennákat az emberektől vagy állatoktól 20 cm-re.

Istruzioni di sicurezza

Adattatore, gateway e router XBee

- Non è possibile garantire il funzionamento dei prodotti XBee Adapter, Gateway o Router a causa del collegamento radio e pertanto non devono essere utilizzati per gli interblocchi in dispositivi critici per la sicurezza come macchine o applicazioni automobilistiche.
- I prodotti XBee Adapter, Gateway o Router non sono stati approvati per l'uso in (questo elenco non è esaustivo):
 - dispositivi medici
 - applicazioni nucleari
 - atmosfere esplosive o infiammabili
- Non ci sono componenti riparabili dall'utente all'interno del prodotto XBee Adapter, Gateway o Router. Non rimuovere i coperchi del prodotto né modificare in alcun modo il Gateway o il Router. Le modifiche possono escludere il prodotto da qualsiasi garanzia e possono causare il funzionamento del gateway o del router al di fuori della conformità normativa per un determinato paese, portando al possibile funzionamento illegale del prodotto.
- Utilizzare la protezione ESD standard del settore quando si maneggia l'adattatore XBee, il gateway o il prodotto router.
- Prestare attenzione durante la manipolazione per evitare danni elettrici al PCB e ai componenti.
- Non esporre i prodotti XBee Adapter, Gateway o Router ad acqua o umidità.

- Utilizzare questo prodotto con le antenne specificate nelle guide per l'utente del prodotto XBee Adapter, Gateway o Router.
- L'utente finale deve essere informato su come rimuovere l'alimentazione dal prodotto XBee Adapter, Gateway o Router o come posizionare le antenne a 20 cm da esseri umani o animali.

Drošības instrukcijas

XBee adapteris, vārtejas un maršrutētāji

- XBee adaptera, vārtejas vai maršrutētāja izstrādājumu darbība nevar tikt garantēta radio saites dēļ, tāpēc tos nevajadzētu izmantot bloķēšanai tādās drošībai svarīgās ierīcēs kā mašīnas vai automobiļu lietojumprogrammas.
- XBee adaptera, vārtejas vai maršrutētāja produkti nav apstiprināti lietošanai (šis saraksts nav pilnīgs):
 - medicīniskās ierīces
 - kodolprogrammas
 - sprādzienbīstamā vai uzliesmojošā vidē
- XBee adaptera, vārtejas vai maršrutētāja izstrādājumā nav neviena komponenta, ko lietotājs varētu apkalpot. Nenoņemiet izstrādājuma vākus un nekādā veidā nepārveidojiet vārteju vai maršrutētāju. Izmaiņas var izslēgt uz izstrādājumu no jebkādas garantijas un var izraisīt vārtejas vai maršrutētāja darbību, kas neatbilst noteiktās valsts normatīvajiem aktiem, izraisot iespējamu produkta nelikumīgu darbību.
- Strādājot ar XBee adaptera, vārtejas vai maršrutētāja izstrādājumu, izmantojiet nozares standarta ESD aizsardzību.
- Rīkojoties, rīkojieties uzmanīgi, lai izvairītos no PCB un komponentu elektriskiem bojājumiem.
- Nepakļaujiet XBee adaptera, vārtejas vai maršrutētāja izstrādājumus ūdens vai mitruma iedarbībai.
- Izmantojiet šo izstrādājumu ar antenām, kas norādītas XBee adaptera, vārtejas vai maršrutētāja izstrādājuma lietotāja rokasgrāmatās.
- Galalietotājam ir jāinformē, kā atvienot strāvu no XBee adaptera, vārtejas vai maršrutētāja izstrādājuma vai atrast antenas 20 cm attālumā no cilvēkiem vai dzīvniekiem.

Saugos instrukcijas

XBee adapteris, šliuzai ir maršrutizatorai

- „XBee” adapterio, šliuzo ar maršrutizatoriaus gaminių veikimas negali būti garantuotas dėl radijo ryšio, todėl jie neturėtų būti naudojami blokuojant saugai svarbius įrenginius, pvz., mašinas ar automobilius.
- XBee adapterio, šliuzo ar maršrutizatoriaus produktai nebuvo patvirtinti naudoti (šis sąrašas nėra baigtinis):
 - medicinos prietaisai
 - branduolinės programos
 - sprogioje ar degioje aplinkoje

- XBee Adapter, Gateway arba Router gaminyje nėra komponentų, kuriuos vartotojas galėtų taisyti. Jokiu būdu nenuimkite gaminio dangtelių ir nekeiskite šliuzo ar maršrutizatoriaus. Dėl modifikacijų gaminiui gali būti netaikoma jokia garantija, o šliuzas arba maršruto parinktuvas gali veikti nesilaikant tam tikros šalies teisės aktų reikalavimų, o tai gali sukelti neteisėtą gaminio veikimą.
- Dirbdami su XBee adapteriu, šliuzu ar maršrutizatoriumi naudokite pramonės standartinę ESD apsaugą.
- Dirbdami būkite atsargūs, kad nepažeistumėte PCB ir komponentų.
- Saugokite XBee adapterį, šliuzą ar maršrutizatorių nuo vandens ar drėgmės.
- Naudokite šį gaminį su antenomis, nurodytomis XBee adapterio, šliuzo ar maršrutizatoriaus gaminio vartotojo vadove.
- Galutiniam vartotojui turi būti paaiškinta, kaip atjungti maitinimą iš XBee adapterio, šliuzo ar maršrutizatoriaus gaminio arba nustatyti antenas 20 cm atstumu nuo žmonių ar gyvūnų.

Sikkerhetsinstruksjoner

XBee-adapter, gateway og rutere

- XBee Adapter-, Gateway- eller Router-produktene kan ikke garanteres drift på grunn av radiolinken og bør derfor ikke brukes til forriglinger i sikkerhetskritiske enheter som maskiner eller bilapplikasjoner.
- XBee Adapter, Gateway eller Router-produktene er ikke godkjent for bruk i (denne listen er ikke uttømmende):
 - medisinsk utstyr
 - kjernefysiske applikasjoner
 - eksplosive eller brennbare atmosfærer
- Det er ingen komponenter som kan repareres av brukeren inne i XBee Adapter-, Gateway- eller Router-produktet. Ikke fjern produktdekslene eller modifier gatewayen eller ruterens på noen måte. Endringer kan ekskludere produktet fra enhver garanti og kan føre til at gatewayen eller ruterens fungerer utenfor regelverket for et gitt land, noe som kan føre til ulovlig drift av produktet.
- Bruk industristandard ESD-beskyttelse når du håndterer XBee Adapter-, Gateway- eller Router-produktet.
- Vær forsiktig ved håndtering for å unngå elektrisk skade på PCB og komponenter.
- Ikke utsett XBee Adapter-, Gateway- eller Router-produktene for vann eller fuktighet.
- Bruk dette produktet med antennene som er spesifisert i brukerveiledningene for XBee Adapter, Gateway eller Router.
- Sluttbrukeren må bli fortalt hvordan man fjerner strømmen fra XBee Adapter-, Gateway- eller Router-produktet eller plasserer antennene 20 cm fra mennesker eller dyr.

Instrukcje bezpieczeństwa

Adapter, bramy i routery XBee

- Produkty XBee Adapter, Gateway lub Router nie mogą zagwarantować działania ze względu na łącze radiowe, dlatego nie należy ich używać do blokad w urządzeniach o krytycznym znaczeniu dla bezpieczeństwa, takich jak maszyny lub aplikacje motoryzacyjne.
- Produkty XBee Adapter, Gateway lub Router nie zostały zatwierdzone do użytku w (lista ta nie jest wyczerpująca):
 - wyroby medyczne
 - zastosowania nuklearne
 - atmosferach wybuchowych lub łatwopalnych
- Wewnątrz adaptera, bramy lub routera XBee nie ma żadnych elementów, które mogłyby być serwisowane przez użytkownika. Nie zdejmuj osłon produktu ani nie modyfikuj w żaden sposób bramki lub routera. Modyfikacje mogą wyłączyć produkt z jakiegokolwiek gwarancji i spowodować, że brama lub router będzie działać niezgodnie z przepisami w danym kraju, co może prowadzić do nielegalnego działania produktu.
- Używaj standardowej ochrony ESD podczas obsługi produktów XBee Adapter, Gateway lub Router.
- Podczas obsługi należy zachować ostrożność, aby uniknąć uszkodzeń elektrycznych PCB i komponentów.
- Nie wystawiaj adaptera, bramki lub routera XBee na działanie wody lub wilgoci.
- Używaj tego produktu z antenami określonymi w instrukcji obsługi adaptera, bramki lub routera XBee.
- Użytkownik końcowy musi zostać poinformowany, jak odłączyć zasilanie od adaptera, bramki lub routera XBee lub jak zlokalizować anteny w odległości 20 cm od ludzi lub zwierząt.

Instruções de segurança

Adaptador, gateways e roteadores XBee

- Os produtos XBee Adapter, Gateway ou Router não podem ter operação garantida devido ao link de rádio e, portanto, não devem ser usados para intertravamentos em dispositivos críticos de segurança, como máquinas ou aplicações automotivas.
- Os produtos XBee Adapter, Gateway ou Router não foram aprovados para uso em (esta lista não é exaustiva):
 - dispositivos médicos
 - aplicações nucleares
 - atmosferas explosivas ou inflamáveis
- Não há componentes que possam ser reparados pelo usuário dentro do produto XBee Adapter, Gateway ou Router. Não remova as tampas do produto nem modifique o Gateway ou o Roteador de forma alguma. As modificações podem excluir o produto de qualquer garantia e fazer com que o gateway ou roteador opere fora da conformidade regulatória de um determinado país, levando à possível operação ilegal do produto.
- Use a proteção ESD padrão do setor ao manusear o produto Adaptador, Gateway ou Roteador XBee.
- Tome cuidado ao manusear para evitar danos elétricos à PCB e aos componentes.
- Não exponha os produtos XBee Adapter, Gateway ou Router à água ou umidade.

- Use este produto com as antenas especificadas nos guias do usuário do produto Adaptador, Gateway ou Roteador XBee.
- O usuário final deve ser informado sobre como remover a energia do produto Adaptador, Gateway ou Roteador XBee ou localizar as antenas a 20 cm de humanos ou animais.

Instrucțiuni de siguranță

Adaptor XBee, gateway-uri și routere

- Nu se poate garanta funcționarea produselor XBee Adapter, Gateway sau Router din cauza conexiunii radio și, prin urmare, nu trebuie utilizate pentru interblocări în dispozitive critice pentru siguranță, cum ar fi mașinile sau aplicațiile auto.
- Produsele XBee Adapter, Gateway sau Router nu au fost aprobate pentru utilizare în (aceasta listă nu este exhaustivă):
 - dispozitive medicale
 - aplicații nucleare
 - atmosfere explozive sau inflamabile
- Nu există componente care să poată fi reparate de utilizator în interiorul produsului XBee Adapter, Gateway sau Router. Nu îndepărtați capacele produsului și nu modificați Gateway-ul sau Routerul în niciun fel. Modificările pot exclude produsul din orice garanție și pot face ca gateway-ul sau routerul să funcționeze în afara conformității cu reglementările pentru o anumită țară, ceea ce duce la o posibilă funcționare ilegală a produsului.
- Folosiți protecția ESD standard în industrie când manipulați produsul XBee Adapter, Gateway sau Router.
- Aveți grijă în timpul manipulării pentru a evita deteriorarea electrică a PCB-ului și a componentelor.
- Nu expuneți produsele XBee Adapter, Gateway sau Router la apă sau umiditate.
- Utilizați acest produs cu antenele specificate în ghidurile de utilizare ale produsului XBee Adapter, Gateway sau Router.
- Utilizatorului final trebuie să i se spună cum să scoată alimentarea de la adaptorul, gateway-ul sau routerul XBee sau să găsească antenele la 20 cm de oameni sau anima

Bezpečnostné inštrukcie

XBee adaptér, brány a smerovače

- Produkty XBee Adapter, Gateway alebo Router nemožno zaručiť kvôli rádiovému spojeniu, a preto by sa nemali používať na blokovanie v zariadeniach kritických z hľadiska bezpečnosti, ako sú stroje alebo automobilové aplikácie.
- Produkty XBee Adapter, Gateway alebo Router neboli schválené na použitie v (tento zoznam nie je úplný):
 - zdravotnícke pomôcky
 - jadrové aplikácie
 - výbušné alebo horľavé atmosféry

- Vo vnútri produktu XBee Adapter, Gateway alebo Router sa nenachádzajú žiadne užívateľsky opraviteľné komponenty. Neodstraňujte kryty produktu ani žiadnym spôsobom neupravujte bránu ani smerovač. Úpravy môžu vyňať produkt zo záruky a môžu spôsobiť, že brána alebo smerovač bude fungovať mimo zákonných predpisov pre danú krajinu, čo môže viesť k nožnej nezákonnej prevádzke produktu.
- Pri manipulácii s produktom XBee Adapter, Gateway alebo Router používajte štandardnú ochranu ESD.
- Pri manipulácii buďte opatrní, aby ste predišli elektrickému poškodeniu dosky plošných spojov a komponentov.
- Produkty XBee Adapter, Gateway alebo Router nevystavujte vode ani vlhkosti.
- Tento produkt používajte s anténami špecifikovanými v používateľských príručkách produktu XBee Adapter, Gateway alebo Router.
- Koncový používateľ musí byť informovaný o tom, ako odpojiť napájanie XBee adaptéra, brány alebo smerovača alebo ako umiestniť antény 20 cm od ľudí alebo zvierat.

Varnostna navodila

Adapter, prehodi in usmerjevalniki XBee

- Izdelkom XBee Adapter, Gateway ali Router ni mogoče zagotoviti delovanja zaradi radijske povezave in se zato ne smejo uporabljati za zaklepanje v varnostno kritičnih napravah, kot so stroji ali avtomobilské aplikácie.
- Izdelki XBee Adapter, Gateway ali Router niso bili odobreni za uporabo v (ta seznam ni izčrpen):
 - medicinskih pripomočkov
 - jedrske aplikácie
 - eksplozivne ali vnetljive atmosfére
- V izdelku XBee Adapter, Gateway ali Usmerjevalnik ni komponent, ki bi jih lahko popravil uporabnik. Ne odstraňujte pokrovov izdelka in na noben način ne spreminjajte prehoda ali usmerjevalnika. Spremembe lahko izključijo izdelek iz kakršne koli garancije in lahko povzročijo, da prehod ali usmerjevalnik deluje zunaj zákonske skladnosti za dano državo, kar vodi do možnega nezakonitega delovanja izdelka.
- Pri ravnanju z izdelkom XBee Adapter, Gateway ali Usmerjevalnik uporabljajte industrijsko standardno zaščito pred ESD.
- Pri rokovanju pazite, da se izognete elektrickým poškodbam tiskanega vezja in komponent.
- Izdelkov XBee Adapter, Gateway ali Usmerjevalnik ne izpostavljajte vodi ali vlagi.
- Ta izdelek uporabljajte z anténami, navedenými v uporabniških príručnikách izdelka XBee Adapter, Gateway ali Router.
- Končnemu uporabniku je treba povedati, kako odstráni napájanie z izdelka XBee Adapter, Gateway ali Usmerjevalnik ali naj locira antény 20 cm od ľudí ali živalí.

Adaptador XBee, puertas de enlace y enrutadores

- No se puede garantizar el funcionamiento de los productos del adaptador, puerta de enlace o enrutador XBee debido al enlace de radio y, por lo tanto, no deben usarse para enclavamientos en dispositivos críticos para la seguridad, como máquinas o aplicaciones automotrices.
- Los productos XBee Adapter, Gateway o Router no han sido aprobados para su uso en (esta lista no es exhaustiva):
 - dispositivos médicos
 - aplicaciones nucleares
 - atmósferas explosivas o inflamables
- No hay componentes reparables por el usuario dentro del adaptador XBee, la puerta de enlace o el enrutador. No retire las cubiertas del producto ni modifique la puerta de enlace o el enrutador de ninguna manera. Las modificaciones pueden excluir el producto de cualquier garantía y pueden hacer que la puerta de enlace o el enrutador funcionen fuera del cumplimiento normativo de un país determinado, lo que puede conducir a la operación ilegal del producto.
- Utilice la protección ESD estándar de la industria cuando manipule el adaptador, la puerta de enlace o el enrutador XBee.
- Tenga cuidado al manipularlo para evitar daños eléctricos en la PCB y los componentes.
- No exponga los productos XBee Adapter, Gateway o Router al agua o la humedad.
- Utilice este producto con las antenas especificadas en las guías de usuario del producto XBee Adapter, Gateway o Router.
- Se debe indicar al usuario final cómo desconectar la alimentación del adaptador, la puerta de enlace o el enrutador XBee o cómo ubicar las antenas a 20 cm de personas o animales.

Säkerhets instruktioner

XBee-adapter, gateways och routrar

- XBee Adapter, Gateway eller Router-produkter kan inte garanteras funktion på grund av radiolänken och bör därför inte användas för förreglingar i säkerhetskritiska enheter som maskiner eller biltillämpningar.
- XBee Adapter, Gateway eller Router-produkter har inte godkänts för användning i (denna lista är inte uttömmande):
 - medicinsk utrustning
 - kärnkraftstillämpningar
 - explosiv eller brandfarlig atmosfär
- Det finns inga komponenter som användaren kan reparera inuti XBee Adapter-, Gateway- eller Routerprodukten. Ta inte bort produkthöljerna eller modifiera gatewayen eller routern på något sätt. Ändringar kan utesluta produkten från alla garantier och kan göra att gatewayen eller routern fungerar utanför regelverket för ett visst land, vilket kan leda till olaglig användning av produkten.
- Använd industristandard ESD-skydd när du hanterar XBee Adapter, Gateway eller Router-produkten.

- Var försiktig vid hanteringen för att undvika elektriska skador på kretskortet och komponenterna.
- Utsätt inte XBee Adapter, Gateway eller Router-produkter för vatten eller fukt.
- Använd den här produkten med de antenner som specificeras i användarhandböckerna för XBee Adapter, Gateway eller Router.
- Slutanvändaren måste informeras om hur man kopplar bort strömmen från XBee Adapter, Gateway eller Router-produkten eller hur man placerar antennerna 20 cm från människor eller djur.

Digi XBee Hive Quick start

The following steps guide you through the setup of your Digi XBee Hive device.

Step 1: What's in the box

When you open the XBee Hive package, look for the following:

- Digi XBee Hive device



The XBee Hive has a product label on the bottom of the device. The label includes product identification information and the default password assigned to the device. The XBee Hive also includes a Phoenix pluggable terminal block for the power supply installed in the power input.

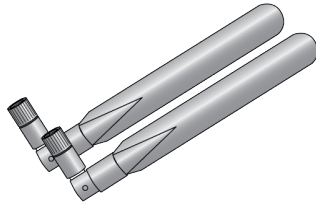
- Digi XBee Hive label

There is a printed copy of the product label on the bottom of your device. You can affix this label to the top or side of the device such that you can access the label after the device is mounted, or store the label in a safe place for future reference.

Step 2: Gather accessories

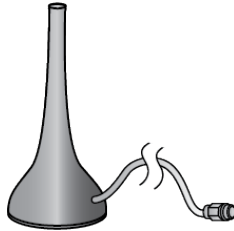
You may purchase accessories with the XBee Hive device, or you can provide your own.

Here is the list of accessories used in this *Quick start*.

**Cellular antennas**

Two cellular antennas ([76002103](#)).

Included in Accessory kit.

**RF antenna**

One RF antenna for XBee.

- For 900 MHz:
 - Refer to the antennas listed for the [XBee XR 900](#).
- For 868 MHz:
 - A08-HASM-560
- For 2.4 GHz:
 - Refer to the antennas listed in the [XBee 3 Hardware Reference Guide](#).

Included in Accessory kit.

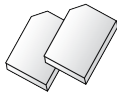
**Power supply**

18 VDC, 100-240VAC ([24000164](#) or [76002117](#))

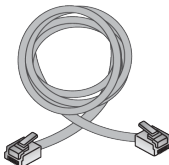
Included in Accessory kit.

**Laptop or personal computer**

Connect a laptop or PC to the same router/switch that your XBee Hive is connected to.

**SIM card(s)**

If you intend to configure cellular WWAN access at this time, acquire SIM cards as needed. Note the carrier, network Access Point Name (APN), and SIM pin—if any—for each card.

**Ethernet cable.**

One ([76002106](#)).

Included in Accessory kit.

Optional: **Serial Converter (RJ45 to DB9)**
One ([76000645](#)).

Included in Accessory kit where customers require a DB9 connector for serial devices.

Step 3: Connect

1. Plug in applicable SMA antennas, going right to left when looking at the device from the top:



- a. XBee
- b. WiFi/Bluetooth
- c. Cellular (Diversity)
- d. GNSS

Note GNSS functionality is not currently available on the XBee Hive sample devices, but will be available in future models.

- e. Cellular (Primary)

Step 4: First time configuration

Currently the XBee Hive device samples use the Multicast Domain Name System (mDNS) to log in. To do this, follow the steps below:

1. Make sure that the XBee Hive and a laptop/PC are connected to the same router/switch so the XBee Hive is accessible.
2. Go to the browser of your choice and enter the URL in the format `https://<serialNumber>.local`, where `<serialNumber>` refers to your device's specific serial number, to determine your device's IP address and locate the user login page.
3. Log into the XBee Hive:

User name: Use the default user name: **admin**.

Password: Use the unique password printed on the bottom label of the device—or the printed label included in the package.

4. This will take you to the XBee Hive dashboard page.

Step 5: Next steps

Once you have setup your XBee Hive, it is time to start working with your device and discover all its features following the [Get started guide](#).

Get started

This section guides you through your first steps with the Digi XBee Hive Gateway.

You will connect your hardware, program the XBee Hive XBee with a profile, and create an XBee network.

Note This section is written specifically for setting up a Zigbee variant of the XBee Hive. Small changes to the procedure as written may be necessary to set up and operate with other profiles.

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Step 1: Requirements

To start working with your XBee Hive and create an XBee network, you need:

1. The accessories listed in [Gather accessories](#).
2. An XBee3 module and its corresponding XBIB-C Development Board and USB-C cable.

Note We recommend using [Digi XBIB-C Development Boards](#) to follow this guide, but any other Digi XBee development board is also valid—such as [Digi XBIB-U Development Boards](#) or the [Digi XBee Grove Development Board](#).

3. XBee Studio application to program XBee profiles. You can download and install from [here](#).

Step 2: Register your kit

To get started with your XBee Hive Development Kit, you must register it and create a Digi Remote Manager account. To do so follow the steps in the form found on [this page](#).

Step 3: Setup the hardware

To connect the hardware:

1. Follow the instructions in [Digi XBee Hive Quick start](#) to connect your XBee Hive.
2. Set up the XBee device for the XBee network.
3. Plug the XBee device into the XBIB-C board. Pay attention to the XBee footprint drawn on the board so you place it with the correct orientation.
4. Connect the USB-C cable to the XBIB-C board in one end and to your local PC on the other end. These devices will be discovered and configured later using XBee Studio.

Step 4: Program an XBee profile

The XBee Hive comes with a set of default configuration settings, firmware version, and XBee protocol based on a Zigbee router profile. To update these configuration, you have to program an XBee profile.

The XBee Hive includes three default profiles—one per protocol—that you can use:

Zigbee: xbee_hive_zigbee

Parameter	Value
CE	1
ID	1234
NI	GATEWAY

DigiMesh: xbee_hive_digimesh

Parameter	Value
CH	C
ID	1234
CE	0
NI	GATEWAY

802.15.4: xbee_hive_802.15.4

Parameter	Value
CH	C
ID	1234
NI	GATEWAY
MY	FFFE

868 MHz: xbee_hive_868

Parameter	Value
CM	3EFFFDF
HP	0
ID	1234
BR	1
CE	0
NI	GATEWAY

900 MHz: xbee_hive_900

Parameter	Value
HP	0
ID	1234
BR	2
CE	0
NI	GATEWAY

Follow these steps to program one of them:

1. Open the XBee Hive WebUI and login.
2. On the top menu, click **XBee**.
3. Under **XBee Administration**, click **Update Manager**.
4. On the **XBee Update Manager** page, click **Add Update Tasks**. The **Add new update** tasks window displays.
5. Select your profile from the **Available XBee Profiles** list and click **Next**.
6. Check the XBee device that appears in the list and click **Add** to apply the XBee profile.

Note If more than one XBee device appears in the list, select the appropriate profile based on the "Hardware" value of your XBee Hive.

To find the device "Hardware" value, go to the **Network Manager** page and look under the **Local Device** section.

7. The new task appears in the **Current XBee Update Tasks** panel.
8. Click **Start Update** to begin running the update tasks list.
9. The window refreshes showing the update progress.

Step 5: Join nodes to the XBee Hive network

Now that you have the XBee Hive configured, you can add new XBee devices to the network. To do so, you have to configure the XBee devices that you connected to your computer in [Setup the hardware](#).

1. Download the XBee 3 get started profiles from [this link](#) and unzip it. The package contains profiles for each XBee 3 protocol and hardware variants, through-hole or SMT:
 - a. Zigbee
 - gs_sensor_zigbee-th.xpro
 - gs_sensor_zigbee-smt.xpro
 - b. DigiMesh
 - gs_sensor_digimesh-th.xpro
 - gs_sensor_digimesh-smt.xpro
 - c. 802.15.4

- `gs_sensor_802.15.4-th.xpro`
- `gs_sensor_802.15.4-smt.xpro`
- d. 868 MHz
 - `xbee_gateway_xr_868.xpro`
- e. 900 MHz
 - `xbee_gateway_xr_900.xpro`
 - `xbee_gateway_xr_900_australia.xpro`
 - `xbee_gateway_xr_900_new_zealand.xpro`
 - `xbee_gateway_xr_900_japan.xpro`

These profiles are ready to work with the XBee Hive programmed with the corresponding protocol profile—`xbee_hive_zigbee`, `xbee_hive_digimesh`, `xbee_hive_802.15.4`—that you already flashed in [Program an XBee profile](#).

They also include a MicroPython application that reports data to the Digi XBee Hive Gateway

2. Program the XBee3 module with the corresponding profile using XBee Studio.
 - a. Open XBee Studio.
 - b. Click **Discover radio modules** on the XCTU toolbar. The **Discover radio modules** dialog box appears.
 - c. Select the serial ports you would like to scan for the XBee 3 modules and click **Next**.
 - d. Select any port parameters you would like to include in the search process—you can leave the default settings—and click **Finish** to initiate the discovery scan. A new dialog opens, displaying devices found and the estimated time remaining.
 - e. When the discover process finishes, check the XBee 3 modules you want to configure and click **Add selected devices**. The modules appear in the device list.
 - f. Select a radio module from the list and wait until all its settings are read.
 - g. Click the **Configuration profiles** drop-down menu on the **Configuration** toolbar and select **Apply configuration profile**. An **Open file** dialog appears, asking for the configuration profile file to load.
 - h. Locate the `gs_sensor_<protocol>-<hw_variant>.xpro` from the software artifacts packet just downloaded and click **Open**.
 - i. Wait until XCTU applies the profile to the XBee3 module.
 - j. Close XCTU.

Note See [Configure your modules](#) in the *XCTU User Guide* for more information on configuring XBee devices.

3. Push the reset button on the development board. The programmed MicroPython application starts to report data to the Digi XBee Hive Gateway.

Step 6: Review your XBee network

Once the XBee devices are correctly configured, you can check if they are now part of your XBee network. To do so:

1. Open the XBee Hive WebUI and login.
2. On the menu, click **XBee**.
3. Under **XBee Administration**, click **Network Manager**.
4. The panel on the right displays all of the network nodes:

The screenshot shows the Digi XBee Hive WebUI. The top navigation bar includes 'Dashboard', 'XBee', 'Status', 'System', and 'admin'. The main content area is titled 'XBee Network'. On the left, there is a 'Network Details' panel showing the following information:

- Status: ✔ Running
- Protocol: Zigbee
- Pan ID: 0000000000001234
- Channel: 0B
- Encryption: ✘ Disabled
- Num. Devices: 2
- Coordinators: 1
- Routers: 0
- End Devices: 1

Below the details is a 'Network Actions' section with the text: 'This is the list of actions you can perform with the XBee network:'. It contains three buttons: 'Discover Network', 'Update Network', and 'Export Network'.

On the right, there are two tables. The first table is 'Local Device' with columns: Node Identifier, Role, MAC Address, 16-bit, Firmware, Hardware, and Details. It contains one entry: GATEWAY with Role 'C' (Coordinator), MAC Address '0013A20041A788DE', 16-bit '0000', Firmware '100B', and Hardware '0x41'. The second table is 'Remote Devices' with the same columns. It contains one entry: SENSOR with Role 'E' (End Device), MAC Address '0013A2004195C887', 16-bit 'E728', Firmware '100B', and Hardware '0x42'.

If you cannot see the XBee nodes yet, perform a network discovery:

1. Click **Discover Network** on the left.
2. In the popup dialog, check the **Clear devices** list before the discovering option.
3. The discovery process starts.
4. Discovered devices appear in the panel on the right.

Next steps

What else can you do with your Digi XBee Hive Gateway?

- [Python application development](#): Create a Python application using the [Digi XBee PyCharm Plugin](#), build, and learn how to launch it in your XBee Hive.
- [XBee network management](#): Discover your XBee network, get information from nodes, update their firmware, and configure their settings.
- System configuration: Configure your network interfaces, serial ports, firewall, VPNs, and other services:
 - [Configuration and management](#)
 - [Bluetooth Low Energy](#)
 - [Power management](#)
 - [Interfaces](#)
 - [Serial port](#)

- [Routing](#)
- [Virtual Private Networks \(VPN\)](#)
- [Services](#)
- [User authentication](#)
- [Firewall](#)
- [Remote device management](#): Remotely monitor and analyze multiple devices, manage their configuration, or update the entire system via the integrated Remote Manager support. You can also use [Amazon AWS IoT](#) and [Microsoft Azure](#).

Firmware configuration

This chapter contains the following topics:

Review XBee Hive default settings	46
Change the device's factory-assigned administrator password	47

Review XBee Hive default settings

You can review the default settings for your XBee Hive device by using the local WebUI or Digi Remote Manager:

Local WebUI

1. Log into the XBee Hive WebUI as a user with Admin access. See [Using the local web interface](#) for details.
2. On the menu, click **System > Device Configuration**.

Digi Remote Manager

1. If you have not already done so, connect to your Digi Remote Manager account.
2. From the menu, click **Devices** to display a list of your devices.
3. Locate your device as described in [Use Digi Remote Manager to view and manage your device](#).
4. Click the **Device ID**.
5. Click **Settings**.
6. Click to expand **Config**.

The following tables list important factory default settings for the XBee Hive.

Default interface configuration

Interface type	Preconfigured interfaces	Devices	Default configuration
Wireless Wide Area Network (WWAN)	▪ Modem	▪ Modem	▪ Firewall zone: External ▪ WAN priority: Metric=3 ▪ SIM failover after 5 attempts ▪ SureLink enabled for IPv4
Local Area Network (LAN)	▪ ETH	▪ Ethernet: ETH	▪ Firewall zone: Internal ▪ IPv4 > Type: DHCP address ▪ LAN priority: Metric=5
	▪ Loopback	▪ Ethernet: Loopback	▪ Firewall zone: Loopback ▪ IP address: 127.0.0.1/8
	▪ Setup IP	▪ Ethernet: ETH	▪ Firewall zone: Setup ▪ IP address 192.168.210.1/24
	▪ Setup Link-local IP	▪ Ethernet: ETH	▪ Firewall zone: Setup ▪ IP address 169.254.100.100/16

Other default configuration settings

Feature	Configuration
Central management	■ Digi Remote Manager is enabled and serves as the primary method for managing your device.
Security policies	■ Packet filtering allows all outbound traffic. ■ SSH and web administration: • Enabled for local administration • Firewall zone: Internal
Monitoring	■ Digi Remote Manager uses the Query State data to generate metrics in Digi Remote Manager. ■ Device health metrics uploaded to Digi Remote Manager at a 60 minute interval. ■ SNMP: Disabled
Serial port	■ Enabled ■ Serial mode: Remote ■ Label: None ■ Baud rate: 9600 ■ Data bits: 8 ■ Parity: None ■ Stop bits: 1 ■ Flow control: None

Change the device's factory-assigned administrator password

Tip Triggering a *Config reset* reverts the unique *admin* password you may have configured back to the factory-assigned default *admin* password. If you are trying to log in to the device locally after the *Config reset* is complete, you will have to use the factory-assigned default *admin* password, which is located on the product label sticker on the bottom of the device or the extra product label sticker. For more information about triggering a device reset, see [Device reset](#).

To change the factory-assigned administrator password for a device to a different one:

Web

1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

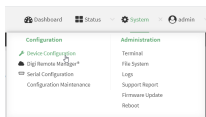
Remote Manager:

- a. Locate your device as described in [Use Digi Remote Manager to view and manage your device](#).
- b. Click the **Device ID**.
- c. Click **Settings**.

- d. Click to expand **Config**.

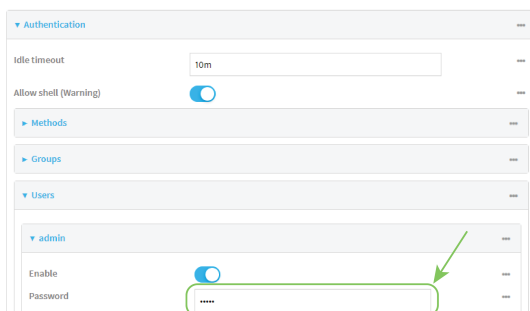
Local Web UI:

- a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



The **Configuration** window is displayed.

3. Click **Authentication** > **Users** > **admin**.
4. Enter a new password for the admin user. The password must be at least eight characters long and must contain at least one uppercase letter, one lowercase letter, one number, and one special character.



5. Click **Apply** to save the configuration and apply the change.

Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Set a new password for the admin user. The password must be at least eight characters long and must contain at least one uppercase letter, one lowercase letter, one number, and one special character.

```
(config)> auth user admin password new-password
(config)>
```

4. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

5. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Change the default SSID and pre-shared key for the preconfigured Wi-Fi access point

For the Wi-Fi enabled XBee HiveW device, by default, the SSID and pre-shared key for the preconfigured Wi-Fi access point are:

- Enabled
- SSID: Digi-XBee-Hive-<serial_number>
- Encryption: WPA2 Personal (PSK)
- Pre-shared key: The unique password printed on the bottom label of the device.

Web

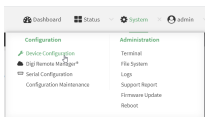
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

Remote Manager:

- a. Locate your device as described in [Use Digi Remote Manager to view and manage your device](#).
- b. Click the **Device ID**.
- c. Click **Settings**.
- d. Click to expand **Config**.

Local Web UI:

- a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



The **Configuration** window is displayed.

- Click **Network > Wi-Fi > Digi AP**.

- Enter a new **SSID** and **Pre-shared key**.
- Click **Apply** to save the configuration and apply the change.

Command line

- Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
- At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

- Set a new SSID for the **digi_ap** access point:

```
(config)> network wifi ap digi_ap ssid new_ssid
(config)>
```

- Set a new pre-shared key:

```
(config)> network wifi ap digi_ap encryption key_psk2 new_key
(config)>
```

- Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

- Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Configuration methods

There are two primary methods for configuring your XBee Hive device:

- Web interface.

The web interface can be accessed in two ways:

- Central management using the Digi Remote Manager, a cloud-based device management and data enablement platform that allows you to connect any device to any application, anywhere. With the Remote Manager, you can configure your XBee Hive device and use the configuration as a basis for a Remote Manager configuration which can be applied to other similar devices. See [Central management](#) for more information about using the Remote Manager to manage and configure your XBee Hive device.
- The local web interface. See [Using the local web interface](#) for more information about using the local web interface to manage and configure your XBee Hive device.

Note Changes made to the device's configuration by using the local web interface will not be automatically reflected in Digi Remote Manager. You must manually refresh Remote Manager for the changes to be displayed.

Web-based instructions in this guide are applicable to both the Remote Manager and the local web interface.

- Command line.

A robust command line allows you to perform all configuration and management tasks from within a command shell. Both the Remote Manager and the local web interface also have the option to open a terminal emulator for executing commands on your XBee Hive device. See [Using the command line](#) for more information about using the command line to manage and configure your XBee Hive device.

In this guide, task topics show how to perform tasks:



Web

Shows how to perform a task by using the local web interface.

Command line

Shows how to perform a task by using the command line interface.

Using Digi Remote Manager

By default, your XBee Hive device is configured to use Digi Remote Manager as its central management server. Devices must be registered with Remote Manager using one of the following options:

- As part of the getting started process.
- If you have not registered the device already, you can do so using the Device ID, MAC address, or your Remote Manager login credentials. See [Add a device to Remote Manager](#).

For information about configuring central management for your XBee Hive device, see [Central management](#).

Access Digi Remote Manager

To access Digi Remote Manager:

1. If you have not already done so, go to <https://myaccount.digi.com/> to sign up for a Digi Remote Manager account.
2. Check your email for Digi Remote Manager login instructions.
3. Go to remotemanager.digi.com.
4. Enter your user name and password. The Digi Remote Manager Dashboard appears.

Using the local web interface

To connect to the XBee Hive local Web UI:

1. Use an Ethernet cable to connect the XBee Hive's **ETH** port to a laptop or PC.
2. Open a browser and go to **<serialnumber>.local**.
3. Log into the device using a configured user name and password.
The default user name is **admin** and the default password is the unique password printed on the label packaged with your device.

Review the dashboard

After logging in, the local web admin dashboard is displayed.

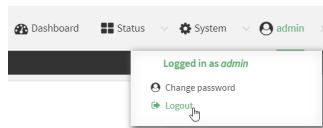
The dashboard shows the current state of the device.

Dashboard area	Description
Network activity	▪ Summarizes network statistics: the total number of bytes sent and received over all configured bridges and Ethernet devices. ▪ Displays the status of the network interfaces configured on the device. ▪ Provides information about the signal strength and technology of the cellular modem(s).
Digi Remote Manager	Displays the device connection status for Digi Remote Manager, the amount of time the connection has been up, and the Digi Remote Manager device ID. See Using Digi Remote Manager. The links in this section enable you to do the following: ▪ Launch Digi Remote Manager: Click Go To Digi Remote Manager to open the Digi Remote Manager login page. ▪ Add a device to Remote Manager: Click Register device in new account to add a device to Remote Manager using your Remote Manager login credentials.
Device	Displays the XBee Hive device's status, statistics, and identifying information.
Serial Ports	Displays information about the serial ports on the XBee Hive. Each serial port is identified by port name or number, followed by the serial port mode configured for the port. The icons next to the port name or number shows the serial port status:

Dashboard area	Description
	▪ Empty circle: Port is not connected. ▪ Green circle: Active connection on the port. ▪ Red X: No signal, which is an error state where the port is not available. ▪ Down arrow: One of the control signals is not active. This icon may display For for ports configured in Remote Access serial port mode and that have a signal monitor enabled (CTS or DCD) in the Monitoring Settings section. You can click the icons at the top of the section to access other pages: ▪ Blue "I": Click to access the Serial Status page. ▪ Blue wrench: Click to access the Serial Configuration page.
Services	Displays an option for the Watchdog service if it has been enabled.
XBee Network	Shows the XBee network status and information such as the protocol, network identifier, or the number of nodes.

Log out of the web interface

- On the main menu, click your user name. Click **Log out**.



Review the dashboard

After logging in, the local web admin dashboard is displayed.

The dashboard shows the current state of the device.

Dashboard area	Description
Network activity	▪ Summarizes network statistics: the total number of bytes sent and received over all configured bridges and Ethernet devices. ▪ Displays the status of the network interfaces configured on the device. ▪ Provides information about the signal strength and technology of the cellular modem(s).
Digi Remote Manager	Displays the device connection status for Digi Remote Manager, the amount of time the connection has been up, and the Digi Remote Manager device ID. See Using Digi Remote Manager. The links in this section enable you to do the following: ▪ Launch Digi Remote Manager: Click Go To Digi Remote Manager to open the Digi Remote Manager login page.

Dashboard area	Description
	▪ Add a device to Remote Manager: Click Register device in new account to add a device to Remote Manager using your Remote Manager login credentials.
Device	Displays the XBee Hive device's status, statistics, and identifying information.
Serial Ports	Displays information about the serial ports on the XBee Hive. Each serial port is identified by port name or number, followed by the serial port mode configured for the port. The icons next to the port name or number shows the serial port status: ▪ Empty circle: Port is not connected. ▪ Green circle: Active connection on the port. ▪ Red X: No signal, which is an error state where the port is not available. ▪ Down arrow: One of the control signals is not active. This icon may display For for ports configured in Remote Access serial port mode and that have a signal monitor enabled (CTS or DCD) in the Monitoring Settings section. You can click the icons at the top of the section to access other pages: ▪ Blue "i": Click to access the Serial Status page. ▪ Blue wrench: Click to access the Serial Configuration page.
Services	Displays an option for the Watchdog service if it has been enabled.
XBee Network	Shows the XBee network status and information such as the protocol, network identifier, or the number of nodes.

Use the local REST API to configure the XBee Hive device

Your XBee Hive device includes a REST API that can be used to return information about the device's configuration and to make modifications to the configuration. You can view the REST API specification from your web browser by opening the URL:

`https://ip-address/cgi-bin/config.cgi`

For example:

`https://192.168.210.1/cgi-bin/config.cgi`

Use the GET method to return device configuration information

To return device configuration, issue the **GET** method. For example, using **curl**:

```
$ curl -k -u admin https://ip-address/cgi-bin/config.cgi/value/path -X GET
```

where:

- *ip-address* is the IP address of the XBee Hive device.
- *path* is the path location in the configuration for the information being returned.

To determine allowed values for *path* from the Admin CLI:

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. At the config prompt, type **?** (question mark):

```
(config)> ?
auth          Authentication
cloud         Central management
firewall      Firewall
monitoring    Monitoring
network       Network
serial        Serial
service       Services
system        System
vpn           VPN

(config)>
```

The allowed values for *path* are listed in the first (left) column.

4. To determine further allowed path location values by using the **?** (question mark) with the path name:

```
(config> service ?

Services

Additional Configuration
-----
dns          DNS
iperf        IPerf
location     Location
mdns         Service Discovery (mDNS)
modbus_gateway Modbus Gateway
multicast    Multicast
ntp          NTP
ping         Ping responder
snmp         SNMP
ssh          SSH
telnet       Telnet
web_admin    Web administration

(config)> service
```

For example, to use **curl** to return the ssh configuration:

```
$ curl -k -u admin https://192.168.210.1/cgi-bin/config.cgi/value/service/ssh -X GET
Enter host password for user 'admin':
{
  ok": true,
  "result": {
    "type": "object",
    "path": "service.ssh"
  },
  "collapsed": {
    "acl.zone.0": "internal"
  },
  "acl.zone.1": "edge"
  },
  "acl.zone.2": "ipsec"
  },
  "acl.zone.3": "setup"
  },
  "enable": "true"
  },
  "key": ""
  },
  "mdns.enable": "true"
  },
  "mdns.name": ""
  },
  "mdns.type": "_ssh._tcp."
  },
  "port": "22"
  },
  "protocol.0": "tcp"
  }
}
$
```

You can also use the **GET** method to return the configuration parameters associated with an item:

```
curl -k -u admin https://192.168.210.1/cgi-bin/config.cgi/keys/service/ssh -X GET
Enter host password for user 'admin':
{ "ok": true, "result": [ "acl", "custom", "enable", "key", "mdns", "port", "protocol" ] }
$
```

Use the POST method to modify device configuration parameters and list arrays

Use the POST method to modify device configuration parameters

To modify configuration parameters, use the **POST** method with the **path** and **value** parameters.

```
$ curl -k -u admin "https://ip-address/cgi-bin/config.cgi/value?path=path&value=new_value" -X POST
```

where:

- *path* is the path to the configuration parameter, in dot notation (for example, **ssh.service.enable**).
- *new_value* is the new value for the parameter.

For example, to disable the ssh service using **curl**:

```
$ curl -k -u admin "https://192.168.210.1/cgi-bin/config.cgi/value?path=service.ssh.enable&value=false" -X POST
Enter host password for user 'admin':
{"ok": true }
$
```

Use the POST method to add items to a list array

To add items to a list array, use the **POST** method with the **path** and **append** parameters. For example, to add the external firewall zone to the ssh service:

```
$ curl -k -u admin "https://192.168.210.1/cgi-bin/config.cgi/value?path=service.ssh.acl.zone&append=true&value=external" -X POST
Enter host password for user 'admin':
{"ok": true, "result": "service.ssh.acl.zone.4" }
$
```

Use the POST method to add objects to a list array

Objects in an array that require one or more underlying values can be set using the **collapsed** URI parameter. We recommend including the **-g** option as well, to instruct curl to turn off globbing. The below example would add a new static route for the WAN interface for the 1.2.4.0/24 destination network:

```
$ curl -g -k -u admin "https://192.168.210.1/cgi-bin/config.cgi/value?path=network.route.static&append=true&collapsed[dst]=1.2.4.0/24&collapsed[interface]=/network/interface/wan" -X POST
Enter host password for user 'admin':
{"ok": true, "result": "network.route.static.1" }
$
```

Use the DELETE method to remove items from a list array

To remove items from a list array, use the **DELETE** method. For example, using **curl**:

```
$ curl -k -u admin "https://192.168.210.1/cgi-bin/config.cgi/value?path=path"
```

where *path* is the path to the list item, including the list number, in dot notation (for example, **service.ssh.acl.zone.4**).

For example, to remove the external firewall zone to the ssh service:

1. Use the **GET** method to determine the SSH service's list number for the external zone:

```
$ curl -k -u admin "https://192.168.210.1/cgi-bin/config.cgi/value?path=service/ssh/acl/zone" -X GET
{
  "ok": true,
  "result": {
    "type": "array",
    "path": "service.ssh.acl.zone"
  },
  "collapsed": {
    "0": "internal"
  },
  "1": "edge"
  "2": "ipsec"
}
```

```
,  
"3": "setup"  
,  
"4": "external"  
  }  
}  
}  
$
```

2. Use the **DELETE** method to remove the external zone (list item 4).

```
$ curl -k -u admin https://192.168.210.1/cgi-bin/config.cgi/value?path=service.ssh.acl.zone.4 -X  
DELETE  
Enter host password for user 'admin':  
{ "ok": true }  
$
```

Using the command line

The Digi XBee Hive device provides a command-line interface that you can use to configure the device, display status and statistics, update firmware, and manage device files.

See [Command line interface](#) for detailed instructions on using the command line interface and see [Command line reference](#) for information on available commands.

Access the command line interface

You can access the XBee Hive command line interface using an SSH connection, a telnet connection, or a serial connection on a serial port configured for the **Login** serial port mode. You can use an open-source terminal software, such as PuTTY or TeraTerm, to access the device through one of these mechanisms.

You can also access the command line interface in the WebUI by using the **Terminal**, or the Digi Remote Manager by using the **Console**.

To access the command line, your device must be configured to allow access, and you must log in as a user who has been configured for the appropriate access.

For further information about configuring access to these services, see:

- Serial: [Configure Login mode for a serial port](#)
- WebUI: [Configure the web administration service](#)
- SSH: [Configure SSH access](#)
- Telnet: [Configure telnet access](#)

Log in to the command line interface

Command line

1. Connect to the XBee Hive device by using a serial connection, SSH or telnet, or the **Terminal** in the WebUI or the **Console** in the Digi Remote Manager. See [Access the command line interface](#) for more information.
 - For serial connections, the default configuration is:
 - **9600** baud rate
 - **8** data bits
 - **no** parity
 - **1** stop bit
 - **no** flow control
 - For SSH and telnet connections, the Setup IP address of the device is **192.168.2.1** on the .
2. At the login prompt, enter the username and password of a user with Admin access:

```
login: admin
Password: *****
```

The default username is **admin**. The default unique password for your device is printed on the device label.

3. Depending on the device configuration, you may be presented with another menu, for example:

Access selection menu:

a: Admin CLI
s: Shell
q: Quit

Select access or quit [admin] :

Type **a** or **admin** to access the XBee Hive command line.

You will now be connected to the Admin CLI:

Connecting now...
Press Tab to autocomplete commands
Press '?' for a list of commands and details
Type 'help' for details on navigating the CLI
Type 'exit' to disconnect from the Admin CLI

>

See [Command line interface](#) for detailed instructions on using the command line interface.

Exit the command line interface

Command line

1. At the command prompt, type **exit**.

> exit

2. Depending on the device configuration, you may be presented with another menu, for example:

Access selection menu:

a: Admin CLI
s: Shell
q: Quit

Select access or quit [admin] :

Type **q** or **quit** to exit.

Central management

This chapter contains the following topics:

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Certificate-based enhanced security	62
Configure your device for Digi Remote Manager support	62
Reach Digi Remote Manager on a private network	74
Log in to Digi Remote Manager	74
Use Digi Remote Manager to view and manage your device	76
Add a device to Remote Manager	76
Configure multiple XBee Hive devices by using Digi Remote Manager configurations	78
View Digi Remote Manager connection status	79
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Digi Remote Manager support

Digi Remote Manager is a hosted remote configuration and management system that allows you to remotely manage a large number of devices. Remote Manager includes a web-based interface that you can use to perform device operations, such as viewing and changing device configurations and performing firmware updates. Remote Manager servers also provide a data storage facility. The Digi Remote Manager is the default cloud-based management system, and is enabled by default.

To use Remote Manager, you must set up a Remote Manager account. To set up a Remote Manager account and learn more about Digi Remote Manager, go to <http://www.digi.com/products/cloud/digi-remote-manager>.

To learn more about Remote Manager features and functions, see the [Digi Remote Manager User Guide](#).

Certificate-based enhanced security

Beginning with firmware version 22.2.9.x, the default URL for the device's Remote Manager connection is edp12.devicecloud.com. This URL is required to utilize the client-side certificate support. Prior to release 22.2.9.x, the default URL was my.devicecloud.com.

- If your Digi device is configured to use a non-default URL to connect to Remote Manager, updating the firmware will not change your configuration. However, if you erase the device's configuration, the Remote Manager URL will change to the default of edp12.devicecloud.com.
- If you perform a factory reset by pressing the **ERASE** twice, the client-side certificate will be erased and you must use the Remote Manager interface to reset the certificate. Select the device in Remote Manager and select **Actions > Reset Device Certificate**.
- The certificate that is provided to the client by Remote Manager is signed by a specific certificate authority, and the device is expecting that same certificate authority. If your IT infrastructure uses its own certificate-based authentication, this might cause the device to interpret the certificate provided by Remote Manager as being from an incorrect certificate authority. If this is the case, you need to include an exception to allow edp12.devicecloud.com to authenticate using its own certificate.

The new URL of edp12.devicecloud.com is for device communication only. Use <https://remotemanager.digi.com> for user interaction with remote manager.

Firewall issues

To utilize the certificate-based security, you may need to open a port through your firewall for egress connectivity to edp12.devicecloud.com. TCP port 3199 is used for communication with Remote Manager.

Configure your device for Digi Remote Manager support

By default, your XBee Hive device is configured to use for central management.

Additional configuration options

These additional configuration settings are not typically configured, but you can set them as needed:

- Disable the Digi Remote Manager connection if it is not required. You can also configure an alternate cloud-based central management application.
- Change the reconnection timer.
- The non-cellular keepalive timeout.
- The cellular keepalive timeout.
- The keepalive count before the Remote Manager connection is dropped.
- SMS support.
- HTTP proxy server support.

To configure your device's Digi Remote Manager support:

Web

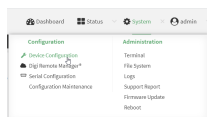
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

Remote Manager:

- a. Locate your device as described in [Use Digi Remote Manager to view and manage your device](#).
- b. Click the **Device ID**.
- c. Click **Settings**.
- d. Click to expand **Config**.

Local Web UI:

- a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



The **Configuration** window is displayed.

3. Click **Central management**.

The Central management configuration window is displayed.

Digi Remote Manager support is enabled by default. To disable, toggle off **Enable central management**.

4. For **Service**, select **Digi Remote Manager**.

5. (Optional) For **Management server**, type the URL for the central management server.

The default varies depending on firmware versions:

- Firmware version 22.2.9.x and newer, the default is the edp12.devicecloud.com. This server is for device-connectivity only, and uses enhanced security through certificate-based communication. See [Digi Remote Manager support](#) for further information.
- Firmware prior to version 22.2.9.x, the default is the Digi Remote Manager server, <https://remotemanager.digi.com>.

6. (Optional) For **Management port**, type the destination port for the remote cloud services connection. The default is **3199**.

7. (Optional) For **Management interface**, select the interface you want used when device connects to Digi Remote Manager.

8. **Firmware server** should normally be left at the default location.

9. (Optional) For **Speedtest server**, type the name or IP address of the server to use to test the speed of the device's internet connection(s).

10. (Optional) For **Retry interval**, type the amount of time that the XBee Hive device should wait before reattempting to connect to remote cloud services after being disconnected. The default is 30 seconds.

Allowed values are any number of hours, minutes, or seconds, and take the format **number {h|m|s}**.

For example, to set **Retry interval** to ten minutes, enter **10m** or **600s**.

11. (Optional) For **Keep-alive interval**, type the amount of time that the XBee Hive device should wait between sending keep-alive messages to remote cloud services when using a non-cellular interface. The default is 60 seconds.

Allowed values are any number of hours, minutes, or seconds, and take the format **number {h|m|s}**.

For example, to set **Keep-alive interval** to ten minutes, enter **10m** or **600s**.

12. (Optional) For **Cellular keep-alive interval**, type the amount of time that the XBee Hive device should wait between sending keep-alive messages to remote cloud services when using a cellular interface. The default is 290 seconds.
Allowed values are any number of hours, minutes, or seconds, and take the format **number {h|m|s}**.
For example, to set **Cellular keep-alive interval** to ten minutes, enter **10m** or **600s**.
13. (Optional) For **Allowed keep-alive misses**, type the number of allowed keep-alive misses. The default is **3**.
14. **Enable watchdog** is used to monitor the connection to Digi Remote Manager. If the connection is down, you can configure the device to restart the connection, or to reboot. The watchdog is enabled by default. To configure the Watchdog service and view metrics, see [Watchdog service](#).
15. If **Enable watchdog** is enabled:
 - a. (Optional) For **Restart Timeout**, type the amount of time to wait before restarting the connection to the remote cloud services, once the connection is down.
Allowed values are any number of hours, minutes, or seconds, and take the format **number{h|m|s}**.
For example, to set **Restart Timeout** to ten minutes, enter **10m** or **600s**.
The minimum value is 30 minutes and the maximum is 48 hours. If not set, this option is disabled. The default is 30 minutes.
 - b. (Optional) For **Reboot Timeout**, type the amount of time to wait before rebooting the device, once the connection to the remote cloud services is down. By default, this option is not set, which means that the option is disabled.
Allowed values are any number of hours, minutes, or seconds, and take the format **number{h|m|s}**.
For example, to set **Reboot Timeout** to ten minutes, enter **10m** or **600s**.
The minimum value is 30 minutes and the maximum is 48 hours. If not set, this option is disabled. The default is disabled.
16. (Optional) Enable **Locally authenticate CLI** to require a login and password to authenticate the user from the remote cloud services CLI. If disabled, no login prompt will be presented and the user will be logged in as **admin**. The default is disabled.
17. (Optional) Configure the XBee Hive device to communicate with remote cloud services by using SMS:
 - a. Click to expand **Short message service**.
 - b. **Enable** SMS messaging.
 - c. For **Destination phone number**, type the phone number for the remote cloud services:
 - Within the US: **12029823370**
 - International: **447537431797**
 - d. (Optional) Type the **Service identifier**.
18. (Optional) Configure the XBee Hive device to communicate with remote cloud services via one of two methods: Pinhole or Proxy server.
If using the Pinhole method, refer to the following
If using the Proxy server method:

- a. Click to expand **HTTP Proxy**.
 - b. **Enable** the use of an HTTP proxy server.
 - c. For **Server**, type the hostname of the HTTP proxy server.
 - d. For **Port**, type or select the port number on the HTTP proxy server that the device should connect to. The default is **2138**.
19. Click **Apply** to save the configuration and apply the change.

Command line

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Digi Remote Manager support is enabled by default. To disable Remote Manager support:

```
(config)> cloud enable false
(config)>
```

4. (Optional) Set the URL for the central management server.

```
(config)> cloud drm drm_url url
(config)>
```

The default varies depending on firmware versions:

- Firmware version 22.2.9.x and newer, the default is the edp12.devicecloud.com. This server is for device-connectivity only, and uses enhanced security through certificate-based communication. See [Digi Remote Manager support](#) for further information.
- Firmware prior to version 22.2.9.x, the default is the Digi Remote Manager server, <https://remotemanager.digi.com>.

5. (Optional) Set the amount of time that the XBee Hive device should wait before reattempting to connect to the remote cloud services after being disconnected. The minimum value is ten seconds. The default is 30 seconds.

```
(config)> cloud drm retry_interval value
```

where *value* is any number of hours, minutes, or seconds, and takes the format **number {h|m|s}**.

For example, to set **the retry interval** to ten minutes, enter either **10m** or **600s**:

```
(config)> cloud drm retry_interval 600s
(config)>
```

6. (Optional) Set the amount of time that the XBee Hive device should wait between sending keep-alive messages to the Digi Remote Manager when using a non-cellular interface. Allowed values are from 30 seconds to two hours. The default is 60 seconds.

```
(config)> cloud drm keep_alive value
(config)>
```

where *value* is any number of hours, minutes, or seconds, and takes the format ***number {h|m|s}***.

For example, to set **the keep-alive interval** to ten minutes, enter either **10m** or **600s**:

```
(config)> cloud drm keep_alive 600s
(config)>
```

7. (Optional) Set the amount of time that the XBee Hive device should wait between sending keep-alive messages to the Digi Remote Manager when using a cellular interface. Allowed values are from 30 seconds to two hours. The default is 290 seconds.

```
(config)> cloud drm cellular_keep_alive value
(config)>
```

where *value* is any number of hours, minutes, or seconds, and takes the format ***number {h|m|s}***.

For example, to set **the cellular keep-alive interval** to ten minutes, enter either **10m** or **600s**:

```
(config)> cloud drm cellular_keep_alive 600s
(config)>
```

8. Set the number of allowed keep-alive misses. Allowed values are any integer between **2** and **64**. The default is **3**.

```
(config)> cloud drm keep_alive_misses integer
(config)>
```

9. The **watchdog** is used to monitor the connection to remote cloud services. If the connection is down, you can configure the device to restart the connection, or to reboot. The watchdog is enabled by default. To disable:

```
(config)> cloud drm watchdog false
(config)>
```

10. If **watchdog** is enabled:

- a. (Optional) Set the amount of time to wait before restarting the connection to the remote cloud services, once the connection is down.

where *value* is any number of hours, minutes, or seconds, and takes the format ***number {h|m|s}***.

For example, to set **restart_timeout** to ten minutes, enter either **10m** or **600s**:

```
(config)> cloud drm restart_timeout 600s
(config)>
```

The minimum value is 30 minutes and the maximum is 48 hours. If not set, this option is disabled. The default is 30 minutes.

- b. (Optional) Set the amount of time to wait before rebooting the device, once the connection to the remote cloud services is down. By default, this option is not set, which means that the option is disabled.

where *value* is any number of hours, minutes, or seconds, and takes the format ***number {h|m|s}***.

For example, to set **reboot_timeout** to ten minutes, enter either **10m** or **600s**:

```
(config)> cloud drm reboot_timeout 600s
(config)>
```

The minimum value is 30 minutes and the maximum is 48 hours. If not set, this option is disabled. The default is disabled.

- 11. **firmware_url** should normally be left at the default location. To change:

```
(config)> cloud drm firmware_url url
(config)>
```

- 12. (Optional) Set the hostname or IP address of the speedtest server. The default is speedtest.accns.com.

```
(config)> cloud drm speedtest_server name
(config)>
```

- 13. (Optional) Determine whether to require a login and password to authenticate the user from the remote cloud services CLI:

```
(config)> cloud drm cli_local_auth true
(config)>
```

If set to **false**, no login prompt will be presented and the user will be logged in as **admin**. The default is **false**.

- 14. (Optional) Configure the XBee Hive device to communicate with remote cloud services by using SMS:

- a. **Enable** SMS messaging:

```
(config)> cloud drm sms enable true
(config)>
```

- b. Set the phone number for Digi Remote Manager:

```
(config)> cloud drm sms destination value
(config)>
```

where *value* is either:

- Within the US: **12029823370**
- International: **447537431797**

- c. (Optional) Set the service identifier:

```
(config)> cloud drm sms service_id id
(config)>
```

15. (Optional) Configure the XBee Hive device to communicate with remote cloud services by using an HTTP proxy server:

- a. **Enable** the use of an HTTP proxy server:

```
(config)> cloud drm proxy enable true
(config)>
```

- b. Set the hostname of the proxy server:

```
(config)> cloud drm proxy host hostname
(config)>
```

- c. (Optional) Set the port number on the proxy server that the device should connect to. The default is 2138.

```
(config)> cloud drm proxy port integer
(config)>
```

16. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

17. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Collect device health data and set the sample interval

You can enable or disable the collection of device health data to upload to Digi Remote Manager, and configure the interval between health sample uploads. By default, device health data upload is enabled, and the health sample interval is set to 60 minutes. Each time a device connects to Digi Remote Manager after the device boots (or re-boots), the device immediately uploads all health metrics.

To avoid a situation where several devices are uploading health metrics information to Remote Manager at the same time, the XBee Hive device includes a preconfigured randomization of two minutes for uploading metrics. For example, if **Health sample interval** is set to five minutes, the metrics will be uploaded to Remote Manager at a random time between five and seven minutes.

To disable the collection of device health data or enable it if it has been disabled, or to change the health sample interval:

Web

1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

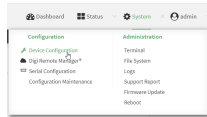
Remote Manager:

- a. Locate your device as described in [Use Digi Remote Manager to view and manage your device](#).

- b. Click the **Device ID**.
- c. Click **Settings**.
- d. Click to expand **Config**.

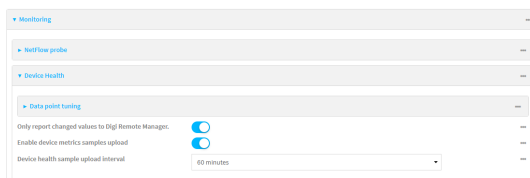
Local Web UI:

- a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



The **Configuration** window is displayed.

3. Click **Monitoring > Device Health**.



4. (Optional) Click to expand **Data point tuning**.
Data point tuning options allow you to configure what data are uploaded to the Digi Remote Manager. All options are enabled by default.
5. **Only report changed values to Digi Remote Manager** is enabled by default.
When enabled:
 - The device only reports device health metrics that have changed health metrics were last uploaded. This is useful to reduce the bandwidth used to report health metrics.
 - All metrics are uploaded once every hour.
 When disabled, all metrics are uploaded every **Health sample interval**.
6. Device health data upload is enabled by default. To disable, toggle off **Enable Device Health samples upload**.
7. For **Health sample interval**, select the interval between health sample uploads.
8. Click **Apply** to save the configuration and apply the change.

Command line

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Device health data upload is enabled by default. To enable or disable:

- To enable:

```
(config)> monitoring devicehealth enable true
(config)>
```

- To disable:

```
(config)> monitoring devicehealth enable false
(config)>
```

4. The interval between health sample uploads is set to 60 minutes by default. To change:

```
(config)> monitoring devicehealth interval value
(config)>
```

where *value* is one of **1**, **5**, **15**, **30**, or **60**, and represents the number of minutes between uploads of health sample data.

5. By default, the device will only report health metrics values to Digi Remote Manager that have changed health metrics were last uploaded. This is useful to reduce the bandwidth used to report health metrics. This is useful to reduce the bandwidth used to report health metrics. Even if enabled, all metrics are uploaded once every hour.

To disable:

```
(config)> monitoring devicehealth only_send_deltas false
(config)>
```

When disabled, all metrics are uploaded every **Health sample interval**.

6. (Optional) Tuning parameters allow to you configure what data are uploaded to the Digi Remote Manager. By default, all tuning parameters are enabled.

To view a list of all available tuning parameters, use the **show** command:

```
(config)> show monitoring devicehealth tuning
all
  cellular
    rx
      bytes
        enable true
    tx
      bytes
        enable true
  eth
    rx
      bytes
        enable true
    tx
      bytes
        enable true
  serial
    rx
```

```

        bytes
        enable true
    tx
        bytes
        enable true
cellular
  1
    rx
        bytes
        enable true
        packets
        enable true
    ...
                                (config)>

```

To disable a tuning parameter, set its value to false. For example, to turn off all reporting for the serial port:

```

(config)> monitoring devicehealth tuning all serial rx bytes enabled false
(config)> monitoring devicehealth tuning all serial tx bytes enabled false
(config)>

```

7. Save the configuration and apply the change.

```

(config)> save
Configuration saved.
>

```

8. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Event log upload to Digi Remote Manager

Your device is automatically configured to upload the event log to Digi Remote Manager. These logs are uploaded every 60 minutes.

Change the upload interval

To change how often the event logs are uploaded to Digi Remote Manager:



1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

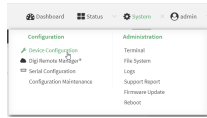
Remote Manager:

- a. Locate your device as described in [Use Digi Remote Manager to view and manage your device](#).
- b. Click the **Device ID**.
- c. Click **Settings**.

- d. Click to expand **Config**.

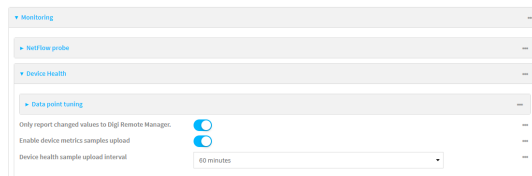
Local Web UI:

- a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



The **Configuration** window is displayed.

3. Click **Monitoring > Device event logs**.



4. For **Device event log upload interval**, change the interval between health sample uploads. The default is **60 minutes**.
5. Click **Apply** to save the configuration and apply the change.

Command line

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. The interval between event log uploads is set to 60 minutes by default. To change:

```
(config)> monitoring events interval value
(config)>
```

where *value* is one of **1, 5, 15, 30, or 60**, and represents the number of minutes between uploads of health sample data.

4. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

5. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Reach Digi Remote Manager on a private network

If your company has a private network and you have devices that need to reach Digi Remote Manager, there are several methods available:

- **Pinhole:** a communication port on your network not protected by the firewall which allows the application on the device to reach Digi Remote Manager.
- **Proxy server:** a dedicated software system equipped with its own IP address that runs on your network and acts as an intermediary between the device and Digi Remote Manager.
- **VPN Tunnel:** a virtual private network that offers a secure, encrypted connection between a device and the internet.

Pinhole method

Using the pinhole method requires your network administrator to remove the firewall connection on a communication port. For more information, see [Firewall concerns for outbound EDP connections to Digi Remote Manager](#).

Proxy server method

The device is capable of connecting through an HTTP proxy, such as Squid, but it is up to the network administrator to decide which HTTP proxy type to use.

To enable a proxy server and enter the server and port in Digi Remote Manager, see step 17 in [Configure your device for Digi Remote Manager support](#).

Tip To see instructions for setting up Squid and then configuring a device (not DAL) to reach Digi Remote Manager, see the Digi Quick Note, [Connecting to Digi Remote Manager Through Web Proxy](#). Though this Quick Note references older technology and device types, it may provide a network administrator with concrete examples from which they can draw correlations to newer technology and devices.

VPN Tunnel method

Configuring a VPN tunnel to communicate with Digi Remote Manager is a two-step process. One step is done by your organization's network administrator and the other by Digi Support.

Step 1: Set up the VPN tunnel

Your organization's network administrator needs to set up a VPN tunnel on your network, which will be used to communicate with Digi Remote Manager through the Digi cloud service.

Step 2. Contact Digi Support.

Digi Support configures the Digi cloud service to allow your VPN to communicate with Digi Remote Manager. Contact Digi Support at <https://www.digi.com/contactus>.

Log in to Digi Remote Manager

To log in to Remote Manager:

1. In a web browser, go to remotemanager.digi.com.
2. Type your username.
3. Click **Continue**.

4. Type your password.
5. Click **Login**.

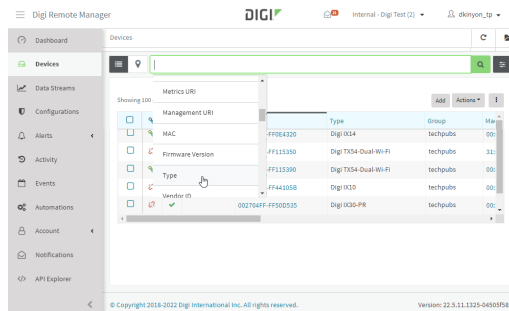
If you used the same browser tab/window to log in again, you will see the page you were on in your previous session. If you opened a new browser tab/window to log in, you will see the default fleet Dashboard page.

Tip If you cannot remember your password, go to remotemanager.digi.com, type your username and then click **Forgot username?** You will be asked to provide your email address associated with your user account. If you are not sure that you have a user account, talk with your Remote Manager administrator.

Use Digi Remote Manager to view and manage your device

To view and manage your device:

1. If you have not already done so, connect to your Digi Remote Manager account.
2. From the menu, click **Devices** to display a list of your devices.
3. Use the Filter bar to locate the device you want to manage. For example, to search by type of device:
 - a. Click the Advanced Search button ()
 - b. Click in the filter bar.



- c. Type the type of device (for example, XBee Hive).

Add a device to Remote Manager

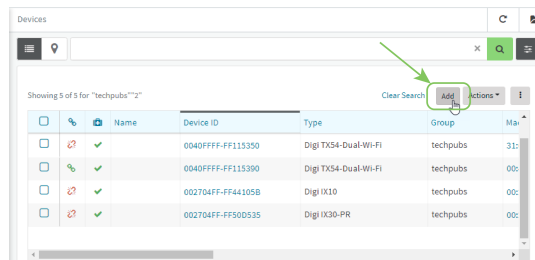
There are several options for adding a device to Remote Manager.

- **Quick Start process.** Use this process to both install a device and then add it to Remote Manager.
- **Device label information.** Use the information on the device label (e.g., Device ID, MAC address, Password) to add a new device to Remote Manager. See [Add a device to Remote Manager using information from the label](#).
- **Digi Remote Manager credentials.** Use your Remote Manager credentials to add a device to Remote Manager when you do not have the device password. See [Add a device to Remote Manager using your Remote Manager login credentials](#).

Add a device to Remote Manager using information from the label

Tip If you do not have access to the device label, you can add the device using your Remote Manager login credentials. See [Add a device to Remote Manager using your Remote Manager login credentials](#).

1. If you have not already done so, connect to your Digi Remote Manager account.
2. From the menu, click **Devices** to display a list of your devices.

3. Click **Add**.

4. Type the Device ID, MAC Address, or IMEI.
5. For **Device Default Password**, enter the default password on the printed label packaged with your device. The same default password is also shown on the label affixed to the bottom of the device.
6. (Optional) Complete the other fields.
1. Click **Add Device**.
Remote Manager adds the XBee Hive device to your account and it appears in the **Device Management** view.

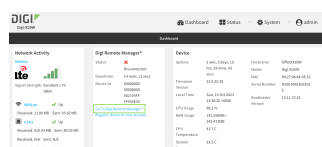
Add a device to Remote Manager using your Remote Manager login credentials

If you want to add a device to Remote Manager, and you do not have its password, you can add it using your Remote Manager login credentials.

To add a device using your Remote Manager credentials:



1. Log into the XBee Hive WebUI as a user with full Admin access rights.
2. On the dashboard, in **Digi Remote Manager** status pane, click **Register device in new account**.

3. The **Register Device in New Account** page displays.

REGISTER DEVICE IN A NEW ACCOUNT

Digi Remote Manager Username:

Digi Remote Manager Password:

Digi Remote Manager Group (optional):

REGISTER

4. For **Digi Remote Manager Username**, type your Remote Manager username.
5. For **Digi Remote Manager Password**, type your Remote Manager password.

6. For **Digi Remote Manager Group (optional)**, type the group to which the device will be added, if needed.
7. Click **Register**.
The device is added to Remote Manager.

Command line

1. Log into the XBee Hive local command line as a user with full Admin access rights.
2. Register a device.

```
(register) [group STRING] password STRING username STRING
```

where:

- group: group to add device in Digi Remote Manager.
- password: Digi Remote Manager password (required).
- username: Digi Remote Manager username (required).

1. Click **Apply** to save the configuration and apply the change.
2. Save the configuration and apply the change.

```
(config)> save  
Configuration saved.  
>
```

3. Type **exit** to exit the Admin CLI.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

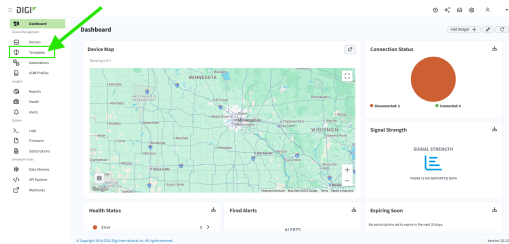
Configure multiple XBee Hive devices by using Digi Remote Manager configurations

Digi recommends you take advantage of Remote Manager templates to manage multiple XBee Hive devices. A Remote Manager template is a named set of device firmware, settings, and file system options. You use the template to automatically update multiple devices and to periodically scan devices to check for compliance with the template. See the [Digi Remote Manager and DAL OS Template documentation](#) for more information about Remote Manager templates.

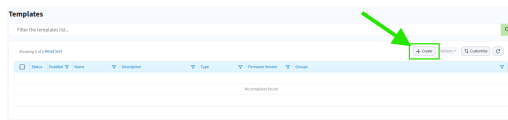
Typically, if you want to provision multiple XBee Hive routers:

1. Using the XBee Hive local WebUI, configure one XBee Hive router to use as the model device for all subsequent XBee Hives you need to manage.
2. Register the configured XBee Hive device in your Remote Manager account.

3. In Remote Manager, create a template:
 - a. From the Dashboard, select **Templates**.



- b. Click **Create**.



- c. Enter a **Name**, an optional **Description**, and select the desired **Model Device** for the template.
 - d. Click **Save and continue**.
 - e. Click **Import from device** and select the device configured above.
 - f. Click **Import**.
 - g. At the **Settings** page, configure any desired configuration overrides and click **Continue**.
 - h. At the **File System** page, make any desired changes to the files that were imported from the device and click **Continue**.
 - i. At the Automations page, click **Enable Scanning**, make any other desired changes, and click **Save**.

Digi Remote Manager provides multiple methods for applying templates to registered devices. You can also include site-specific settings with a profile to override settings on a device-by-device basis.

View Digi Remote Manager connection status

To view the current Digi Remote Manager connection status from the local device:

Web

1. Log into the XBee Hive WebUI as a user with full Admin access rights.
The dashboard includes a Digi Remote Manager status pane:

Command line

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. Use the [show cloud](#) command to view the status of your device's connection to Remote Manager:

```
> show cloud
```

```
Device Cloud Status
```

```
-----
```

```
Status   : Connected
```

```
Server    : edp12.devicecloud.com Device ID : 00000000-00000000-89E1FE-7550D7>
```

1. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Learn more

To learn more about Digi Remote Manager features and functions, see the [Digi Remote Manager User Guide](#).

Manage an XBee network

The XBee Hive is designed to inspect, manage, and work with live XBee networks. The XBee Hive discovers the devices in the network, lists all the connected nodes, and provides information such as their 64-bit address, node identifier, role, and so on.

The XBee Hive network caches a list of known nodes that reflects the real XBee network. It adds new nodes to its network cache in these scenarios:

- When any kind of communication occurs between any remote node in the network and the XBee Hive.
- When the XBee Hive actively searches for remote nodes in the network periodically or by customer request.

You can get information and manage your XBee network using the local web interface.

Access the XBee Hive local web interface

This section contains the following topics:

Review the current XBee network state	82
Discover the XBee network	82
Configure and update an XBee network	87
Export your network	91

Review the current XBee network state

The XBee Network Manager window displays information about the XBee network and allows you to perform several actions. To open the XBee Network Manager:

1. Open the XBee Hive WebUI and login.
2. On the top menu, click **XBee**.
3. Under **XBee Administration**, click **Network Manager**.

The Network Manager window contains three main panels:

- **Network Details** panel.
Displays XBee network general information such as:
 - Network status
 - Pan ID
 - Operating channel
 - Encryption status
 - Number of devices
- **XBee Devices** panel.
Displays the following information of the local and remote XBee devices in the network:
 - Node identifier
 - Role
 - 64-bit MAC address
 - 16-bit address
 - Firmware version
 - Hardware version
- **Network Actions** panel.
Contains several actions that can be performed in the network:
 - **Discover Network**: triggers a one-shot network discovery. See [One-shot discovery](#).
 - **Update Network**: takes you to the **Update Manager** window where you can perform profile updates on local and remote XBee devices. See [Apply XBee profiles](#).
 - **Export Network**: Function not yet implemented.

Note See [Show the network](#) to list all discovered XBee nodes from the CLI.

Discover the XBee network

Nodes that appear in the **Network Manager** list are known to the XBee Hive. The list accumulates known network nodes over time. To find new nodes, you can perform:

- Periodic active network discovery—configured.
- One-shot discovery—on demand.

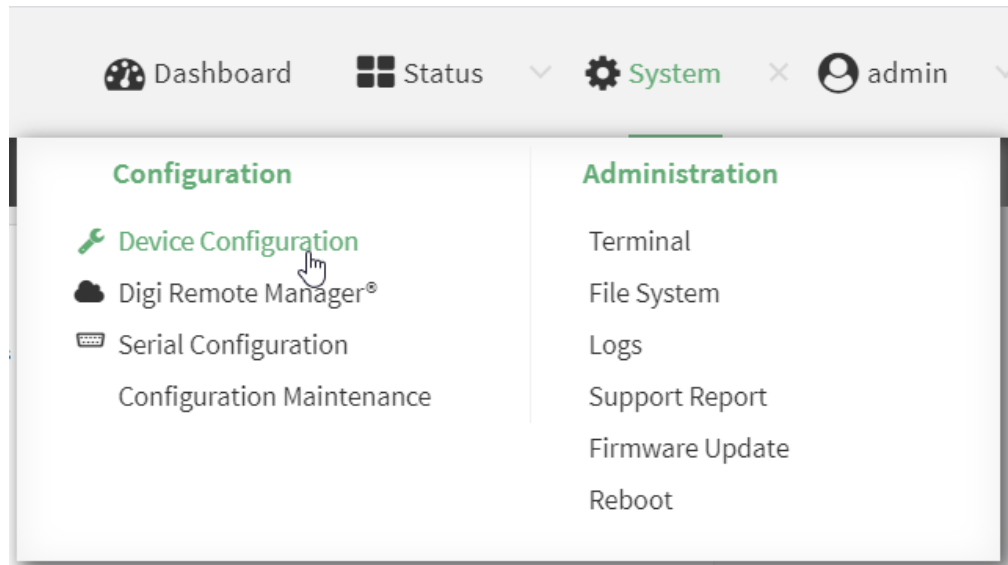
Configure active discovery

To configure active discovery options:

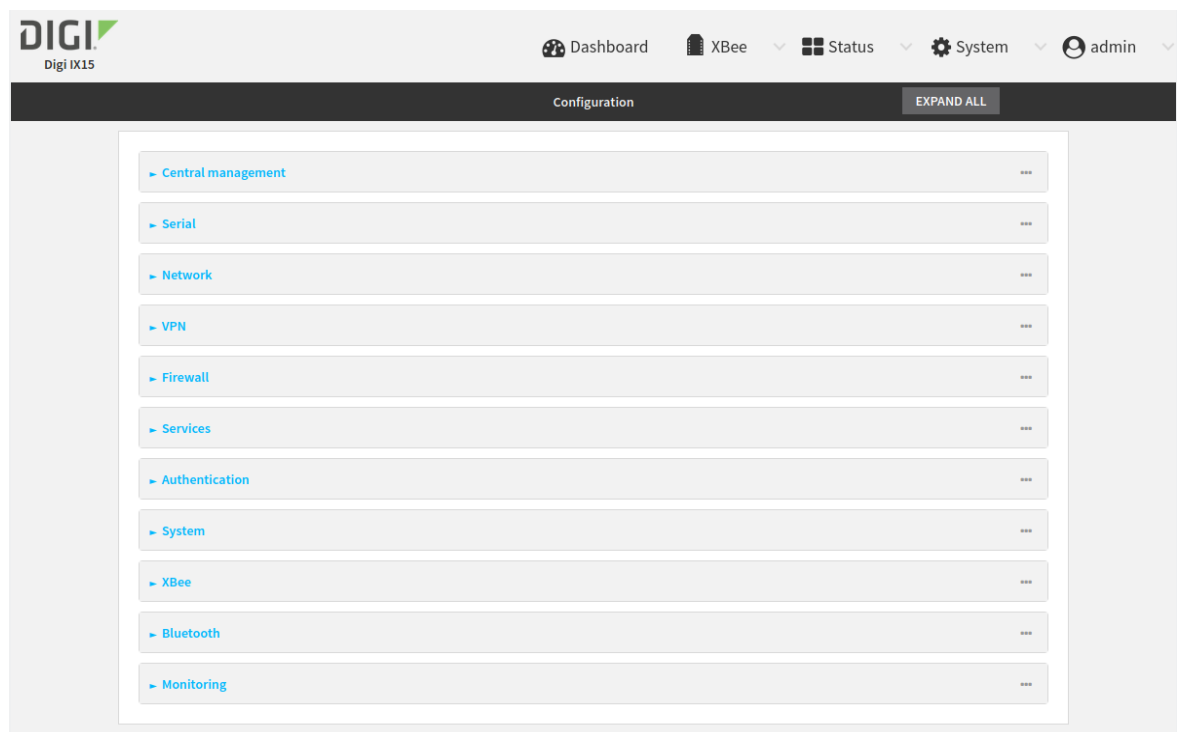


Web

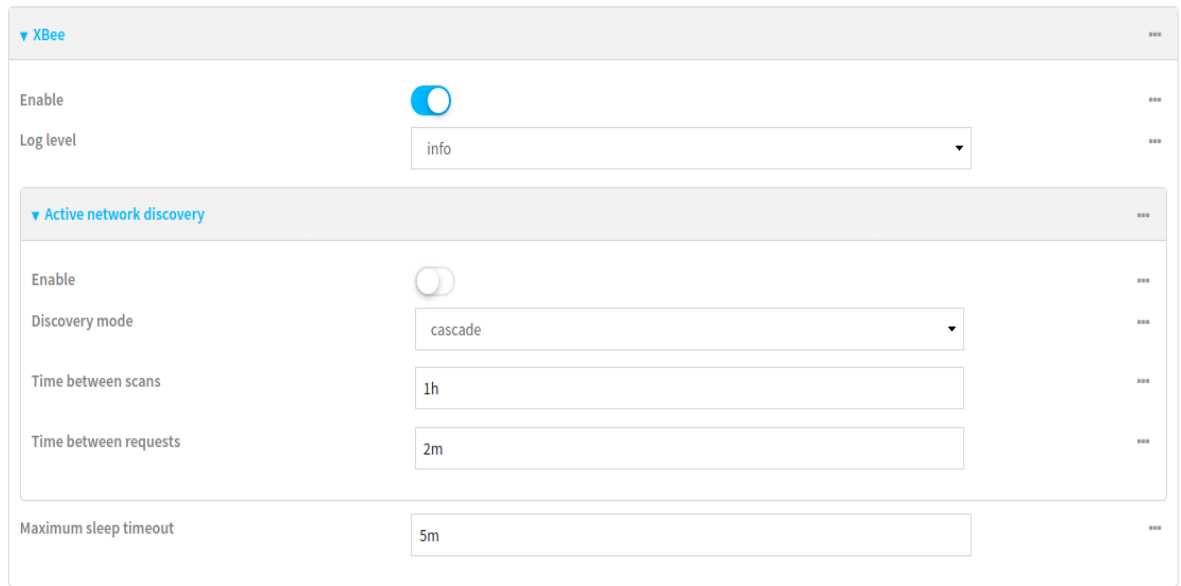
1. Log into the XBee Hive WebUI as a user with full Admin access rights.
2. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



The **Configuration** window displays.



- Click **XBee > Active Network Discovery Settings** to display the power settings.



▼ XBee

Enable ☒

Log level info

▼ Active network discovery

Enable ☐

Discovery mode cascade

Time between scans 1h

Time between requests 2m

Maximum sleep timeout 5m

- Click **Enable** to enable active discovery.
- For **Discovery mode** choose the mode to discover the network:

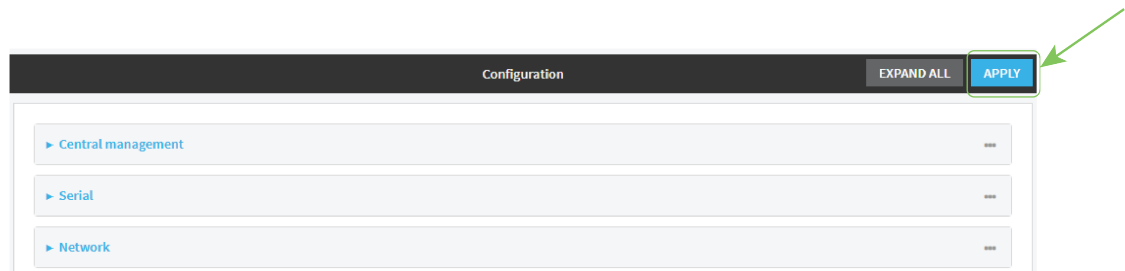
Allowed values are:

- **cascade**: node neighbors discovery is requested once the previous request finishes and after **Time between requests** elapses. This means only one discovery process is running at the same time. This might be a slower method, but it generates less traffic.
 - **flood**: node neighbors discovery is requested when the node is found and after **Time between requests**. This means several discovery processes might be running at the same time. This might be a faster method, but it generates more traffic and might saturate the network.
- For large networks we recommend **cascade** discovery mode.
- The default is **cascade**.

- Set **Time between scans**.
This is the time between network discovery scans.
Allowed values are any number of weeks, days, hours, minutes, or seconds, and take the format `number{w|d|h|m|s}`.
For example, to set **Time between scans** to two hours, enter **2h** or **120m**.
The minimum value is 1 minute and the maximum is 3 days. The default is 1 hour.
- Configure the **Time between requests**.
This is the time in seconds between node neighbor requests. The default is 60 seconds.
 - For **cascade** discovery mode: time to wait after completion of a node neighbor discovery process and before the next node request.
 - For **flood** discovery mode: minimum time to wait between each neighbor request.

Allowed values are any number of minutes, or seconds, and take the format `number{m|s}`.
For example, to set **Time between requests** to five minutes, enter **5m** or **300s**.
The minimum value is 20 seconds and the maximum is 10 minutes. The default is 2 minutes.

- Click **Apply** to save the configuration and apply the change.



Command line

- Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

- At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

- Enable active discovery:

```
(config)> xbee active_discovery enable true
```

- Set the discovery mode.

```
(config)> config xbee active_discovery mode <discovery_mode>
```

where **<discovery_mode>** is the discovery mode:

- **cascade**: node neighbors discovery is requested once the previous request finishes and after **Time between requests** elapses. This means only one discovery process is running at the same time. This might be a slower method, but it generates less traffic.
- **flood**: node neighbors discovery is requested when the node is found and after **Time between requests**. This means several discovery processes might be running at the same time. This might be a faster method, but it generates more traffic and might saturate the network.

For large networks we recommend **cascade** discovery mode.

The default is **cascade**.

- Set the amount of time the XBee Hive should wait between discovery cycles. Allowed values are from 1 minute to 3 days. The default is 1 hour.

```
(config)> config xbee active_discovery time_between_scans <time>
```

where **<time>** is any number of weeks, days, hours, minutes, or seconds, and takes the format *number{w|d|h|m|s}*.

For example, to set the **time between scans** to two hours, enter either 2h or 120m:

```
(config)> config xbee active_discovery time_between_scans 120m
(config)>
```

6. Set the amount of time the XBee Hive should wait between node requests to ask for neighbors. Allowed values are from 20 seconds to 10 minutes. The default is 2 minutes.

```
(config)> config xbee active_discovery time_between_requests <time>
```

where **<time>** is any number of minutes, or seconds, and takes the format *number{m|s}*.

- For **cascade**: time to wait after completion of a node neighbor discovery process and before the next node request.
- For **flood**: minimum time to wait between each neighbor request.

For example, to set the **time between requests** to five minutes, enter either **5m** or **300s**:

```
(config)> config xbee active_discovery time_between_requests 300s
(config)>
```

7. Save the configuration and apply the change:

```
(config)> save
Configuration saved.
>
```

8. Type **exit** to exit the Admin CLI.
Depending on your device configuration, you may be presented with an **Access selection** menu. Type **quit** to disconnect from the device.

One-shot discovery

1. Open the Network Manager
 - a. Open the XBee Hive WebUI and login.
 - b. On the top menu, click **XBee**.
 - c. Under **XBee Administration**, click **Network Manager**.
2. Perform a one-shot discovery
 - a. On the **Network Actions** panel, click **Discover Network**.
 - b. On the **Network Discovery** pop up window, select whether you want to **Clear the devices list** before the new discovery and then click **Discover**.
If you select **Clear devices list before discovering** before discovering, the list of the known nodes is erased. Then only nodes that responded to this one-shot discovery appear in the list.
 - c. Nodes that respond to this query appear in the list as a known XBee.

Note See [Discover the network](#) for more information on how to perform a one-shot discovery from the CLI.

Configure and update an XBee network

The XBee Hive provides a gateway between Internet Protocol (IP) network devices and a network of XBee wireless devices. The XBee Hive supports local and over-the-air (OTA) update in the XBee network nodes. As XBee networks can involve a large number of nodes, XBee Hive provides a way to automatically schedule XBee updates and manage profile files. The XBee Hive allows updating the settings, firmware, and file system of any XBee in the network using XBee profiles.

Note We recommend configuring any XBee, local or remote, using a profile. You may still need to read or set some specific value, for that you can use the CLI. See [Configure individual XBee parameters](#).

- [What is an XBee profile?](#)
- [Manage XBee profiles](#)
- [Upload the XBee profile](#)
- [Apply XBee profiles](#)
- [Configure a sleeping network to work with the XBee Hive](#)

What is an XBee profile?

A configuration profile is a snapshot of a specific device's firmware configuration, including the firmware, settings values, and other configuration information. A configuration profile is an **XPRO** file containing the following elements:

- Device firmware to be programmed in the XBee.
- Firmware settings to configure with their respective values.
- File system to, for example, include any MicroPython application in the node.
- Other configurations and metadata to identify the profile, such as the flash firmware policy, profile description, and so on.

XBee Studio allows you to create configuration profiles. A profile is useful in a production environment when you need to set the same parameters on multiple radios.

Note For more information, see [Profile update](#) in the *XBee Studio User Guide*.

Manage XBee profiles

The Profile Manager page allows you to manage the XBee profiles stored in the XBee Hive. You can upload, download, and delete profiles. For each profile, it also shows whether it contains settings, firmware, and filesystem updates.

To open the XBee Profile Manager:

1. Open the XBee Hive WebUI and login.
2. On the top menu, click **XBee**.
3. Under **XBee Administration**, click **Profile Manager**.

The Profile Manager window allows your to perform the following actions:

1. Upload a profile
To upload a profile from your computer, click **Upload Profile** on the top right corner of

the **Available XBee Profiles** panel. This opens a local file browser that allows you to select the profile file to upload to the device.

2. Download a profile
To download a profile from the device to the computer, click **Download Profile** on the right side of the profile row.
3. Delete a profile
To delete a profile from the device, click **Delete Profile** on the right side of the profile row.

Note You cannot delete the default XBee Hive profiles: **xbee_hive_zigbee**, **xbee_hive_digimesh**, and **xbee_hive_802.15.4**.

Note An XBee configuration profile may contain settings, firmware, and file system updates for an XBee. The Profile Manager shows whether those contents are included or not for each available profile.

Upload the XBee profile

Once you create the desired XBee profile, follow these steps to upload it to the XBee Hive:

1. Open the XBee Hive WebUI and login.
2. On the top menu, click **XBee**.
3. Under **XBee Administration**, click **Profile Manager**.
4. Click **Upload Profile** on the top right corner of the **Available XBee Profiles** panel. This opens a local file browser that allows you to select the profile file to upload to the device.
5. Select the profile you want to upload and click **Open**.
6. The profile is automatically transferred to the device and listed in the **Available XBee Profiles** panel.

Apply XBee profiles

The Update Manager allows you to configure and perform update tasks for the XBee devices in the network. While the update tasks are running, the Update Manager shows the progress of the different tasks.

To open the XBee Update Manager:

1. Open the XBee Hive WebUI and login.
2. On the top menu, click **XBee**.
3. Under **XBee Administration**, click **Update Manager**.

Note You can also get to the **XBee Update Manager** window by clicking **Update Network** in the **Network Actions** panel of the **XBee Network Manager** window.

The Update Manager window allows to perform the following actions:

1. Add update tasks
 - a. On the **XBee Update Manager** window, click **Add Update Tasks**.
A new **Add new update tasks** window displays.
 - b. Select the profile from the **Available XBee Profiles** list and click **Next**.

- c. Select the target XBee devices to apply the profile to.
There are several options to select devices:
 - All devices
 - By role
 - By node ID pattern
 - Specific devices (manually)
- d. Once you have selected the devices, click **Add**. The new task appears in the **Current XBee Update Tasks** panel.
To add more update tasks to the list, click **Add Update Tasks** again.
2. Run update tasks
 - a. Click **Start Update** to begin running the update tasks list. The window refreshes showing the update progress.

From the CLI you can:

- Change the configuration of any XBee in the network using a profile. See [Apply XBee profiles](#).
- Get and set a single setting of any XBee in the network. See [Configure individual XBee parameters](#).

Configure a sleeping network to work with the XBee Hive

Nodes in a network can sleep. To work with sleeping nodes, they must be properly configured so the XBee Hive can manage them.

Zigbee

End devices can sleep long periods of time, but their parents only buffer their messages during a maximum of 30 seconds—see [RF packet buffering timeout](#). This means that end devices with extended sleep periods must notify when they wake to inform the network they can receive data, and stay awake enough time so other nodes, such as the XBee Hive, can send messages to the end device.

Short sleep: nodes that sleep less than 30 seconds

They can receive data transmissions at any time since their parents buffer data long enough for the end devices to wake and poll to receive the data.

- End devices:
 1. Set the child table timeout—**ET**—to a greater value than the expected end device sleep time.
- Routers and coordinator:
 1. Set the sleep period—**SP**—to the largest value in any node in the network. This ensures that the RF packet buffering, poll timeout, and transmission timeouts are set correctly.

Extended sleep: nodes that sleep more than 30 seconds

They cannot receive data transmissions reliably unless you take certain design approaches.

- End devices:
 1. Must notify when they are awake and can receive data. This can be done by using:
 - I/O sampling: configure to send an IO message when the node awakes.
 - From MicroPython, transmit any data to the XBee Hive when it wakes up.
 - Any other intelligence that sends anything when the node wakes up.
 2. Must stay awake to provide other nodes, including the XBee Hive, with enough time to send messages to the end device.
 - a. For cyclic sleep end devices (**SM** = 4, **SM** = 5)
 - i. Configure **SO** to wake for the full **ST** time.
 - ii. Configure a reasonable value for **ST** time to allow transmissions.
 - b. For pin sleep (**SM** = 1) and MicroPython sleep (**SM** = 6) end devices
 - i. Stay awake enough time so other nodes can communicate with the end device.
 3. Set the child table timeout—**ET**—to a greater value than the expected end device sleep time.
- Routers and coordinator:
 1. **SP** and **SN** should be set such that $(\text{SP} * \text{SN})$ matches the longest expected sleep time.

DigiMesh

Nodes in a DigiMesh network can sleep asynchronously or synchronously.

Synchronous sleep

- The XBee Hive must be eligible for sleep coordinator:
 - Sleep mode—**SM**—must be 7: Synchronous cyclic sleep support mode.
 - Sleep options—**SO**—must have bit 1 to 0 to be able to act as sleep coordinator.
- Sleep period—**SP**— set the same value on all nodes in the network.
- Wake time—**ST**—:
 - Set the same value on all nodes in the network.
 - Keep its value sufficiently large so that it won't be affected by an inadvertent change of **NH**, **NN**, **RN**, or **MT**—undesirable overriding syncs.
 - The wake time must be long enough to:
 - Transmit/receive the sync message.
 - Transmit desired data.
 - Provide other nodes with enough time to send messages to sleeping devices.

Asynchronous sleep

Sleeping devices:

1. Must notify when they are awake and can receive data. This can be done by using:

- I/O sampling: configure to send an IO message when the node awakes.
 - From MicroPython, transmit any data to the XBee Hive when it wakes up.
 - Any other intelligence that sends anything when the node wakes up.
- 2. Must stay awake to provide other nodes, including the XBee Hive, with enough time to send messages to the end device.
 - For cyclic sleep end devices (**SM** = 4, **SM** = 5)
 - a. Configure **SO** to wake for the full **ST** time.
 - b. Configure a reasonable value for **ST** time to allow transmissions.
 - For pin sleep (**SM** = 1) and MicroPython sleep (**SM** = 6) devices
 - a. Stay awake enough time so other nodes can communicate with the sleeping device.

802.15.4

Sleeping devices:

1. Must notify when they are awake and can receive data. This can be done by using:
 - I/O sampling: configure to send an IO message when the node awakes.
 - From MicroPython, transmit any data to the XBee Hive when it wakes up.
 - Any other intelligence that sends anything when the node wakes up.
2. Must stay awake to provide other nodes, including the XBee Hive, with enough time to send messages to the end device.
 - For cyclic sleep end devices (**SM** = 4, **SM** = 5)
 - a. Configure **SO** to wake for the full **ST** time.
 - b. Configure a reasonable value for **ST** time to allow transmissions.
 - For pin sleep (**SM** = 1) and MicroPython sleep (**SM** = 6) devices
 - a. Stay awake enough time so other nodes can communicate with the sleeping device.

Export your network

You can export the network to save its current state and import it in the XBee Network Assistant to work offline.

1. Open the Network Manager
 - a. Open the XBee Hive WebUI and login.
 - b. On the top menu, click **XBee**.
 - c. Under **XBee Administration**, click **Network Manager**.
2. Export the XBee Hive XBee network to a file
 - a. On the **Network Actions** panel, click **Export Network**. The **XBee network** dialog opens.
 - b. Type the name of the network and a brief description.
 - c. Click **Export**. A *.xnet file with your XBee Hive XBee network is downloaded.

The exported file can be imported into the XBee Network Assistant to work offline. See [Import an XBee network](#).

Note See [Export the network](#) for more information on how to export the network from the CLI.

Bluetooth® Classic

Note Only the WiFi capable XBee Hive supports Bluetooth® capability natively.

Introduction to Bluetooth® Classic

What Is Bluetooth® Classic?

Bluetooth® Classic allows reliable short-range wireless communication between devices. It is often used for peripherals, data transfer, and networking between nearby computers or embedded systems.

Roles: Server and Client

A Bluetooth® "server" advertises a service and waits for connections. A Bluetooth® "client" discovers devices and initiates a connection to a server.

Services and Profiles

Bluetooth® devices provide "services" defined by profiles, such as Serial Port Profile (SPP) for serial communication. Each service is identified by a unique UUID. RFCOMM is a protocol that emulates a reliable serial port over Bluetooth® Classic.

Key Concepts

Pairing establishes trust and a shared link key between devices. Service discovery lets clients see which services a server device offers. A device must be set to discoverable and pairable to be found and paired by other devices.

XBee Hive Capabilities at a glance

Capability	Tooling	Notes
Scan for other devices	bluetoothctl, PyBluez	Standard discovery with options to get the discovered device's name and class.
Connect as server or client	bluetoothctl, PyBluez, sockets	Connect and interact with Bluetooth® services.
Specify services	sdptool	Specify the services the XBee Hive will advertise.
RFCOMM	bluetoothctl, PyBluez	Allows hosting or connecting to a RFCOMM serial port service.

Typical workflows

1. Explore with CLI
Use `bluetoothctl` to power on, scan, pair/trust, and connect to other Bluetooth® devices
2. Setup the services (Server) the {gw-prod-name} will advertise.
Use `sdptool` to set up the service profiles (serial port profile) available.
3. Automate with Python (Server)
Script a RFCOMM server using PyBluez.
4. Connect to a remote service (Client)
Script a connection to a RFCOMM server using PyBluez.

Bluetooth® Low Energy (LE)

Note Only the WiFi capable XBee Hive supports Bluetooth® Low Energy (LE) capability natively.

Bluetooth® LE fundamentals

Roles

- **Central**(Client): Scans and connects to peripherals; reads/writes characteristics and subscribes to notifications.
- **Peripheral**(Server): Advertises presence; exposes Generic Attribute Profile (GATT) services/characteristics for centrals to access.

GATT model

- **Service**: Groups related functionality. Each service is identified by a universally unique identifier (UUID).
- **Characteristic**: The actual value(s) you read/write/subscribe to (UUID; properties like `read`, `write`, `notify`).
- **Descriptor**: Metadata/config for a characteristic (e.g., Client Characteristic Configuration Descriptor (CCCD) to enable notifications).

Using Bluetooth® LE on XBee Hive

Tools and libraries

- `bluetoothctl`: Interactive CLI for scanning, pairing, connecting, and simple GATT ops.
- `Bleak` (Python): Cross-platform client library for scans, connect/read/write/notify.
- `Bless` (Python): Pythonic peripheral/GATT server for simple advertising/services.

Tip On multi-adapter systems (e.g., built-in + USB dongle), select a controller explicitly in `bluetoothctl` (`select hci1`) and in your Python code/libraries, if supported.

XBee Hive capabilities at a glance

Capability	Tooling	Notes
Scan for peripherals	<code>bluetoothctl</code> , Bleak	Standard discovery with filters by name/UUID.
Connect as Central/Client	<code>bluetoothctl</code> , Bleak	Read/write, enable notifications.
Host Peripheral/Server	<code>bluetoothctl</code> , Bless	Requires exclusive adapter use. Keep client scanners off while serving.

Typical workflows

1. **Explore with CLI:** Use `bluetoothctl` to power on, scan, pair/trust, and test basic GATT reads/writes.
2. **Automate with Python (Client):** Script a Bleak client to connect to a device, read measurements (e.g., Battery Level), and subscribe to notifications.
3. **Emulate/Expose a service (Peripheral):** Run a Bless server to advertise a custom service/characteristic (e.g., a simple counter) for a mobile app or another central to consume.

Troubleshooting

Connection timeouts

Verify the following:

- Pairing expectations.
- RSSI.
- Correct and current (possibly random) address.

No notifications

Ensure the CCCD is enabled:

- CLI: `notify on`
- Bleak: `start_notify()`

Peripheral conflicts

Stop all scans/clients before starting a Bless server (exclusive adapter use).

Scan returns nothing

- Check the following settings:
 - radio power (`bluetoothctl power on`)
 - `rfkill`
 - proximity
- Keep the target awake/advertising.

Terminology quick reference

- **CCCD**: Client Characteristic Configuration Descriptor: enables notify/indicate.
- **GAP**: Generic Access Profile: discovery, connection, advertising rules.
- **GATT**: Generic Attribute Profile: the data model (services/characteristics/descriptors).
- **UUID**: 16- or 128-bit identifier for services/characteristics.

What's next

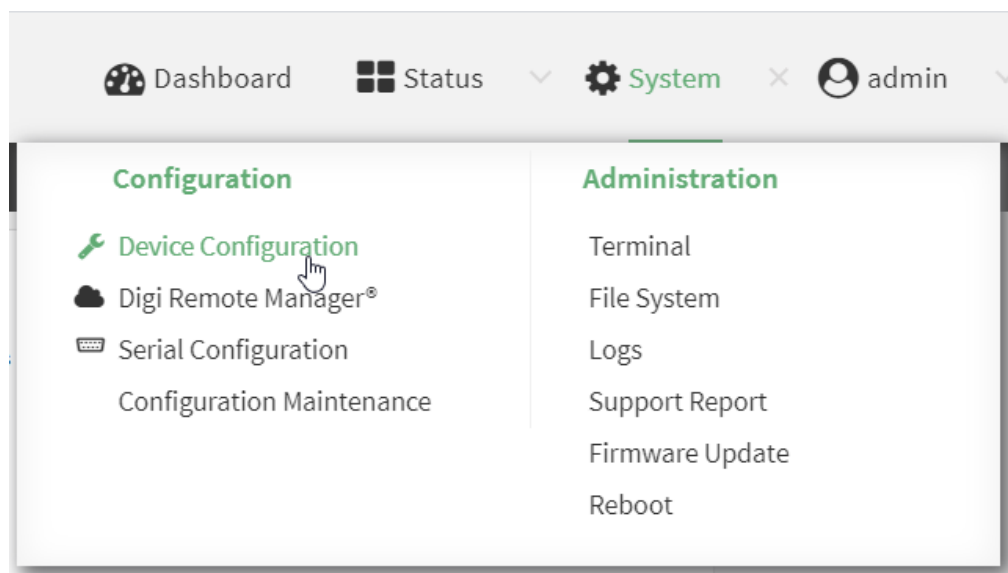
- [CLI](#)
- [Python](#)
- [Examples](#)

Configure Bluetooth Low Energy

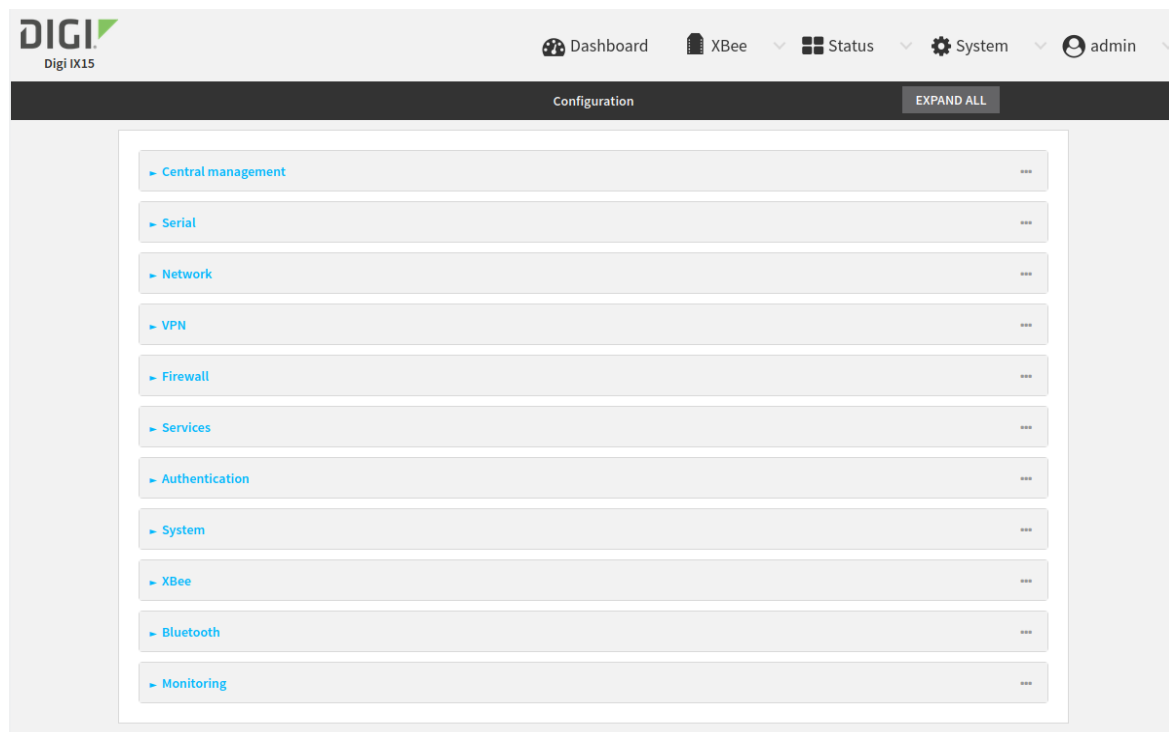
To change the Bluetooth™ Low Energy (LE) configuration:



1. Log into the XBee Hive WebUI as a user with full Admin access rights.
2. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



The **Configuration** window displays.

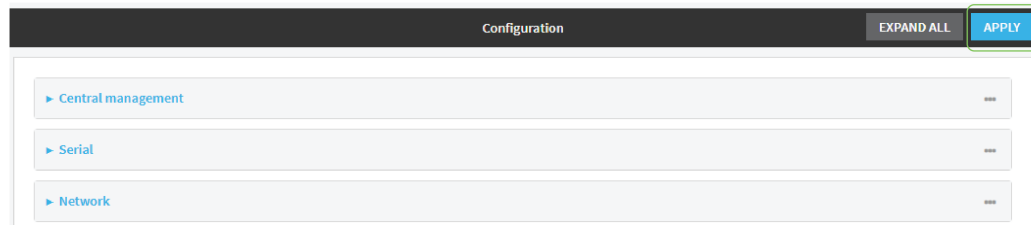


3. Click **Bluetooth** to display the power settings.

4. Click **Enable** to enable Bluetooth Low Energy.
5. For **Bluetooth Low Energy identifier**, type the name for advertising.
6. For **Advertisement power level**, select the output power level to use in Bluetooth™ LE advertisements. The allowed values are:
 - -20 dBm
 - -10 dBm
 - 0 dBm
 - 8 dBm

The default is **8 dBm**.
7. For **Password**, enter the BLE authentication password. This is the password for external applications to establish a Bluetooth™ LE communication.

8. Click **CLI over Bluetooth** to be able to execute CLI commands over Bluetooth™.
9. Click **Apply** to save the configuration and apply the change.



Command line

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Enable Bluetooth™ LE:

```
(config)> bluetooth enable true
```

4. Set the identifier.

```
(config)> bluetooth identifier <id>
```

where **<id>** is the name for Bluetooth™ LE advertisements.

5. Set the advertisement power level:

```
(config)> bluetooth advertisement_power <n>
```

where **<n>** is the power level:

- 0: -20 dBm
- 1: -10 dBm
- 2: 0 dBm
- 3: 8 dBm

The default is **3**.

6. Set the Bluetooth™ LE communication password

```
(config)> bluetooth password <ble_password>
```

where **<ble_password>** is the password to configure.

7. Optionally, you can enable CLI over Bluetooth™.

```
(config)> bluetooth enable_cli true
```

8. Save the configuration and apply the change:

```
(config)> save
Configuration saved.
>
```

9. Type **exit** to exit the Admin CLI.
Depending on your device configuration, you may be presented with an **Access selection** menu. Type **quit** to disconnect from the device.

Using bluetoothctl

Quick start

```
# (Optional) sanity checks outside bluetoothctl
rfkill list          # unblock if necessary: rfkill unblock bluetooth
hciconfig -a         # or: btmgmt info

# Enter bluetoothctl interactive mode
bluetoothctl

# Inside the shell:
list                 # show controllers
select hci0          # pick controller (if multiple)
show                 # verify controller state
power on             # power the radio
agent on             # enable interactive agent for pairing prompts
default-agent        # set as default agent

scan on              # start LE scan
# ... wait for your target to appear, note its MAC and/or name/UUIDs ...
scan off

pair AA:BB:CC:DD:EE:FF # optional; required by some devices
trust AA:BB:CC:DD:EE:FF # optional; allows auto-reconnect
connect AA:BB:CC:DD:EE:FF # establish GATT connection
info AA:BB:CC:DD:EE:FF # summary of services/characteristics
```

Tip If the device uses a resolvable private address, its MAC address may change between scans. Identify the device by **name**, **service UUIDs**, or **advertising data** instead of hard-coding addresses.

Controller basics

Inside `bluetoothctl`:

```
list          # list controllers (hci0, hci1, ...)
select hci0    # select a specific controller
show          # show controller state (powered, discoverable, etc.)
power on/off   # power control
system-alias Hive # optional: set a friendly controller name
```

Scanning and discovery

```
scan on          # start discovery (LE)
# Watch for lines like: Device AA:BB:... MySensor (RSSI: -62) UUIDs: 180F ...
scan off
devices          # list known devices
devices Paired   # paired devices only
devices Trusted  # trusted devices only
```

Tip Keep the following in mind when scanning and discovering devices:

- Keep peripherals **awake/advertising**.
 - Move closer to the device (RSSI closer to 0 is stronger).
 - Filter by advertised **service UUIDs** to avoid targeting the wrong device.
-

Pairing, trusting, connecting

- `pair`: exchanges keys as needed by the device's security requirements.
 - `trust`: marks the device trusted so reconnections can occur without prompts.
 - `connect`: creates a GATT connection to interact with services/characteristics.
-

```
pair AA:BB:CC:DD:EE:FF
# Follow prompts (e.g., "Confirm passkey" / "Enter PIN" / "Y/N")

trust AA:BB:CC:DD:EE:FF
connect AA:BB:CC:DD:EE:FF
info AA:BB:CC:DD:EE:FF
```

Exploring GATT (read/write/notify)

Enter the GATT menu after connecting:

```
menu gatt
list-attributes          # list services/chars/descriptors
# Example attribute path (shortened):
# /org/bluez/hci0/dev_AA_BB_CC_DD_EE_FF/service0012/char0013

select-attribute <ATTR_PATH> # pick a characteristic or descriptor
read                  # read selected characteristic
write 01 00           # write hex bytes (e.g., enable feature)
notify on             # enable notifications (if supported)
# ...observe notifications...
notify off
back
```

Note To subscribe via CLI, you must first **select a characteristic** that supports `notify` or `indicate`, then run `notify on`. Use `list-attributes` to locate the correct characteristic by UUID.

Maintenance and cleanup

```

disconnect AA:BB:CC:DD:EE:FF      # close connection
paired-devices                    # list paired devices
remove AA:BB:CC:DD:EE:FF          # forget device (unpair)
block AA:BB:CC:DD:EE:FF           # optional: blocklist
unblock AA:BB:CC:DD:EE:FF

```

Troubleshooting

Symptom	Action
scan on shows nothing	Ensure power on; check <code>rfkill list</code> and <code>rfkill unblock bluetooth</code> . Keep the peripheral awake/advertising; reduce distance.
connect times out	Verify address (may have changed), move closer (improve RSSI), confirm pairing requirements. Try <code>pair</code> then <code>trust</code> before <code>connect</code> .
Notifications never arrive	In GATT menu, <code>select-attribute</code> the correct characteristic and run <code>notify on</code> . Some devices require writing CCCD explicitly (CLI <code>notify on</code> handles this when supported).
Multiple controllers present	<code>list + select hciN</code> to pick the correct adapter. Ensure only one workflow is using the adapter at a time.
Permissions issues	Use root for bring-up or add the user to the <code>bluetooth</code> group. Confirm <code>bluetoothd</code> is running.

Quick reference

Command	Purpose
<code>power on/off</code>	Power the controller on or off.
<code>agent on/default-agent</code>	Handle pairing prompts.
<code>scan on/off</code>	Start/stop discovery.
<code>pair <MAC>/trust <MAC></code>	Pair & mark trusted MAC addresses.
<code>connect <MAC>/disconnect <MAC></code>	Open/close GATT connection.
<code>info <MAC></code>	Device summary (name, UUIDs, RSSI).
<code>menu gatt-list-attributes</code>	Enumerate services/characters/descriptors.
<code>select-attribute <PATH></code>	Choose a characteristic/descriptor.
<code>read/write <hex...></code>	GATT read/write.
<code>notify on/off</code>	Enable/disable notifications.
<code>paired-devices/remove <MAC></code>	List or forget devices.

Related

- [Overview of BLE on Hive](#)
- [Python](#)
- [Examples](#)

Using Python libraries (Bleak & Bless)

This page covers how to script Bluetooth® Low Energy (LE) on **XBee Hive** using Python. There are two Python libraries you can use:

- **Bleak**: for client/central (scan, connect, read/write, notify).
- **Bless**: for peripheral/server (advertise and host Generic Attribute Profile (GATT)).

Note All examples assume the controller is `hci0` and that you have connectivity confirmed with `bluetoothctl`. If not, see [Using bluetoothctl](#) for information on setting up `bluetoothctl`.

Install (virtual environment)

Use a dedicated virtual environment so system packages remain clean.

```
python3 -m venv /opt/ble-env
source /opt/ble-env/bin/activate
pip install --upgrade pip
pip install --no-cache-dir bleak bless
```

Tip If your build environment is offline, pre-stage wheels for **Bleak** and **Bless** into your image and `pip install /path/to/*.whl`. Keep the venv at `/opt/ble-env` for consistency across docs and examples.

Use Bleak (client/central)

Bleak speaks to BlueZ over D-Bus on Linux. Typical flow:

1. Discover devices.
2. Select device.
3. Connect to selected device.
4. Read/write.
5. (Optional) Subscribe to notifications.

Discover devices

```
# scan_ble_min.py
import asyncio
from bleak import BleakScanner

async def main():
    devices = await BleakScanner.discover(timeout=8.0) # add adapter="hci0" if needed
    for d in devices:
        print(d.address, d.name, (d.metadata or {}).get("uuids", []))
```

```
asyncio.run(main())
```

Tip On systems with multiple adapters, recent Bleak versions support `adapter="hci1"` in `BleakScanner.discover(...)`. If your version does not, ensure your desired controller is the default in BlueZ (`bluetoothctl select hciN`).

Find device by filter (e.g., by service UUID)

```
# scan_ble_filter.py
import asyncio
from bleak import BleakScanner

TARGET_SERVICE = "0000180f-0000-1000-8000-00805f9b34fb" # Battery Service

async def main():
    def match(d, ad):
        uuids = set((d.metadata or {}).get("uuids", []))
        return TARGET_SERVICE in uuids

    device = await BleakScanner.find_device_by_filter(match, timeout=10.0) # add adapter="hci0" if needed
    if not device:
        raise SystemExit("Target not found")
    print("Found:", device.address, device.name)

asyncio.run(main())
```

Connect, read, write, notify (minimal)

For full examples, see <<{XREF_ble-examples_t}>>.

```
# client_min.py
import asyncio
from bleak import BleakClient

ADDRESS = "AA:BB:CC:DD:EE:FF" # or pass a Bleak device object
CHAR_READ = "00002a19-0000-1000-8000-00805f9b34fb" # Battery Level
CHAR_WRITE = "0000fff2-0000-1000-8000-00805f9b34fb" # Example vendor char
CHAR_NOTIFY = "0000fff3-0000-1000-8000-00805f9b34fb" # Example notify char

async def on_notify(_, data: bytearray):
    print("Notify:", data.hex())

async def main():
    async with BleakClient(ADDRESS, timeout=10.0) as client: # BleakClient(..., adapter="hci0") if supported
        print("Connected:", await client.is_connected())

        try:
            val = await client.read_gatt_char(CHAR_READ)
            print("Battery:", int(val[0]), "%")
        except Exception as e:
            print("Read failed:", e)

        try:
            await client.write_gatt_char(CHAR_WRITE, b"\x01\x00", response=True)
            print("Write OK")
        except Exception as e:
```

```

        print("Write failed:", e)

    try:
        await client.start_notify(CHAR_NOTIFY, on_notify)
        await asyncio.sleep(10)
        await client.stop_notify(CHAR_NOTIFY)
    except Exception as e:
        print("Notify failed:", e)

asyncio.run(main())

```

Note Devices that use resolvable private addresses may appear under a different MAC on every scan. Connect via the device object obtained from discovery rather than a hardcoded address whenever possible.

Use Bless (peripheral/server)

Bless lets you advertise and host a GATT service.

The peripheral role typically requires exclusive control of the adapter (stop all scans/clients first).

WARNING! Depending on your image, BlueZ's experimental interfaces may be required for GATT server/advertising management. If Bless fails to register services or advertise:



1. Enable BlueZ experimental features and use one of the following solutions:

- Go to `/etc/bluetooth/main.conf`, and under `[General]`, add `Experimental = true`
- Run `bluetoothd` with `-E` (systemd override).

2. Restart the Bluetooth service.

Performing this operation *will* break any Bluetooth Classic services.

Set up a minimal Bless server

```

# bless_min.py
import asyncio, os
from bless import (BlessServer, BlessGATTService, BlessGATTCharacteristic,
                  GATTCharacteristicProperties, GATTAttributePermissions)

SERVICE_UUID = "12345678-1234-5678-1234-56789abc0000"
CHAR_UUID = "12345678-1234-5678-1234-56789abc0001"

async def main():
    server = BlessServer(name=os.getenv("BLE_NAME", "XBee-Hive-BLE-Demo"))
    svc = BlessGATTService(SERVICE_UUID)
    char = BlessGATTCharacteristic(
        CHAR_UUID,
        properties=GATTCharacteristicProperties.read | GATTCharacteristicProperties.notify,
        permissions=GATTAttributePermissions.readable
    )
    char.value = bytearray(b"00")
    svc.add_characteristic(char)
    server.add_service(svc)

```

```

await server.start()
print("Advertising as:", server.name)
i = 0
try:
    while True:
        char.value = bytearray(f"{i:02d}".encode())
        await server.notify_subscribers(char)
        await asyncio.sleep(1)
        i = (i + 1) % 100
finally:
    await server.stop()

if __name__ == "__main__":
    asyncio.run(main())

```

Stop conflicting users

Before starting Bless, stop scans and client apps.

If you used the CLI:

```

# inside bluetoothctl
scan off
disconnect AA:BB:CC:DD:EE:FF
quit

```

Troubleshooting (Python-specific)

Symptom	Resolution
<code>org.bluez</code> not found / DBus errors	Ensure <code>bluetoothd</code> is running. Confirm <code>dbus-daemon</code> is present. Reboot or restart <code>bluetooth</code> service.
Failed to register application (Bless)	Enable BlueZ experimental mode (<code>-E</code> or <code>Experimental=true</code>) and restart the service. Ensure no other process is using the adapter.
Cannot find device after a while	Device may use a resolvable private address . Re-discover and connect via the device object (Bleak's <code>find_device_by_filter</code>), not a fixed MAC.
Notifications never arrive	Subscribe to the correct characteristic UUID. Verify the peripheral supports <code>notify</code> and that CCCD is set (Bleak <code>start_notify</code> handles CCCD write).
Multiple adapters present	Use <code>adapter="hciN"</code> (if your Bleak version supports it) or set the desired controller as default in BlueZ (<code>bluetoothctl select</code>).
Permissions / capabilities	Use root for bring-up or add your user to the <code>bluetooth</code> group. For services, consider capability bounding or run under a dedicated service account.

File layout (recommended)

Path	Purpose
/opt/ble-env/	Python virtual environment (Bleak/Bless).
/usr/share/hive/examples/ble/	Read-only example scripts installed with the image.
/opt/hive-ble/	Writable app directory for your project and service unit.

See also

- [Overview of BLE on Hive](#)
- [CLI](#)
- [Examples](#)

Bluetooth® Low Energy (LE) Examples

Two copy-paste Python examples you can run on XBee Hive:

1. A **Bleak client** that discovers a device, connects, reads a characteristic, and (optionally) subscribes to notifications.
2. A **Bless peripheral** that advertises a simple GATT service and pushes a counter every second.

Note Many peripherals use **resolvable private addresses** (MAC changes between scans). Discover by **name** or **service UUID** over hard-coded MACs whenever possible.

Example 1: Bleak client

This script:

1. Discovers a target device by **service UUID** or **name** (or uses a fixed address if you provide one).
2. Connects and reads Battery Level (UUID 0x2A19) by default.
3. (Optional) Subscribes to a notification characteristic if you provide a UUID.

You can configure it via environment variables. See [Run](#) below for more information.

```
# file: ble_client_demo.py
import asyncio, os, sys
from bleak import BleakScanner, BleakClient

# Configuration via environment variables
ADAPTER = os.getenv("BLE_ADAPTER")          # e.g., "hci0" or "hci1" (optional; depends on Bleak
version)
ADDRESS = os.getenv("BLE_DEVICE_ADDRESS")    # fixed MAC if you have one
TARGET_NAME = os.getenv("BLE_TARGET_NAME")   # preferred: match by name
TARGET_SERVICE = os.getenv("BLE_TARGET_SERVICE") # or match by service UUID
CHAR_READ = os.getenv("BLE_CHAR_READ", "00002a19-0000-1000-8000-00805f9b34fb") # Battery
Level
```

```

CHAR_NOTIFY = os.getenv("BLE_CHAR_NOTIFY")    # e.g., vendor notify UUID

def log(*a): print("[ble-client]", *a)

async def discover_target():
    if ADDRESS:
        log("Using fixed address:", ADDRESS)
        return ADDRESS

    log("Scanning for target (8s)...")
    def _match(device, ad_data):
        if TARGET_SERVICE:
            uuids = set((device.metadata or {}).get("uuids", []))
            return TARGET_SERVICE.lower() in {u.lower() for u in uuids}
        if TARGET_NAME:
            return (device.name or "").strip() == TARGET_NAME
        return False

    # Bleak supports adapter="hciN" on newer versions; pass only if set
    kwargs = {"timeout": 8.0}
    if ADAPTER:
        kwargs["adapter"] = ADAPTER

    if TARGET_SERVICE or TARGET_NAME:
        device = await BleakScanner.find_device_by_filter(_match, **kwargs)
        if not device:
            raise RuntimeError("Target not found by filter (name/service).")
        log("Found:", device.address, device.name)
        return device
    else:
        raise RuntimeError("Set BLE_TARGET_NAME or BLE_TARGET_SERVICE or BLE_DEVICE_ADDRESS")

async def main():
    target = await discover_target()
    client_kwargs = {"timeout": 15.0}
    if ADAPTER:
        client_kwargs["adapter"] = ADAPTER

    async with BleakClient(target, **client_kwargs) as client:
        connected = await client.is_connected()
        log("Connected:", connected)
        if not connected:
            raise RuntimeError("Connection failed")

        # Read a characteristic (Battery Level by default)
        try:
            val = await client.read_gatt_char(CHAR_READ)
            if len(val) == 1:
                log(f"Read {CHAR_READ}: {int(val[0])}%")
            else:
                log(f"Read {CHAR_READ}: 0x{val.hex()}")
        except Exception as e:
            log("Read failed:", e)

        # Optional: subscribe to notifications
        if CHAR_NOTIFY:
            async def on_notify(_, data: bytearray):
                log("Notify", CHAR_NOTIFY, f"len={len(data)} hex={data.hex()}")

```

```

        try:
            await client.start_notify(CHAR_NOTIFY, on_notify)
            log("Subscribed; listening for 10s...")
            await asyncio.sleep(10)
            await client.stop_notify(CHAR_NOTIFY)
            log("Unsubscribed")
        except Exception as e:
            log("Notify failed:", e)

if __name__ == "__main__":
    try:
        asyncio.run(main())
    except KeyboardInterrupt:
        sys.exit(130)
    except Exception as e:
        log("Error:", e)
        sys.exit(1)

```

Run

- By service UUID (recommended for resolvable private addresses):

```

source /opt/ble-env/bin/activate
export BLE_TARGET_SERVICE="0000180f-0000-1000-8000-00805f9b34fb" # Battery Service, as
an example
python3 ble_client_demo.py

```

Pick one of the following discovery modes:

- By fixed address (MAC):

```

source /opt/ble-env/bin/activate
export BLE_DEVICE_ADDRESS="AA:BB:CC:DD:EE:FF"
python3 ble_client_demo.py

```

- By exact device name:

```

source /opt/ble-env/bin/activate
export BLE_TARGET_NAME="MySensor"
python3 ble_client_demo.py

```

Optional parameters

- If your Bleak build supports adapter selection:

```

export BLE_ADAPTER="hci0"

```

- To subscribe to notifications (if your peripheral has a notify char):

```

export BLE_CHAR_NOTIFY="0000fff3-0000-1000-8000-00805f9b34fb"

```

Expected output (example)

```

[ble-client] Scanning for target (8s)...
[ble-client] Found: AA:BB:CC:DD:EE:FF MySensor

```

```
[ble-client] Connected: True
[ble-client] Read 00002a19-0000-1000-8000-00805f9b34fb: 87%
[ble-client] Subscribed; listening for 10s...
[ble-client] Notify 0000fff3-0000-1000-8000-00805f9b34fb len=3 hex=01a503
[ble-client] Unsubscribed
```

Clean up

If you paired during testing and want to remove the bond:

```
# inside bluetoothctl
paired-devices
remove AA:BB:CC:DD:EE:FF
```

Example 2: Bless peripheral

This script hosts one custom service with one readable/notify characteristic. It updates the value every second and notifies subscribers.



WARNING! Peripheral mode usually requires **exclusive control** of the adapter. Stop all scans/clients first. Some images require BlueZ **experimental** mode for GATT server/advertising (enable via `bluetoothd -E` or `Experimental=true` in `main.conf` and restart the service).

```
# file: bless_counter_demo.py
import asyncio, os
from bless import (BlessServer, BlessGATTService, BlessGATTCharacteristic,
                  GATTCharacteristicProperties, GATTAttributePermissions)

SERVICE_UUID = os.getenv("BLE_SERVICE_UUID", "12345678-1234-5678-1234-56789abc0000")
CHAR_UUID = os.getenv("BLE_CHAR_UUID", "12345678-1234-5678-1234-56789abc0001")
DEVICE_NAME = os.getenv("BLE_NAME", "XBee-Hive-BLE-Demo")

async def main():
    server = BlessServer(name=DEVICE_NAME)

    svc = BlessGATTService(SERVICE_UUID)
    char = BlessGATTCharacteristic(
        CHAR_UUID,
        properties=GATTCharacteristicProperties.read | GATTCharacteristicProperties.notify,
        permissions=GATTAttributePermissions.readable
    )
    char.value = bytearray(b"00")
    svc.add_characteristic(char)
    server.add_service(svc)

    await server.start()
    print(f"[bless] Advertising as: {DEVICE_NAME}")
    i = 0
    try:
        while True:
            payload = f"{i:02d}".encode()
            char.value = bytearray(payload)
            await server.notify_subscribers(char)
            await asyncio.sleep(1)
```

```

        i = (i + 1) % 100
    except KeyboardInterrupt:
        pass
    finally:
        await server.stop()
        print("[bless] Stopped")

if __name__ == "__main__":
    asyncio.run(main())

```

Run

```

source /opt/ble-env/bin/activate
export BLE_NAME="XBee-Hive-BLE-Demo"
python3 bless_counter_demo.py

```

Verify from another central (CLI)

From a second machine or after stopping the server's scans/clients:

[source]

```

bluetoothctl
scan on
# find "XBee-Hive-BLE-Demo"; note its MAC
scan off
connect AA:BB:CC:DD:EE:FF
menu gatt
list-attributes
# select the characteristic matching CHAR_UUID shown above
select-attribute /org/bluez/hci0/dev_AA_BB_CC_DD_EE_FF/serviceXXXX/charYYYY
notify on
# observe the counter value changing each second
notify off
back
disconnect AA:BB:CC:DD:EE:FF

```

Expected output (server side)

```

[bless] Advertising as: XBee-Hive-BLE-Demo
# (no output until a client subscribes)
# once subscribed, notifications are sent every second

```

Common issues (examples)

Symptom	Action
Client can't find device by address	The device may use a resolvable private address . If so, switch to discovery by <code>BLE_TARGET_SERVICE</code> or <code>BLE_TARGET_NAME</code>
Bless fails to register/advertise	Enable BlueZ experimental features and restart <code>bluetooth</code> service. Ensure no other process is using the adapter.
Notifications not	Confirm the characteristic supports <code>notify</code> and the client actually called

Symptom	Action
received	<code>start_notify</code> or <code>notify on</code> (CLI). Check <code>CCCD</code> is set.
Busy adapter / conflicts	Stop <code>scan on</code> in <code>bluetoothctl</code> , disconnect active clients, and retry.

See also

- [Overview of BLE on Hive](#)
- [CLI](#)
- [Python](#)

Interfaces

Digi XBee Hive Gateway devices have several physical communications interfaces. These interfaces can be bridged in a Local Area Network (LAN) or assigned to a Wide Area Network (WAN).

This chapter contains the following topics:

Wireless Wide Area Networks (WWANs)	113
Local Area Networks (LANs)	189
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Show SureLink status and statistics	224

Wireless Wide Area Networks (WWANs)

A Wireless Wide Area Network (WWAN) provides connectivity to the internet or a remote network through a cellular connection. A WWAN configuration consists of the following:

- A cellular modem.
- Several networking parameters for the WAN, such as firewall configuration and IPv4 and IPv6 support.
- Several parameters controlling failover.

Configure SureLink active recovery to detect modem failures

Problems can occur beyond the immediate modem connection that prevent some IP traffic from reaching its destination. Normally this kind of problem does not cause the XBee Hive device to detect that the modem has failed, because the connection continues to work while the core problem exists somewhere else in the network.

Using Digi SureLink, you can configure the XBee Hive device to regularly probe connections through the modem to determine if the modem connection has failed.

Required configuration items

- By default, SureLink is enabled for the preconfigured **Modem** interface. The default configuration tests the DNS servers configured for the interface.

When SureLink is configured for Wireless WANs, SureLink tests are only run if the cellular modem is connected and has an IP address. Use the **SIM failover** options to configure the XBee Hive device to automatically recover the modem in the event that it cannot obtain an IP address. See [Configure a Wireless Wide Area Network \(WWAN\)](#) for details about **SIM failover**.

- The type of tests to be performed:
 - **Ping test:** Uses ICMP to determine connectivity. The default behavior is to ping the interface gateway, which means that an initial traceroute is sent to the hostname or IP address configured in the SureLink advanced settings, and then the first hop in that route is used for the ping test.
 - **DNS test:** Performs a DNS query to the named DNS server.
 - **HTTP test:** Uses HTTP(s) GET requests to determine connectivity to the configured web server.
 - **Test DNS servers configured for this interface:** Tests communication with DNS servers that are either provided by DHCP, or statically configured for this interface.
 - **Test the interface status:** Tests the current status of the interface. The test fails if the interface is down. Failing this test infers that all other tests fail.
 - **Custom test:** Tests the interface with custom commands.
 - **TCP connection test:** Tests that the interface can reach a destination port on the configured host.
 - **Test another interface's status:** Tests the status of another interface.
- The actions to take to recover connectivity in the event of failed tests:
 - **Change default gateway:** Increases the interface's metric to change the default gateway. This recovery action is enabled by default for the preconfigured

WWAN interface.

- **Restart interface** This recovery action is enabled by default for the preconfigured WWAN interface.
- **Reset modem:** This recovery action is enabled by default for the preconfigured WWAN interface.
- **Switch to alternate SIM:** Switches to an alternate SIM. This recovery action is enabled by default for the preconfigured WWAN interface.
- **Reboot device.**
- Execute custom **Recovery commands.**
- **Powercycle the modem.** This recovery action is enabled by default for the preconfigured WWAN interface.
- Two options also apply to every type of action:
 - **SureLink test failures:** The number of failures for this recovery action to perform, before moving to the next recovery action.
 - **Override wait interval before performing the next recovery action:** The time to wait before the next test is run. If set to the default value of **0s**, the **Test interval** is used.

Additional configuration items

- The behavior of the XBee Hive device upon test failure:
 - The default behavior, which is to restart the **Modem** interface.
 - SIM switching (also enabled by default).
 - Reset the modem.
 - Reboot the device.
- The interval between connectivity tests.
- The number of probe failures before the Modem interface is considered to have failed.
- The amount of time that the device should wait for a response to a probe attempt before considering it to have failed.
- If the type of probe test is:
 - Ping: Configure the number of bytes in the ping packet.
 - Interface status: Configure the amount of time that the interface is down before it is considered to have failed, and the amount of time it takes to make an initial connection before it is considered down.
- Additional test targets.
- If more than one test target is configured, determine whether the interface should fail over based on the failure of one of the test targets, or all of the test targets.

Order of precedence for SureLink actions

SureLink recovery actions are performed in the order that they are configured. As a result, if you include the **Reboot Device** with other SureLink recovery actions, it should be the last action in the recovery action list. Otherwise, the device will reboot and all recovery actions listed after the **Reboot Device** action will be ignored.

To configure the XBee Hive device to regularly probe connections through the WWAN:



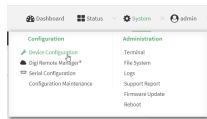
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

Remote Manager:

- a. Locate your device as described in [Use Digi Remote Manager to view and manage your device](#).
- b. Click the **Device ID**.
- c. Click **Settings**.
- d. Click to expand **Config**.

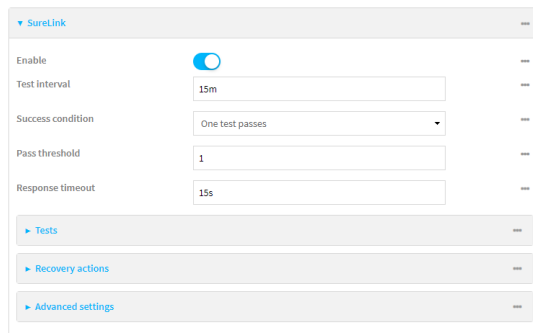
Local Web UI:

- a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



The **Configuration** window is displayed.

3. Click **Network > Interfaces**.
4. Create a new WWAN or select an existing one:
 - To create a new WWAN, see [Configure a Wireless Wide Area Network \(WWAN\)](#).
 - To edit an existing WWAN, click to expand the appropriate WWAN.
5. After creating or selecting the WWAN, click **SureLink**.



6. (Optional) Change the **Test interval** between connectivity tests.
 Allowed values are any number of weeks, days, hours, minutes, or seconds, and take the format **number{w|d|h|m|s}**.
 For example, to set **Interval** to ten minutes, enter **10m** or **600s**.
 The default is 15 minutes.
7. (Optional) If more than one test target is configured, for **Success condition**, select either:
 - **One test passes**: Only one test needs to pass for Surelink to consider an interface to be up.
 - **All test pass**: All tests need to pass for SureLink to consider the interface to be up.

8. (Optional) For **Pass threshold**, type or select the number of times that the test must pass after failure, before the interface is determined to be working and is reinstated.
9. (Optional) For **Response timeout**, type the amount of time that the device should wait for a response to a test failure before considering it to have failed.

Allowed values are any number of weeks, days, hours, minutes, or seconds, and take the format **number{w|d|h|m|s}**.

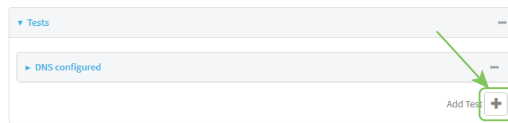
For example, to set **Response timeout** to ten minutes, enter **10m** or **600s**.

The default is 15 seconds.

10. Click to expand **Tests**.

By default, **Test DNS servers configured for this interface** is automatically configured and enabled. This test communication with DNS servers that are either provided by DHCP, or statically configured for this interface.

- a. Click 



New tests are enabled by default. To disable, click to toggle off **Enable**.

- b. Type a **Label** for the test.
- c. Click to toggle on **IPv6** if the test should apply to both IPv6 rather than IPv4.
- d. Select the **Test type**.

Available test types:

- **Ping test:** Uses ICMP to determine connectivity.

If **Ping test** is selected, complete the following:

- **Ping target:** The type of target for the ping, one of:
 - **Hostname or IP address** of an external server.
 - **Ping host:** hostname or IP address of the server.
 - The **Interface gateway**. If **Interface gateway** is selected, an initial traceroute is sent to the hostname or IP address configured in the SureLink advanced settings, and then the first hop in that route is used for the ping test.
 - The **Interface address**.
 - The **Interface DNS** server.

- **Ping payload size:** The number of bytes to send as part of the ping payload.

- **DNS test:** Performs a DNS query to the named DNS server.

If **DNS test** is selected, complete the following:

- **DNS server:** The IP address of the DNS server.

- **HTTP test:** Uses HTTP(s) GET requests to determine connectivity to the configured web server.

If **HTTP test** is selected, complete the following:

- **Web server:** The URL of the web server.

- **Test DNS servers configured for this interface:** Tests communication with DNS servers that are either provided by DHCP, or statically configured for this interface.
- **Test the interface status:** Tests the current status of the interface. The test fails if the interface is down. Failing this test infers that all other tests fail.

If **Test the interface status** is selected, complete the following:

- **Down time:** The amount of time that the interface is down before the test can be considered to have failed.

Allowed values are any number of weeks, days, hours, minutes, or seconds, and take the format *number{w|d|h|m|s}*.

For example, to set **Down time** to ten minutes, enter **10m** or **600s**.

- **Initial connection time:** The amount of time to wait for the interface to connect for the first time before the test is considered to have failed.

Allowed values are any number of weeks, days, hours, minutes, or seconds, and take the format *number{w|d|h|m|s}*.

For example, to set **Initial connection time** to ten minutes, enter **10m** or **600s**.

- **Custom test:** Tests the interface with custom commands.

If **Custom test** is selected, complete the following:

- The **Commands to run to test**.

- **TCP connection test:** Tests that the interface can reach a destination port on the configured host.

If **TCP connection test** is selected, complete the following:

- **TCP connect host:** The hostname or IP address of the host to create a TCP connection to.
- **TCP connect port:** The TCP port to create a TCP connection to.

- **Test another interface's status:** Tests the status of another interface.

If **Test another interface's status** is selected, complete the following:

- **Test interface:** The interface to test.
- **IP version:** The type of IP connection, one of:
 - **Any:** Either the IPv4 or IPv6 connection must be up.
 - **Both:** Both the IPv4 or IPv6 connection must be up.
 - **IPv4:** The IPv4 connection must be up.
 - **IPv6:** The IPv6 connection must be up.
- **Expected status:** The status required for the test to pass.
 - **Up:** The test will pass only if the referenced interface is up and passing its own SureLink tests (if applicable).
 - **Down:** The test will pass only if the referenced interface is down or failing its own SureLink tests (if applicable).

e. Repeat for each additional test.

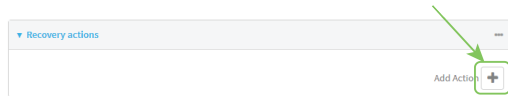
11. Add recovery actions:

- a. Click to expand **Recovery actions**.

By default, there are two preconfigured recovery actions:

- **Update routing**: Uses the **Change default gateway** action, which increases the interface's metric by 100 to change the default gateway.
- **Restart interface**.

- b. Click 



New recovery actions are enabled by default. To disable, click to toggle off **Enable**.

- c. Type a **Label** for the recovery action.
- d. For **Recovery type**, select **Reboot device**.
- e. For **Recovery type**, select the type of recovery action. If multiple recovery actions are configured, they are performed in the order that they are listed.
 - **Change default gateway**: Increases the interface's metric to change the default gateway.

If **Change default gateway** is selected, complete the following:

 - **SureLink test failures**: The number of failures for this recovery action to perform, before moving to the next recovery action.
 - **Increase metric to change active default gateway**: Increase the interface's metric by this amount. This should be set to a number large enough to change the routing table to use another default gateway. The default is **100**.
 - **Override wait interval before performing the next recovery action**: The time to wait before the next test is run. If set to the default value of **0s**, the **Test interval** is used.
 - **Restart interface**.

If **Restart interface** is selected, complete the following:

 - **SureLink test failures**: The number of failures for this recovery action to perform, before moving to the next recovery action.
 - **Override wait interval before performing the next recovery action**: The time to wait before the next test is run. If set to the default value of **0s**, the **Test interval** is used.
 - **Reset modem**: This recovery action is available for WWAN interfaces only.

If **Reset modem** is selected, complete the following:

 - **SureLink test failures**: The number of failures for this recovery action to perform, before moving to the next recovery action.
 - **Override wait interval before performing the next recovery action**: The time to wait before the next test is run. If set to the default value of **0s**, the **Test interval** is used.

- **Switch to alternate SIM:** Switches to an alternate SIM. This recovery action is available for WWAN interfaces only.

If **Switch to alternate SIM** is selected, complete the following:

- **SureLink test failures:** The number of failures for this recovery action to perform, before moving to the next recovery action.
- **Override wait interval before performing the next recovery action:** The time to wait before the next test is run. If set to the default value of **0s**, the **Test interval** is used.

- **Reboot device.**

If **Reboot device** is selected, complete the following:

- **SureLink test failures:** The number of failures for this recovery action to perform, before moving to the next recovery action.
- **Override wait interval before performing the next recovery action:** The time to wait before the next test is run. If set to the default value of **0s**, the **Test interval** is used.

- **Execute custom Recovery commands.**

If **Recovery commands** is selected, complete the following:

- **SureLink test failures:** The number of failures for this recovery action to perform, before moving to the next recovery action.
- The **Commands to run to recovery connectivity**.
- **Override wait interval before performing the next recovery action:** The time to wait before the next test is run. If set to the default value of **0s**, the **Test interval** is used.

- **Switch eSIM profile** for carrier profile connectivity issue detection and alternate carrier profile selection to help maintain cellular service. For more information, [see Configure SureLink to switch eSIM profiles](#) in the Cellular documentation portal.

If **Switch eSIM profile** is selected, complete the following:

- **Label**, type a word or phrase to identify the action. For example, *Repower modem - eSIM*.
- **Recovery type**, select **Switch eSIM profile**.

- **Powercycle the modem.** This recovery action is available for WWAN interfaces only.

If **Powercycle the modem** is selected, complete the following:

- **SureLink test failures:** The number of failures for this recovery action to perform, before moving to the next recovery action.
- **Override wait interval before performing the next recovery action:** The time to wait before the next test is run. If set to the default value of **0s**, the **Test interval** is used.

f. Repeat for each additional recovery action.

12. (Optional) Configure advanced SureLink parameters:

- a. Click to expand **Advanced settings**.
 - b. For **Delayed Start**, type the amount of time to wait while the device is starting before SureLink testing begins. This setting is bypassed when the interface is determined to be up.
 Allowed values are any number of weeks, days, hours, minutes, or seconds, and take the format **number{w|d|h|m|s}**.
 For example, to set **Delayed start** to ten minutes, enter **10m** or **600s**.
 The default is 300 seconds.
 - c. For **Backoff interval**, type the time to add to the test interval when restarting the list of actions. This option is capped at 15 minutes.
 Allowed values are any number of weeks, days, hours, minutes, or seconds, and take the format **number{w|d|h|m|s}**.
 For example, to set **Backoff interval** to ten minutes, enter **10m** or **600s**.
 The default is 300 seconds.
 - d. **Test interface gateway by pinging** is used by the **Interface gateway Ping test** as the endpoint for traceroute to use to determine the interface gateway. The default is 8.8.8.8, and should only be changed if this IP address is not accessible due to networking issues.
13. Click **Apply** to save the configuration and apply the change.

Command line

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
 Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Create a new WWAN, or edit an existing one:
 - To create a new WWAN, see [Configure a Wireless Wide Area Network \(WWAN\)](#).
 - To edit an existing WWAN, change to the WWAN's node in the configuration schema. For example, for a WWAN named **my_wwan**, change to the **my_wwan** node in the configuration schema:

```
(config)> network interface my_wwan
(config network interface my_wwan)>
```

4. Enable SureLink.
 By default, SureLink is enabled for the preconfigured WWAN (modem xbee_cellular).

```
(config network interface my_wwan)> surelink enable true
(config network interface my_wwan)>
```

5. By default, the **Test DNS servers configured for this interface** test is automatically configured and enabled. This tests communication with DNS servers that are either provided by DHCP, or statically configured for this interface.

To add additional tests:

- a. Add a test:

```
(config network interface my_wwan)> add surelink tests end
(config network interface my_wwan surelink tests 1)>
```

- b. New tests are enabled by default. To disable:

```
(config network interface my_wwan surelink tests 1)> enable false
(config network interface my_wwan surelink tests 1)>
```

- c. Create a label for the test:

```
(config network interface my_wwan surelink tests 1)> label string
(config network interface my_wwan surelink tests 1)>
```

- d. if the test should apply to both IPv6 rather than IPv4, enable IPv6:

```
(config network interface my_wwan surelink tests 1)> ipv6 true
(config network interface my_wwan surelink tests 1)>
```

- e. Set the test type:

```
(config network interface my_wwan surelink tests 1)> test value
(config network interface my_wwan surelink tests 1)>
```

where *value* is one of:

- **ping**: Uses ICMP to determine connectivity.

If **ping** is selected, complete the following:

- Set the **ping_method**:

```
(config network interface my_wwan surelink tests 1)> ping_method value
(config network interface my_wwan surelink tests 1)>
```

where *value* is one of:

- **hostname**: The hostname or IP address of an external server.

- Set **ping_host** to the hostname or IP address of the server:

```
(config network interface my_wwan surelink tests 1)> ping_host hostname/IP_  
address  
(config network interface my_wwan surelink tests 1)>
```

- **interface_gateway**. If set, an initial traceroute is sent to the hostname or IP address configured in the SureLink advanced settings, and then the first hop in that route is used for the ping test.

- **interface_address**.

- **interface_dns**: The interface's DNS server.

- Set the number of bytes to send as part of the ping payload:

```
(config network interface my_wwan ipsec tunnel ipsec_example surelink tests 1)>
ping_size int
(config network interface my_wwan surelink tests 1)>
```

- **dns**: Performs a DNS query to the named DNS server.

If **dns** is set, set the IPv4 or IPv6 address of the DNS server:

```
(config network interface my_wwan surelink tests 1)> dns_server IP_address
(config network interface my_wwan surelink tests 1)>
```

- **http**: Uses HTTP(s) GET requests to determine connectivity to the configured web server.

If **http** is set, set the URL of the web server.

```
(config network interface my_wwan surelink tests 1)> http url
(config network interface my_wwan surelink tests 1)>
```

- **dns_configured**: Tests communication with DNS servers that are either provided by DHCP, or statically configured for this interface.
- **interface_up**: Tests the current status of the interface. The test fails if the interface is down. Failing this test infers that all other tests fail.

If **interface_up** is set, complete the following:

- Set the amount of time that the interface is down before the test can be considered to have failed.

```
(config network interface my_wwan surelink tests 1)> interface_down_time value
(config network interface my_wwan surelink tests 1)>
```

where *value* is any number of weeks, days, hours, minutes, or seconds, and takes the format ***number*{w|d|h|m|s}**.

For example, to set **interface_down_time** to ten minutes, enter either **10m** or **600s**:

```
(config network interface my_wwan surelink tests 1)> interface_down_time 600s
(config)>
```

- Set the amount of time to wait for the interface to connect for the first time before the test is considered to have failed.

```
(config network interface my_wwan surelink tests 1)> interface_timeout value
(config network interface my_wwan surelink tests 1)>
```

where *value* is any number of weeks, days, hours, minutes, or seconds, and takes the format ***number*{w|d|h|m|s}**.

For example, to set **interface_timeout** to ten minutes, enter either **10m** or **600s**:

```
(config network interface my_wwan surelink tests 1)> interface_timeout 600s
(config)>
```

- **custom_test:** Tests the interface with custom commands.

If **custom_test** is set, set the commands to run to perform the test:

```
(config network interface my_wwan surelink tests 1)> custom_test_commands "string"
(config network interface my_wwan surelink tests 1)>
```

- **tcp_connection:** Tests that the interface can reach a destination port on the configured host.

If **tcp_connection** is selected, complete the following:

- Set the hostname or IP address of the host to create a TCP connection to:

```
(config network interface my_wwan surelink tests 1)> tcp_host hostname/IP_
address
(config network interface my_wwan surelink tests 1)>
```

- Set the TCP port to create a TCP connection to.

```
(config network interface my_wwan surelink tests 1)> tcp_port port
(config network interface my_wwan surelink tests 1)>
```

- **other:** Tests the status of another interface.

If **other** is selected, complete the following:

- Set the interface to test.
 - Use the **?** to determine available interfaces:
 - Set the interface. For example:

```
(config network interface my_wwan surelink tests 1)> other_interface
/network/interface/eth1
(config network interface my_wwan surelink tests 1)>
```

- Set the type of IP connection:

```
(config network interface my_wwan surelink tests 1)> other_ip_version value
(config network interface my_wwan surelink tests 1)>
```

where *value* is one of:

- **any:** Either the IPv4 or IPv6 connection must be up.
- **both:** Both the IPv4 or IPv6 connection must be up.
- **ipv4** The IPv4 connection must be up.
- **ipv6:** The IPv6 connection must be up.
- The status required for the test to pass.

```
(config network interface my_wwan surelink tests 1)> other_status value
(config network interface my_wwan surelink tests 1)>
```

where *value* is one of:

- **up**: The test will pass only if the referenced interface is up and passing its own SureLink tests (if applicable).
- **down**: The test will pass only if the referenced interface is down or failing its own SureLink tests (if applicable).

f. Repeat for each additional test.

6. Add recovery actions:

a. Type ... to return to the root of the configuration:

```
(config network interface my_wwan surelink tests 1)> ...
(config)>
```

b. Add a recovery action:

```
(config)> add network interface my_wwan surelink actions end
(config network interface my_wwan surelink actions 0)>
```

c. New actions are enabled by default. To disable:

```
(config network interface my_wwan surelink actions 0)> enable false
(config network interface my_wwan surelink actions 0)>
```

d. Create a label for the action:

```
(config network interface my_wwan surelink actions 0)> label string
(config network interface my_wwan surelink actions 0)>
```

e. Set the type of recovery action. If multiple recovery actions are configured, they are performed in the order that they are listed.

```
(config network interface my_wwan surelink actions 0)> modem_action value
(config network interface my_wwan surelink actions 0)>
```

where *value* is one of:

- **update_routing_table**: Increases the interface's metric to change the default gateway.

If **update_routing_table** is selected, complete the following:

- Set the number of failures for this recovery action to perform, before moving to the next recovery action:

```
(config network interface my_wwan surelink actions 0)> test_failures int
(config network interface my_wwan surelink actions 0)>
```

The default is **3**.

- Set the amount that the interface's metric should be increased. This should be set to a number large enough to change the routing table to use another default gateway.

```
(config network interface my_wwan surelink actions 0)> metric_adjustment_modem
int
(config network interface my_wwan surelink actions 0)>
```

The default is **100**.

- Set the time to wait before the next test is run. If set to the default value of **0s**, the test interval is used.

```
(config network interface my_wwan surelink actions 0)> override_interval int
(config network interface my_wwan surelink actions 0)>
```

■ **restart_interface.**

If **restart_interface** is selected, complete the following:

- Set the number of failures for this recovery action to perform, before moving to the next recovery action:

```
(config network interface my_wwan surelink actions 0)> test_failures int
(config network interface my_wwan surelink actions 0)>
```

The default is **3**.

- Set the time to wait before the next test is run. If set to the default value of **0s**, the test interval is used.

```
(config network interface my_wwan surelink actions 0)> override_interval int
(config network interface my_wwan surelink actions 0)>
```

■ **reset_modem.**

If **reset_modem** is selected, complete the following:

- Set the number of failures for this recovery action to perform, before moving to the next recovery action:

```
(config network interface my_wwan surelink actions 0)> test_failures int
(config network interface my_wwan surelink actions 0)>
```

The default is **3**.

- Set the time to wait before the next test is run. If set to the default value of **0s**, the test interval is used.

```
(config network interface my_wwan surelink actions 0)> override_interval int
(config network interface my_wwan surelink actions 0)>
```

■ **switch_sim:** Switches to an alternate SIM.

If **switch_sim** is selected, complete the following:

- Set the number of failures for this recovery action to perform, before moving to the next recovery action:

```
(config network interface my_wwan surelink actions 0)> test_failures int
(config network interface my_wwan surelink actions 0)>
```

The default is **3**.

- Set the time to wait before the next test is run. If set to the default value of **0s**, the test interval is used.

```
(config network interface my_wwan surelink actions 0)> override_interval int
(config network interface my_wwan surelink actions 0)>
```

■ **modem_power_cycle.**

If **modem_power_cycle** is selected, complete the following:

- Set the number of failures for this recovery action to perform, before moving to the next recovery action:

```
(config network interface my_wwan surelink actions 0)> test_failures int
(config network interface my_wwan surelink actions 0)>
```

The default is **3**.

- Set the time to wait before the next test is run. If set to the default value of **0s**, the test interval is used.

```
(config network interface my_wwan surelink actions 0)> override_interval int
(config network interface my_wwan surelink actions 0)>
```

■ **reboot_device.**

If **reboot_device** is selected, complete the following:

- Set the number of failures for this recovery action to perform, before moving to the next recovery action:

```
(config network interface my_wwan surelink actions 0)> test_failures int
(config network interface my_wwan surelink actions 0)>
```

The default is **3**.

- Set the time to wait before the next test is run. If set to the default value of **0s**, the test interval is used.

```
(config network interface my_wwan surelink actions 0)> override_interval int
(config network interface my_wwan surelink actions 0)>
```

■ **custom_action:** Execute custom recovery commands.

If **custom_action** is selected, complete the following:

- Set the number of failures for this recovery action to perform, before moving to the next recovery action:

```
(config network interface my_wwan surelink actions 0)> test_failures int
(config network interface my_wwan surelink actions 0)>
```

The default is **3**.

- Set the commands to run to attempt to recovery connectivity.

```
(config network interface my_wwan surelink actions 0)> custom_action_commands_
modem "string"
(config network interface my_wwan surelink actions 0)>
```

- Set the time to wait before the next test is run. If set to the default value of **0s**, the test interval is used.

```
(config network interface my_wwan surelink actions 0)> override_interval int
(config network interface my_wwan surelink actions 0)>
```

- **switch eSIM profile:** Alternate carrier profile selection to help maintain cellular service.

If **switch_eSIM_profile** is selected, complete the following:

- Set the type of recovery

```
(config network interface my_wwan surelink actions 0) > modem_action switch_
esim_profile
(config network interface my_wwan surelink actions 0) >
```

- Set how you want the carrier profile to be identified (by ICCID or SPN)

```
(config network interface my_wwan surelink actions 0) > profile_specification [value]
(config network interface my_wwan surelink actions 0) >
```

with [value] being *ICCID* or *SPN*.

- f. Repeat for each additional recovery action.

7. Optional SureLink configuration parameters:

- a. Type ... to return to the root of the configuration:

```
(config network interface my_wwan surelink actions 0)> ...
(config)>
```

- b. Set the test interval between connectivity tests:

```
(config)> network interface my_wwan surelink interval value
(config)>
```

where *value* is any number of weeks, days, hours, minutes, or seconds, and takes the format **number{w|d|h|m|s}**.

For example, to set **interval** to ten minutes, enter either **10m** or **600s**:

```
(config)> network interface my_wwan surelink interval 600s
(config)>
```

The default is **15m**.

- c. If more than one test target is configured, set the success condition:

```
(config)> network interface my_wwan surelink success_condition value
(config)>
```

where *value* is either:

- **one**: Only one test needs to pass for SureLink to consider an interface to be up.
 - **all**: All tests need to pass for SureLink to consider the interface to be up.
- d. Set the number of times that the test must pass after failure, before the interface is determined to be working and is reinstated.

```
(config)> network interface my_wwan surelink pass_threshold int
(config)>
```

The default is **1**.

- e. Set the amount of time that the device should wait for a response to a test failure before considering it to have failed:

```
(config)> network interface my_wwan surelink timeout value
(config)>
```

where *value* is any number of weeks, days, hours, minutes, or seconds, and takes the format **number{w|d|h|m|s}**.

For example, to set **timeout** to ten minutes, enter either **10m** or **600s**:

```
(config)> network interface my_wan surelink timeout 600s
(config)>
```

The default is **15s**.

- f. Set the amount of time to wait while the device is starting before SureLink testing begins. This setting is bypassed when the interface is determined to be up.

```
(config)> network interface my_wwan surelink advanced delayed_start value
(config)>
```

where *value* is any number of weeks, days, hours, minutes, or seconds, and takes the format **number{w|d|h|m|s}**.

For example, to set **delayed_start** to ten minutes, enter either **10m** or **600s**:

```
(config)> network interface my_wan surelink advanced delayed_start 600s
(config)>
```

The default is **300s**.

- g. Set the time to add to the test interval when restarting the list of actions. This option is capped at 15 minutes.

```
(config)> network interface my_wwan surelink advanced backoff_interval value
(config)>
```

where *value* is any number of weeks, days, hours, minutes, or seconds, and takes the format **number{w|d|h|m|s}**.

For example, to set **backoff_interval** to ten minutes, enter either **10m** or **600s**:

```
(config)> network interface my_wan surelink advanced backoff_interval 600s
(config)>
```

The default is 300 seconds.

- h. The **interface_gateway** parameter is used by the Interface gateway Ping test as the endpoint for traceroute to use to determine the interface gateway. The default is **8.8.8.8**, and should only be changed if this IP address is not accessible due to networking issues. To set to an alternate host:

```
(config)> network interface my_wwan surelink advanced interface_gateway hostname/IP_
address
(config)>
```

8. Save the configuration and apply the change.

```
(config network interface my_wwan ipv4 surelink)> save
Configuration saved.
>
```

9. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Configure the device to reboot when a failure is detected

Using SureLink, you can configure the XBee Hive device to reboot when it has determined that an interface has failed.

Required configuration items

- By default, SureLink is enabled for the preconfigured **Modem** interface. The default configuration tests the DNS servers configured for the interface.
When SureLink is configured for Wireless WANs, SureLink tests are only run if the cellular modem is connected and has an IP address. Use the **SIM failover** options to configure the XBee Hive device to automatically recover the modem in the event that it cannot obtain an IP address. See [Configure a Wireless Wide Area Network \(WWAN\)](#) for details about **SIM failover**.
- Enable device reboot upon interface failure.
- The type of tests to be performed:
 - **Ping test:** Uses ICMP to determine connectivity. The default behavior is to ping the interface gateway, which means that an initial traceroute is sent to the hostname or IP address configured in the SureLink advanced settings, and then the first hop in that route is used for the ping test.
 - **DNS test:** Performs a DNS query to the named DNS server.
 - **HTTP test:** Uses HTTP(s) GET requests to determine connectivity to the configured web server.
 - **Test DNS servers configured for this interface:** Tests communication with DNS servers that are either provided by DHCP, or statically configured for this interface.

- **Test the interface status:** Tests the current status of the interface. The test fails if the interface is down. Failing this test infers that all other tests fail.
- **Custom test:** Tests the interface with custom commands.
- **TCP connection test:** Tests that the interface can reach a destination port on the configured host.
- **Test another interface's status:** Tests the status of another interface.

Additional configuration items

- See [Configure SureLink active recovery to detect modem failures](#) for optional SureLink configuration parameters.

To configure the XBee Hive device to reboot when an interface has failed:

Web

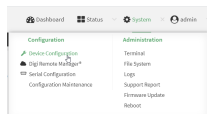
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

Remote Manager:

- a. Locate your device as described in [Use Digi Remote Manager to view and manage your device](#).
- b. Click the **Device ID**.
- c. Click **Settings**.
- d. Click to expand **Config**.

Local Web UI:

- a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



The **Configuration** window is displayed.

3. Click **Network > Interfaces**.
4. Create a new interface or select an existing one:
 - To create a new interface, see [Configure a Wireless Wide Area Network \(WWAN\)](#).
 - To edit an existing interface, click to expand the appropriate interface.

5. After creating or selecting the interface, click **SureLink**.

6. (Optional) Change the **Test interval** between connectivity tests.
Allowed values are any number of weeks, days, hours, minutes, or seconds, and take the format **number{w|d|h|m|s}**.
For example, to set **Interval** to ten minutes, enter **10m** or **600s**.
The default is 15 minutes.
7. (Optional) If more than one test target is configured, for **Success condition**, select either:
- **One test passes**: Only one test needs to pass for Surelink to consider an interface to be up.
 - **All test pass**: All tests need to pass for SureLink to consider the interface to be up.
8. (Optional) For **Pass threshold**, type or select the number of times that the test must pass after failure, before the interface is determined to be working and is reinstated.
9. (Optional) For **Response timeout**, type the amount of time that the device should wait for a response to a test failure before considering it to have failed.
Allowed values are any number of weeks, days, hours, minutes, or seconds, and take the format **number{w|d|h|m|s}**.
For example, to set **Response timeout** to ten minutes, enter **10m** or **600s**.
The default is 15 seconds.
10. Click to expand **Tests**.
By default, **Test DNS servers configured for this interface** is automatically configured and enabled. This test communication with DNS servers that are either provided by DHCP, or statically configured for this interface.
- a. Click

New tests are enabled by default. To disable, click to toggle off **Enable**.

- b. Type a **Label** for the test.
- c. Click to toggle on **IPv6** if the test should apply to both IPv6 rather than IPv4.
- d. Select the **Test type**.
Available test types:

- **Ping test:** Uses ICMP to determine connectivity.

If **Ping test** is selected, complete the following:

- **Ping target:** The type of target for the ping, one of:
 - **Hostname or IP address** of an external server.
 - **Ping host:** hostname or IP address of the server.
 - The **Interface gateway**. If **Interface gateway** is selected, an initial traceroute is sent to the hostname or IP address configured in the SureLink advanced settings, and then the first hop in that route is used for the ping test.
 - The **Interface address**.
 - The **Interface DNS** server.
- **Ping payload size:** The number of bytes to send as part of the ping payload.

- **DNS test:** Performs a DNS query to the named DNS server.

If **DNS test** is selected, complete the following:

- **DNS server:** The IP address of the DNS server.

- **HTTP test:** Uses HTTP(s) GET requests to determine connectivity to the configured web server.

If **HTTP test** is selected, complete the following:

- **Web server:** The URL of the web server.

- **Test DNS servers configured for this interface:** Tests communication with DNS servers that are either provided by DHCP, or statically configured for this interface.

- **Test the interface status:** Tests the current status of the interface. The test fails if the interface is down. Failing this test infers that all other tests fail.

If **Test the interface status** is selected, complete the following:

- **Down time:** The amount of time that the interface is down before the test can be considered to have failed.

Allowed values are any number of weeks, days, hours, minutes, or seconds, and take the format *number*{w|d|h|m|s}.

For example, to set **Down time** to ten minutes, enter **10m** or **600s**.

- **Initial connection time:** The amount of time to wait for the interface to connect for the first time before the test is considered to have failed.

Allowed values are any number of weeks, days, hours, minutes, or seconds, and take the format *number*{w|d|h|m|s}.

For example, to set **Initial connection time** to ten minutes, enter **10m** or **600s**.

- **Custom test:** Tests the interface with custom commands.

If **Custom test** is selected, complete the following:

- The **Commands to run to test**.

- **TCP connection test:** Tests that the interface can reach a destination port on the configured host.

If **TCP connection test** is selected, complete the following:

- **TCP connect host:** The hostname or IP address of the host to create a TCP connection to.
 - **TCP connect port:** The TCP port to create a TCP connection to.
 - **Test another interface's status:** Tests the status of another interface.
- If **Test another interface's status** is selected, complete the following:
- **Test interface:** The interface to test.
 - **IP version:** The type of IP connection, one of:
 - **Any:** Either the IPv4 or IPv6 connection must be up.
 - **Both:** Both the IPv4 or IPv6 connection must be up.
 - **IPv4:** The IPv4 connection must be up.
 - **IPv6:** The IPv6 connection must be up.
 - **Expected status:** The status required for the test to pass.
 - **Up:** The test will pass only if the referenced interface is up and passing its own SureLink tests (if applicable).
 - **Down:** The test will pass only if the referenced interface is down or failing its own SureLink tests (if applicable).

e. Repeat for each additional test.

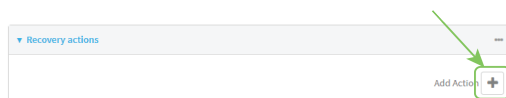
11. Add recovery actions:

a. Click to expand **Recovery actions**.

By default, there are two preconfigured recovery actions:

- **Update routing:** Uses the **Change default gateway** action, which increases the interface's metric by 100 to change the default gateway.
- **Restart interface.**

b. Click 



New recovery actions are enabled by default. To disable, click to toggle off **Enable**.

- c. Type a **Label** for the recovery action.
- d. For **Recovery type**, select **Reboot device**.
- e. For **Recovery type**, select the type of recovery action. If multiple recovery actions are configured, they are performed in the order that they are listed.
- **Change default gateway:** Increases the interface's metric to change the default gateway.
- If **Change default gateway** is selected, complete the following:
- **SureLink test failures:** The number of failures for this recovery action to perform, before moving to the next recovery action.

- **Increase metric to change active default gateway:** Increase the interface's metric by this amount. This should be set to a number large enough to change the routing table to use another default gateway. The default is **100**.
 - **Override wait interval before performing the next recovery action:** The time to wait before the next test is run. If set to the default value of **0s**, the **Test interval** is used.
- **Restart interface.**
- If **Restart interface** is selected, complete the following:
- **SureLink test failures:** The number of failures for this recovery action to perform, before moving to the next recovery action.
 - **Override wait interval before performing the next recovery action:** The time to wait before the next test is run. If set to the default value of **0s**, the **Test interval** is used.
- **Reset modem:** This recovery action is available for WWAN interfaces only.
- If **Reset modem** is selected, complete the following:
- **SureLink test failures:** The number of failures for this recovery action to perform, before moving to the next recovery action.
 - **Override wait interval before performing the next recovery action:** The time to wait before the next test is run. If set to the default value of **0s**, the **Test interval** is used.
- **Switch to alternate SIM:** Switches to an alternate SIM. This recovery action is available for WWAN interfaces only.
- If **Switch to alternate SIM** is selected, complete the following:
- **SureLink test failures:** The number of failures for this recovery action to perform, before moving to the next recovery action.
 - **Override wait interval before performing the next recovery action:** The time to wait before the next test is run. If set to the default value of **0s**, the **Test interval** is used.
- **Reboot device.**
- If **Reboot device** is selected, complete the following:
- **SureLink test failures:** The number of failures for this recovery action to perform, before moving to the next recovery action.
 - **Override wait interval before performing the next recovery action:** The time to wait before the next test is run. If set to the default value of **0s**, the **Test interval** is used.
- **Execute custom Recovery commands.**
- If **Recovery commands** is selected, complete the following:
- **SureLink test failures:** The number of failures for this recovery action to perform, before moving to the next recovery action.
 - The **Commands to run to recovery connectivity**.

- **Override wait interval before performing the next recovery action:** The time to wait before the next test is run. If set to the default value of **0s**, the **Test interval** is used.
 - **Switch eSIM profile** for carrier profile connectivity issue detection and alternate carrier profile selection to help maintain cellular service. For more information, [see Configure SureLink to switch eSIM profiles](#) in the Cellular documentation portal.
If **Switch eSIM profile** is selected, complete the following:
 - **Label**, type a word or phrase to identify the action. For example, *Repower modem - eSIM*.
 - **Recovery type**, select **Switch eSIM profile**.
 - **Powercycle the modem.** This recovery action is available for WWAN interfaces only.
If **Powercycle the modem** is selected, complete the following:
 - **SureLink test failures:** The number of failures for this recovery action to perform, before moving to the next recovery action.
 - **Override wait interval before performing the next recovery action:** The time to wait before the next test is run. If set to the default value of **0s**, the **Test interval** is used.
 - f. Repeat for each additional recovery action.
12. (Optional) Configure advanced SureLink parameters:
- a. Click to expand **Advanced settings**.
 - b. For **Delayed Start**, type the amount of time to wait while the device is starting before SureLink testing begins. This setting is bypassed when the interface is determined to be up.
Allowed values are any number of weeks, days, hours, minutes, or seconds, and take the format **number{w|d|h|m|s}**.
For example, to set **Delayed start** to ten minutes, enter **10m** or **600s**.
The default is 300 seconds.
 - c. For **Backoff interval**, type the time to add to the test interval when restarting the list of actions. This option is capped at 15 minutes.
Allowed values are any number of weeks, days, hours, minutes, or seconds, and take the format **number{w|d|h|m|s}**.
For example, to set **Backoff interval** to ten minutes, enter **10m** or **600s**.
The default is 300 seconds.
 - d. **Test interface gateway by pinging** is used by the **Interface gateway Ping test** as the endpoint for traceroute to use to determine the interface gateway. The default is 8.8.8.8, and should only be changed if this IP address is not accessible due to networking issues.
13. Click **Apply** to save the configuration and apply the change.

Command line

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Create a new interface, or edit an existing one:
 - To create a new interface, see [Configure a Wireless Wide Area Network \(WWAN\)](#).
 - To edit an existing interface, change to the interface's node in the configuration schema. For example, for an interface named **my_wwan**, change to the **my_wwan** node in the configuration schema:

```
(config)> network interface my_wwan
(config network interface my_wwan)>
```

4. Enable SureLink.

By default, SureLink is enabled for the preconfigured WWAN (modem xbee_cellular).

```
(config network interface my_wwan)> surelink enable true
(config network interface my_wwan)>
```

5. By default, the **Test DNS servers configured for this interface** test is automatically configured and enabled. This tests communication with DNS servers that are either provided by DHCP, or statically configured for this interface.

To add additional tests:

- a. Add a test:

```
(config network interface my_wwan)> add surelink tests end
(config network interface my_wwan surelink tests 1)>
```

- b. New tests are enabled by default. To disable:

```
(config network interface my_wwan surelink tests 1)> enable false
(config network interface my_wwan surelink tests 1)>
```

- c. Create a label for the test:

```
(config network interface my_wwan surelink tests 1)> label string
(config network interface my_wwan surelink tests 1)>
```

- d. if the test should apply to both IPv6 rather than IPv4, enable IPv6:

```
(config network interface my_wwan surelink tests 1)> ipv6 true
(config network interface my_wwan surelink tests 1)>
```

- e. Set the test type:

```
(config network interface my_wwan surelink tests 1)> test value
(config network interface my_wwan surelink tests 1)>
```

where *value* is one of:

- **ping**: Uses ICMP to determine connectivity.

If **ping** is selected, complete the following:

- Set the **ping_method**:

```
(config network interface my_wwan surelink tests 1)> ping_method value
(config network interface my_wwan surelink tests 1)>
```

where *value* is one of:

- **hostname**: The hostname or IP address of an external server.
- Set **ping_host** to the hostname or IP address of the server:

```
(config network interface my_wwan surelink tests 1)> ping_host hostname/IP_
address
(config network interface my_wwan surelink tests 1)>
```

- **interface_gateway**. If set, an initial traceroute is sent to the hostname or IP address configured in the SureLink advanced settings, and then the first hop in that route is used for the ping test.
- **interface_address**.
- **interface_dns**: The interface's DNS server.

- Set the number of bytes to send as part of the ping payload:

```
(config network interface my_wwan ipsec tunnel ipsec_example surelink tests 1)>
ping_size int
(config network interface my_wwan surelink tests 1)>
```

- **dns**: Performs a DNS query to the named DNS server.

If **dns** is set, set the IPv4 or IPv6 address of the DNS server:

```
(config network interface my_wwan surelink tests 1)> dns_server IP_address
(config network interface my_wwan surelink tests 1)>
```

- **http**: Uses HTTP(s) GET requests to determine connectivity to the configured web server.

If **http** is set, set the URL of the web server.

```
(config network interface my_wwan surelink tests 1)> http url
(config network interface my_wwan surelink tests 1)>
```

- **dns_configured**: Tests communication with DNS servers that are either provided by DHCP, or statically configured for this interface.
- **interface_up**: Tests the current status of the interface. The test fails if the interface is down. Failing this test infers that all other tests fail.

If **interface_up** is set, complete the following:

- Set the amount of time that the interface is down before the test can be considered to have failed.

```
(config network interface my_wwan surelink tests 1)> interface_down_time value
(config network interface my_wwan surelink tests 1)>
```

where *value* is any number of weeks, days, hours, minutes, or seconds, and takes the format ***number{w|d|h|m|s}***.

For example, to set **interface_down_time** to ten minutes, enter either **10m** or **600s**:

```
(config network interface my_wwan surelink tests 1)> interface_down_time 600s
(config)>
```

- Set the amount of time to wait for the interface to connect for the first time before the test is considered to have failed.

```
(config network interface my_wwan surelink tests 1)> interface_timeout value
(config network interface my_wwan surelink tests 1)>
```

where *value* is any number of weeks, days, hours, minutes, or seconds, and takes the format ***number{w|d|h|m|s}***.

For example, to set **interface_timeout** to ten minutes, enter either **10m** or **600s**:

```
(config network interface my_wwan surelink tests 1)> interface_timeout 600s
(config)>
```

- **custom_test**: Tests the interface with custom commands.

If **custom_test** is set, set the commands to run to perform the test:

```
(config network interface my_wwan surelink tests 1)> custom_test_commands "string"
(config network interface my_wwan surelink tests 1)>
```

- **tcp_connection**: Tests that the interface can reach a destination port on the configured host.

If **tcp_connection** is selected, complete the following:

- Set the hostname or IP address of the host to create a TCP connection to:

```
(config network interface my_wwan surelink tests 1)> tcp_host hostname/IP_
address
(config network interface my_wwan surelink tests 1)>
```

- Set the TCP port to create a TCP connection to.

```
(config network interface my_wwan surelink tests 1)> tcp_port port
(config network interface my_wwan surelink tests 1)>
```

- **other**: Tests the status of another interface.

If **other** is selected, complete the following:

- Set the interface to test.
 - i. Use the **?** to determine available interfaces:
 - ii. Set the interface. For example:

```
(config network interface my_wan surelink tests 1)> other_interface
/network/interface/eth1
(config network interface my_wan surelink tests 1)>
```

- Set the type of IP connection:

```
(config network interface my_wwan surelink tests 1)> other_ip_version value
(config network interface my_wwan surelink tests 1)>
```

where *value* is one of:

- **any**: Either the IPv4 or IPv6 connection must be up.
- **both**: Both the IPv4 or IPv6 connection must be up.
- **ipv4**: The IPv4 connection must be up.
- **ipv6**: The IPv6 connection must be up.

- The status required for the test to pass.

```
(config network interface my_wwan surelink tests 1)> other_status value
(config network interface my_wwan surelink tests 1)>
```

where *value* is one of:

- **up**: The test will pass only if the referenced interface is up and passing its own SureLink tests (if applicable).
- **down**: The test will pass only if the referenced interface is down or failing its own SureLink tests (if applicable).

- f. Repeat for each additional test.

6. Add recovery actions:

- a. Type ... to return to the root of the configuration:

```
(config network interface my_wwan surelink tests 1)> ...
(config)>
```

- b. Add a recovery action:

```
(config)> add network interface my_wwan surelink actions end
(config network interface my_wwan surelink actions 0)>
```

- c. New actions are enabled by default. To disable:

```
(config network interface my_wwan surelink actions 0)> enable false
(config network interface my_wwan surelink actions 0)>
```

- d. Create a label for the action:

```
(config network interface my_wwan surelink actions 0)> label string
(config network interface my_wwan surelink actions 0)>
```

- e. Set the type of recovery action to **reboot_device**:

```
(config network interface my_wwan surelink actions 0)> action reboot_device
(config network interface my_wwan surelink actions 0)>
```

- Set the number of failures for this recovery action to perform, before moving to the next recovery action:

```
(config network interface my_wwan surelink actions 0)> test_failures int
(config network interface my_wwan surelink actions 0)>
```

The default is **3**.

- Set the time to wait before the next test is run. If set to the default value of **0s**, the test interval is used.

```
(config network interface my_wwan surelink actions 0)> override_interval int
(config network interface my_wwan surelink actions 0)>
```

7. Optional SureLink configuration parameters:

- a. Type ... to return to the root of the configuration:

```
(config network interface my_wwan surelink actions 0)> ...
(config)>
```

- b. Set the test interval between connectivity tests:

```
(config)> network interface my_wwan surelink interval value
(config)>
```

where *value* is any number of weeks, days, hours, minutes, or seconds, and takes the format **number{w|d|h|m|s}**.

For example, to set **interval** to ten minutes, enter either **10m** or **600s**:

```
(config)> network interface my_wan surelink interval 600s
(config)>
```

The default is **15m**.

- c. If more than one test target is configured, set the success condition:

```
(config)> network interface my_wwan surelink success_condition value
(config)>
```

where *value* is either:

- **one**: Only one test needs to pass for Surelink to consider an interface to be up.
- **all**: All tests need to pass for SureLink to consider the interface to be up.

- d. Set the number of times that the test must pass after failure, before the interface is determined to be working and is reinstated.

```
(config)> network interface my_wwan surelink pass_threshold int
(config)>
```

The default is **1**.

- e. Set the amount of time that the device should wait for a response to a test failure before considering it to have failed:

```
(config)> network interface my_wwan surelink timeout value
(config)>
```

where *value* is any number of weeks, days, hours, minutes, or seconds, and takes the format **number{w|d|h|m|s}**.

For example, to set **timeout** to ten minutes, enter either **10m** or **600s**:

```
(config)> network interface my_wwan surelink timeout 600s
(config)>
```

The default is **15s**.

- f. Set the amount of time to wait while the device is starting before SureLink testing begins. This setting is bypassed when the interface is determined to be up.

```
(config)> network interface my_wwan surelink advanced delayed_start value
(config)>
```

where *value* is any number of weeks, days, hours, minutes, or seconds, and takes the format **number{w|d|h|m|s}**.

For example, to set **delayed_start** to ten minutes, enter either **10m** or **600s**:

```
(config)> network interface my_wwan surelink advanced delayed_start 600s
(config)>
```

The default is **300s**.

- g. Set the time to add to the test interval when restarting the list of actions. This option is capped at 15 minutes.

```
(config)> network interface my_wwan surelink advanced backoff_interval value
(config)>
```

where *value* is any number of weeks, days, hours, minutes, or seconds, and takes the format **number{w|d|h|m|s}**.

For example, to set **backoff_interval** to ten minutes, enter either **10m** or **600s**:

```
(config)> network interface my_wwan surelink advanced backoff_interval 600s
(config)>
```

The default is 300 seconds.

- h. The **interface_gateway** parameter is used by the Interface gateway Ping test as the endpoint for traceroute to use to determine the interface gateway. The default is **8.8.8.8**, and should only be changed if this IP address is not accessible due to networking issues. To set to an alternate host:

```
(config)> network interface my_wwan surelink advanced interface_gateway hostname/IP_
address
(config)>
```

8. Save the configuration and apply the change.

```
(config network interface my_wwan ipv4 surelink)> save
Configuration saved.
>
```

9. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Disable SureLink

If your device uses a private APN with no Internet access or has a restricted WAN connection that doesn't allow DNS resolution, you can disable SureLink connectivity tests. You can also reconfigure SureLink to disable the DNS test and use one or more other tests.

Web

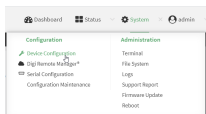
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

Remote Manager:

- a. Locate your device as described in [Use Digi Remote Manager to view and manage your device](#).
- b. Click the **Device ID**.
- c. Click **Settings**.
- d. Click to expand **Config**.

Local Web UI:

- a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



The **Configuration** window is displayed.

3. Click **Network > Interfaces**.
4. Select the appropriate WAN or WWAN on which SureLink should be disabled..

- After selecting the WAN or WWAN, click **SureLink**.

The screenshot shows the 'SureLink' configuration page. At the top, there's a toggle for 'Enable' which is currently turned on. Below it are several input fields: 'Test interval' set to '15m', 'Success condition' set to 'One test passes' (with a dropdown arrow), 'Pass threshold' set to '1', and 'Response timeout' set to '15s'. At the bottom, there are three expandable sections: 'Tests', 'Recovery actions', and 'Advanced settings', each with a right-pointing arrow.

- Toggle off **Enable** to disable SureLink.
- Click **Apply** to save the configuration and apply the change.

Command line

- Select the device in Remote Manager and click **Actions > Open Console**, or log into the Xbee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
- At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

- Change to the WAN or WWAN's node in the configuration schema. For example, to disable SureLink for the Modem interface:

```
(config)> network interface modem xbee_cellular
(config network interface modem xbee_cellular)>
```

- Disable SureLink:

```
(config network interface modem xbee_cellular> surelink enable false
(config network interface modem xbee_cellular)>
```

- Save the configuration and apply the change.

```
(config network interface my_wwan surelink)> save
Configuration saved.
>
```

- Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Disable the default DNS test

Alternatively, you can disable the default DNS test for devices that use a private APN with no Internet access, or that have restricted wired WAN connections that do not allow DNS resolution, and configure alternate test.

Web

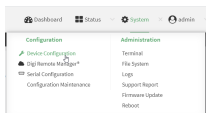
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

Remote Manager:

- a. Locate your device as described in [Use Digi Remote Manager to view and manage your device](#).
- b. Click the **Device ID**.
- c. Click **Settings**.
- d. Click to expand **Config**.

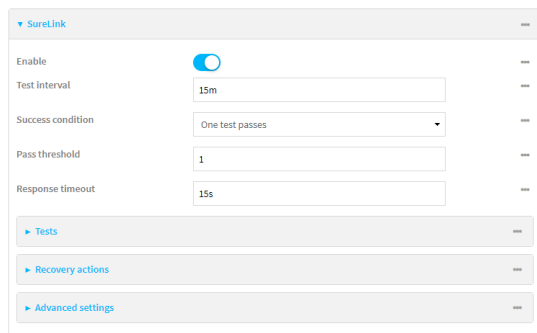
Local Web UI:

- a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



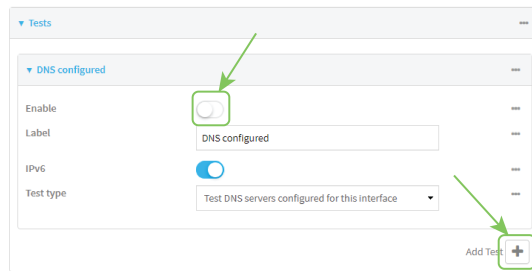
The **Configuration** window is displayed.

3. Click **Network > Interfaces**.
4. Select the appropriate WAN or WWAN on which the default DNS test should be disabled..
5. After selecting the WAN or WWAN, click **SureLink**.



6. Click to expand **Tests**.
7. Click to expand the default **DNS configured** test.
8. Click to toggle off **Enable**.

9. Click  to add a new test.



10. Type a **Label** for the test.
11. Click to toggle on **IPv6** if the test should apply to both IPv6 rather than IPv4.
12. Select the **Test type**.

Available test types:

- **Ping test:** Uses ICMP to determine connectivity.

If **Ping test** is selected, complete the following:

- **Ping target:** The type of target for the ping, one of:
 - **Hostname or IP address** of an external server.
 - **Ping host:** hostname or IP address of the server.
 - The **Interface gateway**. If **Interface gateway** is selected, an initial traceroute is sent to the hostname or IP address configured in the SureLink advanced settings, and then the first hop in that route is used for the ping test.
 - The **Interface address**.
 - The **Interface DNS** server.
- **Ping payload size:** The number of bytes to send as part of the ping payload.

- **DNS test:** Performs a DNS query to the named DNS server.

If **DNS test** is selected, complete the following:

- **DNS server:** The IP address of the DNS server.

- **HTTP test:** Uses HTTP(s) GET requests to determine connectivity to the configured web server.

If **HTTP test** is selected, complete the following:

- **Web server:** The URL of the web server.

- **Test DNS servers configured for this interface:** Tests communication with DNS servers that are either provided by DHCP, or statically configured for this interface.

- **Test the interface status:** Tests the current status of the interface. The test fails if the interface is down. Failing this test infers that all other tests fail.

If **Test the interface status** is selected, complete the following:

- **Down time:** The amount of time that the interface is down before the test can be considered to have failed.

Allowed values are any number of weeks, days, hours, minutes, or seconds, and take the format **number{w|d|h|m|s}**.

For example, to set **Down time** to ten minutes, enter **10m** or **600s**.

- **Initial connection time:** The amount of time to wait for the interface to connect for the first time before the test is considered to have failed.

Allowed values are any number of weeks, days, hours, minutes, or seconds, and take the format ***number{w|d|h|m|s}***.

For example, to set **Initial connection time** to ten minutes, enter **10m** or **600s**.

- **Custom test:** Tests the interface with custom commands.

If **Custom test** is selected, complete the following:

- The **Commands to run to test**.

- **TCP connection test:** Tests that the interface can reach a destination port on the configured host.

If **TCP connection test** is selected, complete the following:

- **TCP connect host:** The hostname or IP address of the host to create a TCP connection to.
- **TCP connect port:** The TCP port to create a TCP connection to.

- **Test another interface's status:** Tests the status of another interface.

If **Test another interface's status** is selected, complete the following:

- **Test interface:** The interface to test.
- **IP version:** The type of IP connection, one of:
 - **Any:** Either the IPv4 or IPv6 connection must be up.
 - **Both:** Both the IPv4 or IPv6 connection must be up.
 - **IPv4:** The IPv4 connection must be up.
 - **IPv6:** The IPv6 connection must be up.
- **Expected status:** The status required for the test to pass.
 - **Up:** The test will pass only if the referenced interface is up and passing its own SureLink tests (if applicable).
 - **Down:** The test will pass only if the referenced interface is down or failing its own SureLink tests (if applicable).

13. Click **Apply** to save the configuration and apply the change.

Command line

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Change to WAN or WWAN's node in the configuration schema. For example, to disable the default DNS test for an interface named `my_wan`:

```
(config)> network interface my_wan
(config network interface my_wan)>
```

4. Disable the default DNS test:

```
(config network interface my_wan)> surelink tests 0 enable false
(config network interface my_wan)>
```

5. Add a new test:

a. Add a test:

```
(config network interface my_wan)> add surelink tests end
(config network interface my_wan surelink tests 1)>
```

b. Create a label for the test:

```
(config network interface my_wan surelink tests 1)> label string
(config network interface my_wan surelink tests 1)>
```

c. if the test should apply to both IPv6 rather than IPv4, enable IPv6:

```
(config network interface my_wan surelink tests 1)> ipv6 true
(config network interface my_wan surelink tests 1)>
```

d. Set the test type:

```
(config network interface my_wan surelink tests 1)> test value
(config network interface my_wan surelink tests 1)>
```

where *value* is one of:

- **ping**: Uses ICMP to determine connectivity.

If **ping** is selected, complete the following:

- Set the **ping_method**:

```
(config network interface my_wan surelink tests 1)> ping_method value
(config network interface my_wan surelink tests 1)>
```

where *value* is one of:

- **hostname**: The hostname or IP address of an external server.
- Set **ping_host** to the hostname or IP address of the server:

```
(config network interface my_wan surelink tests 1)> ping_host hostname/IP_
address
(config network interface my_wan surelink tests 1)>
```

- **interface_gateway**. If set, an initial traceroute is sent to the hostname or IP address configured in the SureLink advanced settings, and then the first hop in that route is used for the ping test.
- **interface_address**.
- **interface_dns**: The interface's DNS server.

- Set the number of bytes to send as part of the ping payload:

```
(config network interface my_wan ipsec tunnel ipsec_example surelink tests 1)>
ping_size int
(config network interface my_wan surelink tests 1)>
```

- **dns:** Performs a DNS query to the named DNS server.

If **dns** is set, set the IPv4 or IPv6 address of the DNS server:

```
(config network interface my_wan surelink tests 1)> dns_server IP_address
(config network interface my_wan surelink tests 1)>
```

- **http:** Uses HTTP(s) GET requests to determine connectivity to the configured web server.

If **http** is set, set the URL of the web server.

```
(config network interface my_wan surelink tests 1)> http url
(config network interface my_wan surelink tests 1)>
```

- **dns_configured:** Tests communication with DNS servers that are either provided by DHCP, or statically configured for this interface.
- **interface_up:** Tests the current status of the interface. The test fails if the interface is down. Failing this test infers that all other tests fail.

If **interface_up** is set, complete the following:

- Set the amount of time that the interface is down before the test can be considered to have failed.

```
(config network interface my_wan surelink tests 1)> interface_down_time value
(config network interface my_wan surelink tests 1)>
```

where *value* is any number of weeks, days, hours, minutes, or seconds, and takes the format **number{w|d|h|m|s}**.

For example, to set **interface_down_time** to ten minutes, enter either **10m** or **600s**:

```
(config network interface my_wan surelink tests 1)> interface_down_time 600s
(config)>
```

- Set the amount of time to wait for the interface to connect for the first time before the test is considered to have failed.

```
(config network interface my_wan surelink tests 1)> interface_timeout value
(config network interface my_wan surelink tests 1)>
```

where *value* is any number of weeks, days, hours, minutes, or seconds, and takes the format **number{w|d|h|m|s}**.

For example, to set **interface_timeout** to ten minutes, enter either **10m** or **600s**:

```
(config network interface my_wan surelink tests 1)> interface_timeout 600s
(config)>
```

- **custom_test:** Tests the interface with custom commands.

If **custom_test** is set, set the commands to run to perform the test:

```
(config network interface my_wan surelink tests 1)> custom_test_commands "string"
(config network interface my_wan surelink tests 1)>
```

- **tcp_connection:** Tests that the interface can reach a destination port on the configured host.

If **tcp_connection** is selected, complete the following:

- Set the hostname or IP address of the host to create a TCP connection to:

```
(config network interface my_wan surelink tests 1)> tcp_host hostname/IP_address
(config network interface my_wan surelink tests 1)>
```

- Set the TCP port to create a TCP connection to.

```
(config network interface my_wan surelink tests 1)> tcp_port port
(config network interface my_wan surelink tests 1)>
```

- **other:** Tests the status of another interface.

If **other** is selected, complete the following:

- Set the interface to test.
 - i. Use the **?** to determine available interfaces:
 - ii. Set the interface. For example:

```
(config network interface my_wan surelink tests 1)> other_interface
/network/interface/eth1
(config network interface my_wan surelink tests 1)>
```

- Set the type of IP connection:

```
(config network interface my_wan surelink tests 1)> other_ip_version value
(config network interface my_wan surelink tests 1)>
```

where *value* is one of:

- **any:** Either the IPv4 or IPv6 connection must be up.
- **both:** Both the IPv4 or IPv6 connection must be up.
- **ipv4** The IPv4 connection must be up.
- **ipv6:** The IPv6 connection must be up.
- The status required for the test to pass.

```
(config network interface my_wan surelink tests 1)> other_status value
(config network interface my_wan surelink tests 1)>
```

where *value* is one of:

- **up**: The test will pass only if the referenced interface is up and passing its own SureLink tests (if applicable).
 - **down**: The test will pass only if the referenced interface is down or failing its own SureLink tests (if applicable).
6. Save the configuration and apply the change.

```
(config network interface my_wan ipv4 surelink)> save
Configuration saved.
>
```

7. Type **exit** to exit the Admin CLI.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Using cellular modems in a Wireless WAN (WWAN)

The XBee Hive supports one cellular modem, named **Modem**, which is included in a preconfigured Wireless WAN, also named **Modem**.

Configure cellular modem

To configure your XBee Hive's cellular modem, you need to modify the network and SIM settings.

Required configuration items

- Enable the cellular modem.
The cellular modem is enabled by default.
- Configure the maximum number of interfaces that can use the modem.
- Enable carrier switching, which allows the modem to automatically match the carrier for the active SIM.
Carrier switching is enabled by default.
- Configure the access technology.
- Determine which cellular antennas to use.

Additional configuration items

To configure the modem:

Web

1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

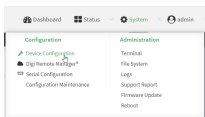
Remote Manager:

- a. Locate your device as described in [Use Digi Remote Manager to view and manage your device](#).
- b. Click the **Device ID**.
- c. Click **Settings**.

- d. Click to expand **Config**.

Local Web UI:

- a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



The **Configuration** window is displayed.

3. For single-cellular models, click **Network > Modems > WWAN cellular modem** or **XBee Cellular**.
4. Click **Network > Modems > XBee Cellular**.
5. Modem configurations are enabled by default.
6. For **Maximum number of interfaces**, type the number of interfaces that can be configured to use this modem. This is used when using [dual-APN SIMs](#). The default is **1**.
7. For **Signal strength query interval**, type or select the amount of time the system waits before polling the modem for signal information.
Allowed values are any number of weeks, days, hours, minutes, or seconds, and take the format **number{w|d|h|m|s}**.
For example, to set **Signal strength query interval** to ten minutes, enter **10m** or **600s**.
The default is **10s**.
8. Enable **Carrier switching** to allow the modem to automatically match the carrier for the active SIM. **Carrier switching** is enabled by default.
9. For **Access technology**, select the type of cellular technology that this modem should use to access the cellular network, or select **All technologies** to configure the modem to use the best available technology. The default is **All technologies**.
10. For **Antennas**, select whether the modem should use the main antenna, the auxiliary antenna, or both the main and auxiliary antennas.

Note For **4G bands**, specify the frequency bands you want to include or exclude. By default, all bands are used. To only use certain bands, separate each band in the list with a space (for example, *B1 B3 B5*). To exclude certain bands, separate each band in the list with a space and precede each band with an exclamation point (for example, *!B1 !B5*).



CAUTION! Make sure to confirm with your service provider that the bands you want to include or exclude are accurate. Connection issues may occur if a service provider changed any of the frequency bands they use for their network and you have set limitations on the bands to which the XBee Hive can connect.

11. (Optional) For **4G bands**, specify the 4G bands.
12. Click **Apply** to save the configuration and apply the change.

Command line

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Modem configurations are enabled by default. To disable:

```
(config)> network modem modem xbee_cellular enable false
(config)>
```

4. Set the amount of time the system waits before polling the modem for signal information:

```
(config)> network modem modem xbee_cellular query_interval value
(config)>
```

where *value* is any number of weeks, days, hours, minutes, or seconds, and takes the format **number{w|d|h|m|s}**.

For example, to set **query_interval** to ten minutes, enter either **10m** or **600s**:

```
(config)> network modem wan query_interval 600s
(config)>
```

The default is **10s**.

5. Set the maximum number of interfaces. This is used when using [dual-APN SIMs](#). The default is **1**.

```
(config)> network modem modem xbee_cellular max_intfs int
(config)>
```

6. Carrier switching allows the modem to automatically match the carrier for the active SIM. Carrier switching is enabled by default. To disable:

```
(config)> network modem modem xbee_cellular carrier_switch false
(config)>
```

7. Set the type of cellular technology that this modem should use to access the cellular network:

```
(config)> network modem modem xbee_cellular access_tech value
(config)>
```

Available options for *value* vary depending on the modem type. To determine available options:

```
(config)> network modem modem xbee_cellular access_tech ?
```

Access technology: The cellular network technology that the modem may use.

Format:

2G

3G

4G

4GM

4GT

all

Default value: all

Current value: all

(config)>

The default is **all**, which uses the best available technology.

8. Set whether the modem should use the main antenna, the auxiliary antenna, or both the main and auxiliary antennas:

(config)> network modem modem xbee_cellular antenna *value*

(config)>

where *value* is one of the following:

- **main**
- **aux**
- **both**

9. (Optional) To specify the 4G bands you want to include or exclude:

(config)> network modem modem xbee_cellular 4g_bands

(config)>

10. Save the configuration and apply the change.

(config)> save

Configuration saved.

>

11. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Cellular modem APNs

The XBee Hive device uses a preconfigured list of Access Point Names (APNs) when attempting to connect to a cellular carrier for the first time. You can find the `serviceproviders-local.txt` and `serviceproviders.txt` files in the filesystem of the XBee Hive. The order of the APNs for a specific carrier in these text files corresponds to the order in which the XBee Hive will try those APNs until it makes a successful connection. After the device has successfully connected, it will remember the correct APN. As a result, it is not necessary to configure APNs. However, you can configure the system to use a specified APN if you choose to do so.

Configure cellular modem APNs

To configure the APN:

Web

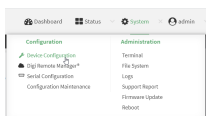
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

Remote Manager:

- a. Locate your device as described in [Use Digi Remote Manager to view and manage your device](#).
- b. Click the **Device ID**.
- c. Click **Settings**.
- d. Click to expand **Config**.

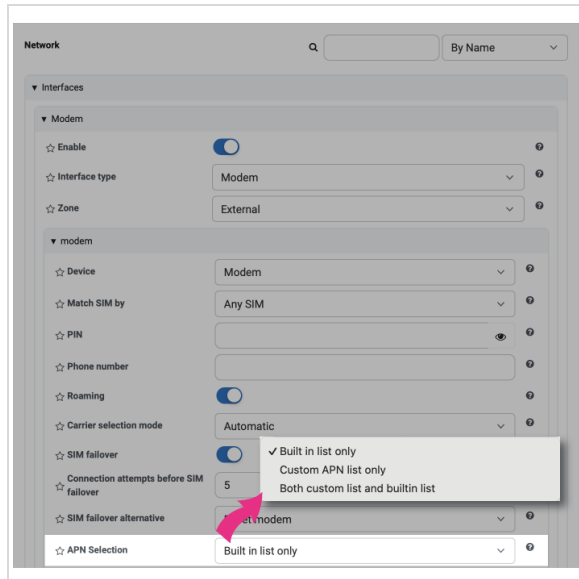
Local Web UI:

- a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



The **Configuration** window is displayed.

3. For your single-cellular XBee Hive, click **Network > Interfaces > Modem > modem > APN Selection**.



4. For **APN Selection**, select whether you want your XBee Hive to use the preconfigured APNs, custom APNs, or both.
 - a. If you selected either the *Custom APN list only* or the *Both custom list and builtin list*, click  to add an APN.
 - b. (Optional) For **APN**, add a name.

- c. (Optional) For **IP version**, select one of the following settings:
 - **Automatic**: Requests both IPv4 and IPv6 address.
 - **IPv4**: Requests only an IPv4 address.
 - **IPv6**: Requests only an IPv6 address.

The default is **Automatic**.
 - d. (Optional) For **Authentication method**, select one of the following settings:
 - **None**: No authentication is required.
 - **Automatic**: The device will attempt to connect using CHAP first, and then PAP.
 - **CHAP**: Uses the Challenge Handshake Authentication Profile (CHAP) to authenticate.
 - **PAP**: Uses the Password Authentication Profile (PAP) to authenticate.

If **Automatic**, **CHAP**, or **PAP** is selected, enter the **Username** and **Password** required to authenticate.

The default is **None**.
 - e. (Optional) For **PDP context index**, type the number for the index of the SIM card that the APN is programmed into. The default is **0** so the index is set automatically.
 - f. **Lightweight M2M support** is enabled by default. Disable if you are using an AT&T SIM that does not support AT&T lightweight M2M.
 - g. Repeat these steps to add additional APNs, if needed.
5. Click **Apply** to save the configuration and apply the change.

Command line

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
- Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. At the config prompt, type:

```
(config)> network interface modem xbee_cellular modem apn 0 apn value
(config)>
```

where *value* is the APN for the SIM card.

4. (Optional) To add additional APNs:
 - a. Use the **add** command to add a new APN entry. For example:

```
(config)> add network interface modem xbee_cellular modem apn end
(config network interface modem xbee_cellular modem apn 1)>
```

- b. Set the value of the APN:

```
(config network interface modem xbee_cellular modem apn 1)> apn value
(config network interface modem xbee_cellular modem apn 1)>
```

where *value* is the APN for the SIM card.

5. (Optional) Set the IP version:

```
(config)> network interface modem xbee_cellular modem apn 0 ip_version version
(config)>
```

where *version* is one of the following:

- **auto**: Requests both IPv4 and IPv6 address.
- **ipv4**: Requests only an IPv4 address.
- **ipv6**: Requests only an IPv6 address.

The default is **auto**.

6. (Optional) Set the PDP context index:

```
(config network interface wwan1 modem apn 0) > cid value
(config network interface wwan1 modem apn 0) >
```

where *value* is the index number of the SIM that the APN is programmed into. *0* means the index will be automatically set.

7. (Optional) Set the authentication method:

```
(config)> network interface modem xbee_cellular modem apn 0 auth method
(config)>
```

where *method* is one of the following:

- **none**: No authentication is required.
- **auto**: The device will attempt to connect using CHAP first, and then PAP.
- **chap**: Uses the Challenge Handshake Authentication Profile (CHAP) to authenticate.
- **pap**: Uses the Password Authentication Profile (PAP) to authenticate.

If **auto**, **chap**, or **pap** is selected, enter the **Username** and **Password** required to authenticate:

```
(config)> network interface modem xbee_cellular modem apn 0 username name
(config)> network interface modem xbee_cellular modem apn 0 password pwd
(config)>
```

The default is **none**.

8. Disable Lightweight M2M support if you are using an AT&T SIM that does not support AT&T lightweight M2M:

```
(config)> network interface modem xbee_cellular modem apn 0 attm2mglobal false
(config)>
```

9. (Optional) To configure the device to use either the preconfigured APNs, custom APNs, or both:

```
(config)> network interface modem xbee_cellular modem apn_selection value
(config)>
```

Where *value* is one of the following:

- apn_list_only
- both_lists
- built-in-list-only

10. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

11. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Show cellular status and statistics

You can view a summary status for all cellular modems, or view detailed status and statistics for a specific modem.

Web

1. Log into the XBee Hive WebUI as a user with full Admin access rights.
2. On the menu, click **Status**.
3. Under **Connections**, click **Modems**.

The modem status window is displayed

Command line

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. Use the **show modem** command:

- To view a status summary for the modem:

```
> show modem
```

```
Modem SIM      Status  APN      Signal Strength
-----
modem xbee_cellular 1 (ready)  connected 1234    Good (-84 dBm)
```

```
>
```

- To view detailed status and statistics, use the **show modem name *name*** command:

```
> show modem name modem xbee_cellular
```

```
modem xbee_cellular: [Telit] LM940
```

```
Status
```

```
State           : connected
Signal Strength  : Good (-85 dBm)
Bars            : 2/5
Temperature      : 34C
```

```
wwan1 Interface
```

```
APN              : 1234
IPv4 surelink     : passing
IPv4 address      : 189.232.229.47
IPv4 gateway      : 189.232.229.1
IPv4 MTU          : 1500
IPv4 DNS server(s) : 245.144.162.207, 245.144.162.208

IPv6 surelink     : passing
IPv6 address      : 11f6:4680:0d67:59d2:552b:3429:81a8:f1ea
IPv6 gateway      : ff50:d95d:7e98:abe8:3030:9138:4f25:f51b
IPv6 MTU          : 1500

TX bytes         : 127941
RX bytes         : 61026
Uptime           : 10 hrs, 56 mins (39360s)
```

```
SIM
```

```
SIM Slot         : 1
SIM Status        : ready
IMSI              : 61582122197895
ICCID             : 26587628655003992180
SIM Provider      : AT&T
```

```
>
```

Unlock a SIM card

A SIM card can be locked if a user tries to set an invalid PIN for the SIM card too many times. In addition, some cellular carriers require a SIM PIN to be added before the SIM card can be used. If the SIM card is locked, the Digi XBee Hive Gateway device cannot make a cellular connection.

Command line

To unlock a SIM card:

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the Admin CLI prompt, use the `modem puk unlock` command to set a new PIN for the SIM card:

```
> modem puk unlock puk_code new_pin modem_name
>
```

For example, to unlock a SIM card in the modem named `modem xbee_cellular` with PUK code `12345678`, and set the new SIM PIN to `1234`:

```
> modem puk unlock 12345678 1234 modem xbee_cellular
>
```

3. Type `exit` to exit the Admin CLI.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type `quit` to disconnect from the device.

Note If the SIM remains in a locked state after using the unlock command, contact your cellular carrier.

Signal strength for 4G cellular connections

For 4G connections, the **RSRP** value determines signal strength.

- **Excellent:** > -90 dBm
- **Good:** -90 dBm to -105 dBm
- **Fair:** -106 dBm to -115 dBm
- **Poor:** -116 dBm to -120 dBm:
- **No service:** < -120 dBm

See [Show cellular status and statistics](#) for procedures to view this information.

Signal strength for 3G and 2G cellular connections

For 3G and 2G cellular connections, the current **RSSI** value determines signal strength.

- **Excellent:** > -70 dBm
- **Good:** -70 dBm to -85 dBm
- **Fair:** -86 dBm to -100 dBm
- **Poor:** < -100 dBm to -109 dBm
- **No service:** -110 dBm

See [Show cellular status and statistics](#) for procedures to view this information.

Tips for improving cellular signal strength

If the signal strength LEDs or the signal quality for your device indicate **Poor** or **No service**, try the following things to improve signal strength:

- Move the XBee Hive device to another location.
- Try connecting a different set of antennas, if available.
- Purchase a Digi Antenna Extender Kit:
 - [Antenna Extender Kit, 1m](#)

AT command access

To run AT commands from the XBee Hive command line:

Command line

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the Admin CLI prompt, type **modem at-interactive** and press **Enter**. Type **n** if you do not want exclusive access. This allows you to send AT commands to the device while still allowing the device to connect, disconnect, and/or reconnect to the cellular network.
3. At the Admin CLI prompt, use the **modem at-interactive** command to begin an interactive AT command session:

```
> modem at-interactive
```

```
Do you want exclusive access to the modem? (y/n) [y]:
```

4. Type **n** if you do not want exclusive access. This allows you to send AT commands to the device while still allowing the device to connect, disconnect, and/or reconnect to the cellular network.

The following is an example interactive AT command:

```
> modem at-interactive
```

```
Do you want exclusive access to the modem? (y/n) [y]: n
```

```
Starting terminal access to modem AT commands.
```

```
Note that the modem is still in operation.
```

```
To quit enter '~.' ('~.' if using an ssh client) and press ENTER
```

```
Connected
```

```
ati
```

```
Manufacturer: Sierra Wireless, Incorporated
```

```
Model: MC7455
```

```
Revision: SWI9X30C_02.24.03.00 r6978 CARMD-EV-FRMWR2 2017/03/02 13:36:45
```

```
MEID: 35907206045169
```

```
IMEI: 359072060451693
```

```
IMEI SV: 9
```

```
FSN: LQ650551070110
```

```
+GCAP: +CGSM
```

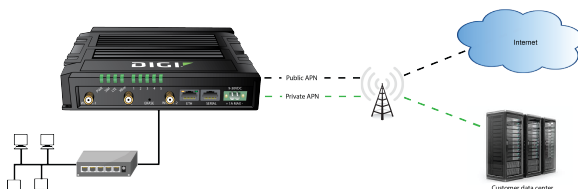
```
OK
```

5. Type **exit** to exit the Admin CLI.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Configure dual APNs

Some cellular carriers offer a dual APN feature that allows a SIM card to be provisioned with two separate APNs that can be used simultaneously. For example, Verizon offers this service as its Split Data Routing feature. This feature provides two separate networking paths through a single cellular modem and SIM card, and allows for configurations such as:

- Segregating public and private traffic, including policy-based routes to ensure that your internal network traffic always goes through the private connection.
- Separation of untrusted Internet traffic from trusted internal network traffic.
- Secure connection to internal customer network without using a VPN.
- Separate billing structures for public and private traffic.
- Site-to-site networking, without the overhead of tunneling for each device.



To accomplish this, we will create separate WWAN interfaces that use the same modem but use different APNs, and then use routing roles to forward traffic to the appropriate WWAN interface.

Web

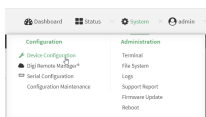
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

Remote Manager:

- a. Locate your device as described in [Use Digi Remote Manager to view and manage your device](#).
- b. Click the **Device ID**.
- c. Click **Settings**.
- d. Click to expand **Config**.

Local Web UI:

- a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



The **Configuration** window is displayed.

3. Increase the maximum number of interfaces allowed for the modem:
 - a. Click **Network > Modems > Modem**.
 - b. For **Maximum number of interfaces**, type **2**.

The screenshot shows the 'Modem' configuration page. The 'Maximum number of interfaces' field is highlighted with a green circle, and a green arrow points to the value '2' entered in the field.

4. Create the WWAN interfaces:

In this example, we will create two interfaces named **WWAN_Public** and **WWAN_Private**.

 - a. Click **Network > Interfaces**.
 - b. For **Add Interface**, type **WWAN_Public** and click **↩**

The screenshot shows the 'Network > Interfaces' page. The 'Add' button next to the 'WWAN_Public' interface is highlighted with a green circle, and a green arrow points to it.

- c. For **Interface type**, select **Modem**.
 - d. For **Zone**, select **External**.
 - e. For **Device**, select **Modem**.
 - f. (Optional) For **APN selection**, select whether you want to configure the device to use the preconfigured APNs, custom APNs, or both.
 - g. For **Add Interface**, type **WWAN_Private** and click **↩**

The screenshot shows the 'Network > Interfaces' page. The 'Add' button next to the 'WWAN_Private' interface is highlighted with a green circle, and a green arrow points to it.

- h. For **Interface type**, select **Modem**.
 - i. For **Zone**, select **External**.
 - j. For **Device**, select **Modem**.
 - This should be the same modem selected for the **WWAN_Public** WWAN.
 - k. For **APN selection**, select whether you want to configure the device to use the preconfigured APNs, custom APNs, or both.

5. Create the routing policies. For example, to route all traffic from a device with the IP address of 192.168.2.101 through the private APN:

- a. Click **Network > Routes > Policy-based routing**.
- b. Click the  to add a new route policy.



- c. For **Label**, enter **Route through private APN**.
- d. For **Interface**, select **Interface: WWAN_Private**.
- e. Configure the source address:
 - i. Click to expand **Source address**.
 - ii. For **Type**, select **IPv4 address**.
 - iii. For **Address**, type **192.168.2.101**.
- f. Configure the destination address:
 - i. Click to expand **Destination address**.
 - ii. For **Type**, select **Interface**.
 - iii. For **Interface**, select **Interface: WWAN_Private**.

6. Click **Apply** to save the configuration and apply the change.

Command line

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Set the maximum number of interfaces for the modem:

```
(config)> network modem modem xbee_cellular max_intfs 2
(config)>
```

4. Create the WWAN interfaces:

- a. Create the **WWANPublic** interface:

```
(config)> add network interface WWANPublic
(config network interface WWANPublic)>
```

- b. Set the interface type to modem:

```
(config network interface WWANPublic)> type modem
(config network interface WWANPublic)>
```

- c. Set the modem device:

```
(config network interface WWANPublic)> modem device modem xbee_cellular
(config network interface WWANPublic)>
```

- d. Configure whether you want the device to use the preconfigured APNs, custom APNs, or both. For more information, see [Cellular modem APNs](#).

```
(config network interface WWANPublic)> modem apn public_apn
(config network interface WWANPublic)>
```

- e. Use to periods (..) to move back one level in the configuration:

```
(config network interface WWANPublic)> ..
(config network interface)>
```

- f. Create the **WWANPrivate** interface:

```
(config network interface)> add WWANPrivate
(config network interface WWANPrivate)>
```

- g. Set the interface type to modem:

```
(config network interface WWANPrivate)> type modem
(config network interface WWANPrivate)>
```

- h. Set the modem device:

```
(config network interface WWANPrivate)> modem device modem xbee_cellular
(config network interface WWANPrivate)>
```

- i. Enable **APN list only**:

```
(config network interface WWANPrivate)> modem apn_selection apn_list_only
(config network interface WWANPrivate)>
```

- j. Set the private APN:

```
(config network interface WWANPublic)> modem apn private_apn
(config network interface WWANPublic)>
```

- 5. Create the routing policies. For example, to route all traffic from a device with the IP address of 192.168.2.101 through the private APN:

- a. Add a new routing policy:

```
(config)> add network route policy end
(config network route policy 0)>
```

- b. Set the label that will be used to identify this route policy:

```
(config network route policy 0)> label "Route through private apn"
(config network route policy 0)>
```

- c. Set the interface:

```
(config network route policy 0)> interface /network/interface/WWANPrivate
(config network route policy 0)>
```

- d. Configure the source address:

- i. Set the source type to **address**:

```
(config network route policy 0)> src type address
(config network route policy 0)>
```

- ii. Set the IP address to **192.168.2.101**:

```
(config network route policy 0)> src address 192.168.2.101
(config network route policy 0)>
```

- e. Configure the destination address:

- i. Set the type to **interface**:

```
(config network route policy 1)> dst type interface
(config network route policy 1)>
```

- ii. Set the interface to **WWANPrivate** :

```
(config network route policy 1)> interface /network/interface/WWANPrivate
(config network route policy 1)>
```

- 6. Save the configuration and apply the change.

```
(config network route policy 1)> save
Configuration saved.
>
```

7. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Configure a Wireless Wide Area Network (WWAN)

Configuring a Wireless Wide Area Network (WWAN) involves configuring the following items:

Required configuration items

- The interface type: **Modem**.
- The firewall zone: **External**.
- The cellular modem that is used by the WWAN.

Additional configuration items

- SIM selection for this WWAN.
- The SIM PIN.
- The SIM phone number for SMS connections.
- Enable or disable roaming.
- SIM failover configuration.
- APN configuration.
- The custom gateway/netmask.
- IPv4 configuration:
 - The type being the way to control how the modem in the Digi device obtains an IP address from the cellular network.
 - The metric for IPv4 routes associated with the WAN.
 - The relative weight for IPv4 routes associated with the WAN.
 - The IPv4 management priority of the WAN. The active interface with the highest management priority will have its address reported as the preferred contact address for central management and direct device access.
 - The IPv4 Maximum Transmission Unit (MTU) of the WAN.
 - Whether to assign a static IPv4 address to the WAN.
 - When to use DNS: always, never, or only when this interface is the primary default route.
 - SureLink active recovery configuration. See [Configure SureLink active recovery to detect modem failures](#) for further information.
- IPv6 configuration:
 - The type being the way to control how the modem in the Digi device obtains an IP address from the cellular network.
 - The metric for IPv6 routes associated with the WAN.
 - The relative weight for IPv6 routes associated with the WAN.

- The IPv6 management priority of the WAN. The active interface with the highest management priority will have its address reported as the preferred contact address for central management and direct device access.
- The IPv6 Maximum Transmission Unit (MTU) of the WAN.
- Whether to assign a static IPv6 address to the WAN.
- When to use DNS: always, never, or only when this interface is the primary default route.
- SureLink active recovery configuration. See [Configure SureLink active recovery to detect modem failures](#) for further information.

Web

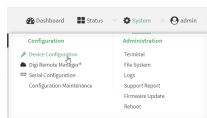
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

Remote Manager:

- a. Locate your device as described in [Use Digi Remote Manager to view and manage your device](#).
- b. Click the **Device ID**.
- c. Click **Settings**.
- d. Click to expand **Config**.

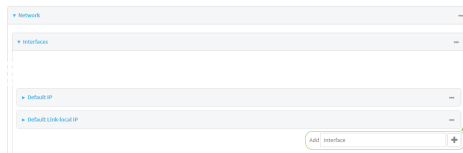
Local Web UI:

- a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



The **Configuration** window is displayed.

3. Click **Network > Interfaces**.
4. Create the WWAN or select an existing WWAN:
 - To create a new WWAN:
 - a. For **Add interface**, type a name for the WWAN and click **Go**



- b. For **Interface type**, select **Modem**.

New WWANs are enabled by default. To disable, toggle off **Enable**.

- To edit an existing WWAN, click to expand the WWAN.
5. For **Zone**, select **External**.
 6. For **Device**, select the cellular modem.
 7. For **Match SIM by**, select a SIM matching criteria to determine when this WWAN should be used:
 - If **SIM slot** is selected, for **Match SIM slot**, select which SIM slot must be in active for this WWAN to be used.
 - If **Carrier** is selected, for **Match SIM carrier**, select which cellular carrier must be in active for this WWAN to be used.
 - If **PLMN identifier** is selected, for **Match PLMN identifier**, type the PLMN id that must be in active for this WWAN to be used.
 - If **IMSI** is selected, for **Match IMSI**, type the International Mobile Subscriber Identity (IMSI) that must be in active for this WWAN to be used.
 - If **ICCID** is selected, for **Match ICCID**, type the unique SIM card ICCID that must be in active for this WWAN to be used.
 8. Type the **PIN** for the SIM. Leave blank if no PIN is required.
 9. Type the **Phone number** for the SIM, for SMS connections.
Normally, this should be left blank. It is only necessary to complete this field if the SIM does not have a phone number or if the phone number is incorrect.
 10. **Roaming** is enabled by default. Click to disable.
 11. For **Carrier selection mode**, select one of the following:
 - **Automatic**: The cellular carrier is selected automatically by the device.
 - **Manual**: The cellular carrier must be manually configured. If the configured network is not available, no cellular connection will be established.
 - **Manual/Automatic**: The carrier is manually configured. If the configured network is not available, automatic carrier selection is used.

If **Manual** or **Manual/Automatic** is selected:

- a. For **Network PLMN ID**, type the PLMN ID for the cellular network.
- b. For **Network technology**, select the technology that should be used. The default is **All technologies**, which means that the best available technology will be used.

Note If **Manual** is configured for **Carrier selection mode** and a specific network technology is selected for the **Network technology**, your modem must support the selected technology or no cellular connection will be established. If you are using a cellular connection to perform this procedure, you may lose your connection and the device will no longer be accessible.

12. **SIM failover** is enabled by default, which means that the modem will automatically fail over from the active SIM to the next available SIM when the active SIM fails to connect. If enabled:
 - a. For **Connection attempts before SIM failover**, type the number of times that the device should attempt to connect to the active SIM before failing over to the next available SIM.
 - b. For **SIM failover alternative**, configure how SIM failover will function if automatic SIM switching is unavailable:
 - **None**: The device will perform no alternative action if automatic SIM switching is unavailable.
 - **Reset modem**: The device will reset the modem if automatic SIM switching is unavailable.
 - **Reboot device**: The device will reboot if automatic SIM switching is unavailable.
13. For **APN Selection**, select whether you want to configure the XBee Hive to use the preconfigured APNs, custom APNs, or both. See [Cellular modem APNs](#) for information and instructions for setting an APN.
14. (Optional) To configure the IP address of a custom gateway or a custom netmask:
 - a. Click **Custom gateway** to expand.
 - b. Click **Enable**.
 - c. For **Gateway/Netmask**, enter the IP address and netmask of the custom gateway. To override only the gateway netmask, but not the gateway IP address, use all zeros for the IP address. For example, **0.0.0.0/32** will use the network-provided gateway, but with a /32 netmask.
15. (Optional) IPv4 configuration items:
 - a. Click **IPv4** to expand.
 - b. IPv4 support is **Enabled** by default. Click to disable.
 - c. Set the **Type**.
 - **Static IP address** - Digi device obtains the static IP address from the cellular network.
 - **DHCP address** - Digi device obtains IP address through a DHCP server on the cellular network.
 - a. Set the **MTU**.
 - b. For **Use DNS**:
 - **Always**: DNS will always be used for this WWAN; when multiple interfaces have the same DNS server, the interface with the lowest metric will be used for DNS requests.

- **When primary default route:** Only use the DNS servers provided for this WWAN when the WWAN is the primary route.
- **Never:** Never use DNS servers for this WWAN.

The default setting is **When primary default route**.

16. (Optional) IPv6 configuration items:
 - a. Click **IPv6** to expand.
 - b. IPv6 support is **Enabled** by default. Click to disable.
 - c. Set the **Type**.
 - Static IP address - Digi device obtains the static IP address from the cellular network.
 - DHCP address - Digi device obtains IP address through a DHCP server on the cellular network.
 - a. Set the **MTU**.
 - b. For **Use DNS**:
 - **Always:** DNS will always be used for this WWAN; when multiple interfaces have the same DNS server, the interface with the lowest metric will be used for DNS requests.
 - **When primary default route:** Only use the DNS servers provided for this WWAN when the WWAN is the primary route.
 - **Never:** Never use DNS servers for this WWAN.

The default setting is **When primary default route**.

1. See [Configure SureLink active recovery to detect modem failures](#) for information about configuring **SureLink**.
17. Click **Apply** to save the configuration and apply the change.

Command line

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Create a new WWAN or edit an existing one:

- To create a new WWAN named **my_wwan**:

```
(config)> add network interface my_wwan
(config network interface my_wwan)>
```

- To edit an existing WWAN named **my_wwan**, change to the **my_wwan** node in the configuration schema:

```
(config)> network interface my_wwan
(config network interface my_wwan)>
```

4. Set the appropriate firewall zone:

```
(config network interface my_wwan)> zone zone
(config network interface my_wwan)>
```

See [Firewall configuration](#) for further information.

5. Select a cellular modem:

- a. Enter **modem device ?** to view available modems and the proper syntax.

```
(config network interface my_wwan)> modem device ?
```

Device: The modem used by this network interface.

Format:

modem xbee_cellular

Current value:

```
(config network interface my_wwan)> device
```

- b. Set the device:

```
(config network interface my_wwan)> modem device modem xbee_cellular
(config network interface my_wwan)>
```

6. Set the SIM matching criteria to determine when this WWAN should be used:

```
(config network interface my_wwan)> modem match value
(config network interface my_wwan)>
```

Where *value* is one of:

- **any**
- **carrier**

Set the cellular carrier must be in active for this WWAN to be used:

- a. Use **?** to determine available carriers:

```
(config network interface my_wwan)> modem carrier
```

Match SIM carrier: The SIM carrier match criteria. This interface is applied when the SIM card is

provisioned from the carrier.

Format:

AT&T

Rogers

Sprint

T-Mobile

Telstra

Verizon

Vodafone

other

Default value: AT&T

Current value: AT&T

```
(config network interface my_wwan)>
```

- b. Set the carrier:

```
(config network interface my_wwan)> modem carrier value  
(config network interface my_wwan)>
```

■ **iccid**

Set the unique SIM card ICCID that must be in active for this WWAN to be used:

```
(config network interface my_wwan)> modem iccid ICCID  
(config network interface my_wwan)>
```

■ **imsi**

Set the International Mobile Subscriber Identity (IMSI) that must be in active for this WWAN to be used:

```
(config network interface my_wwan)> modem imsi IMSI  
(config network interface my_wwan)>
```

■ **plmn_id**

Set the PLMN id that must be in active for this WWAN to be used:

```
(config network interface my_wwan)> modem plmn_id PLMN_ID  
(config network interface my_wwan)>
```

■ **sim_slot**

Set which SIM slot must be in active for this WWAN to be used:

```
(config network interface my_wwan)> modem sim_slot value  
(config network interface my_wwan)>
```

where *value* is either **1** or **2**.

7. Set the PIN for the SIM. Leave blank if no PIN is required.

```
(config network interface my_wwan)> modem pin value  
(config network interface my_wwan)>
```

8. Set the phone number for the SIM, for SMS connections:

```
(config network interface my_wwan)> modem phone num  
(config network interface my_wwan)>
```

Normally, this should be left blank. It is only necessary to complete this field if the SIM does not have a phone number or if the phone number is incorrect.

9. Roaming is enabled by default. To disable:

```
(config network interface my_wwan)> modem roaming false  
(config network interface my_wwan)>
```

10. Set the carrier selection mode:

```
(config network interface my_wwan)> modem operator_mode value
(config network interface my_wwan)>
```

where *value* is one of:

- **automatic**: The cellular carrier is selected automatically by the device.
- **manual**: The cellular carrier must be manually configured. If the configured network is not available, no cellular connection will be established.
- **manual_automatic**: The carrier is manually configured. If the configured network is not available, automatic carrier selection is used.

If **manual** or **manual_automatic** is set:

a. Set the Network PLMN ID:

```
(config network interface my_wwan)> modem operator PLMN_ID
(config network interface my_wwan)>
```

b. Set the cellular network technology:

```
(config network interface my_wwan)> modem operator_technology value
(config network interface my_wwan)>
```

where *value* is one of:

- **all**: The best available technology will be used.
- **2G**: Only 2G technology will be used.
- **3G**: Only 3G technology will be used.
- **4G**: Only 4G technology will be used.
- **NR5G-NSA**: Only 5G non-standalone technology will be used.
- **NR5G-SA**: Only 5G standalone technology will be used.

The default is **all**.

Note If **manual** is configured for the carrier selection mode and a specific network technology is selected for the cellular network technology, your modem must support the selected technology or no cellular connection will be established. If you are using a cellular connection to perform this procedure, you may lose your connection and the device will no longer be accessible.

11. SIM failover is enabled by default, which means that the modem will automatically fail over from the active SIM to the next available SIM when the active SIM fails to connect. To disable:

```
(config network interface my_wwan)> modem sim_failover false
(config network interface my_wwan)>
```

If enabled:

- a. Set the number of times that the device should attempt to connect to the active SIM before failing over to the next available SIM:

```
(config network interface my_wwan)> modem sim_failover_retries num
(config network interface my_wwan)>
```

The default setting is **5**.

- b. Configure how SIM failover will function if automatic SIM switching is unavailable:

```
(config network interface my_wwan)> modem sim_failover_alt value
(config network interface my_wwan)>
```

where *value* is one of:

- **none**: The device will perform no alternative action if automatic SIM switching is unavailable.
- **reset**: The device will reset the modem if automatic SIM switching is unavailable.
- **reboot**: The device will reboot if automatic SIM switching is unavailable.

12. (Optional) To configure the device to use either the preconfigured APNs, custom APNs, or both:

```
(config)> network interface modem xbee_cellular modem apn_selection value
(config)>
```

Where *value* is one of the following:

- **apn_list_only**
- **both_lists**
- **built-in-list-only**

13. (Optional) To configure the IP address of a custom gateway or a custom netmask:

- a. Enable the custom gateway:

```
(config network interface my_wwan)> modem custom_gw enable true
(config network interface my_wwan)>
```

- b. Set the IP address and netmask of the custom gateway:

```
(config network interface my_wwan)> modem custom_gw gateway ip_address/netmask
(config network interface my_wwan)> modem custom_gw
```

To override only the gateway netmask, but not the gateway IP address, use all zeros for the IP address. For example, **0.0.0.0/32** will use the network-provided gateway, but with a /32 netmask.

14. Optional IPv4 configuration items:

- a. IPv4 support is enabled by default. To disable:

```
(config network interface my_wwan)> ipv4 enable false
(config network interface my_wwan)>
```

- b. Set the type, which determines how the modem in the device obtains an IP address from the cellular network.

```
(config network interface my_wwan)> ipv4 modem_type value
(config network interface my_wwan)>
```

Where *value* is one of:

- **static**: Digi device obtains the static IP address from the cellular network.
- **dhcp**: Digi device obtains IP address via a DHCP server on the cellular network.

- c. Set the MTU:

```
(config network interface my_wwan)> ipv4 mtu num
(config network interface my_wwan)>
```

- d. Configure when the WWAN's DNS servers will be used:

```
(config network interface my_wwan)> ipv4 dns value
(config network interface my_wwan)>
```

Where *value* is one of:

- **always**: DNS will always be used for this WWAN; when multiple interfaces have the same DNS server, the interface with the lowest metric will be used for DNS requests.
- **never**: Never use DNS servers for this WWAN.
- **primary**: Only use the DNS servers provided for this WWAN when the WWAN is the primary route.

The default setting is **primary**.

15. Optional IPv6 configuration items:

- a. IPv6 support is enabled by default. To disable:

```
(config network interface my_wwan)> ipv6 enable false
(config network interface my_wwan)>
```

- b. Set the type, which determines how the modem in the device obtains an IP address from the cellular network.

```
(config network interface my_wwan)> ipv6 modem_type value
(config network interface my_wwan)>
```

Where *value* is one of:

- **static**: Digi device obtains the static IP address from the cellular network.
- **dhcp**: Digi device obtains IP address via a DHCP server on the cellular network.

- c. Set the MTU:

```
(config network interface my_wwan)> ipv6 mtu num
(config network interface my_wwan)>
```

- d. Configure when the WWAN's DNS servers will be used:

```
(config network interface my_wwan)> ipv6 dns value
(config network interface my_wwan)>
```

Where *value* is one of:

- **always**: DNS will always be used for this WWAN; when multiple interfaces have the same DNS server, the interface with the lowest metric will be used for DNS

requests.

- **never**: Never use DNS servers for this WWAN.
- **primary**: Only use the DNS servers provided for this WWAN when the WWAN is the primary route.

The default setting is **primary**.

16. See [Configure SureLink active recovery to detect modem failures](#) for information about configuring active recovery.
17. Save the configuration and apply the change.

```
(config network interface my_wan)> save
Configuration saved.
>
```

18. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Show WWAN status and statistics



Web

Log into the XBee Hive WebUI as a user with full Admin access rights.

1. From the menu, click **Status**.
2. Under **Networking**, click **Interfaces**.

Command line

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. Enter the [show network](#) command at the Admin CLI prompt:

```
> show network
```

Interface	Proto	Status	Address
setupip	IPv4	up	192.168.210.1/24
setuplinklocalip	IPv4	up	169.254.100.100/16
eth	IPv4	up	192.168.2.1/24
eth	IPv6	up	fd00:2704::1/48
loopback	IPv4	up	127.0.0.1/8
eth1	IPv4	up	10.10.10.10/24
eth1	IPv6	up	fe00:2404::240:f4ff:fe80:120/64
eth1	IPv4	up	10.10.10.10/24
eth1	IPv6	up	fe00:2404::240:f4ff:fe80:120/64
modem xbee_cellular	IPv4	up	10.200.1.101/30

```
modem xbee_cellular      IPv6  down
```

```
>
```

3. Additional information can be displayed by using the [show network verbose](#) command:

```
> show network verbose
```

Interface	Proto	Status	Type	Zone	Device	Metric	Weight
setupip	IPv4	up	static	setup	eth	10	10
setuplinklocalip	IPv4	up	static	setup	eth	0	10
eth	IPv4	up	static	internal	eth	5	10
eth	IPv6	up	static	internal	eth	5	10
loopback	IPv4	up	static	loopback	loopback	0	10
eth1	IPv4	up	dhcp	external	eth1	1	10
eth1	IPv6	up	dhcp	external	eth1	1	10
eth1	IPv4	up	dhcp	external	eth1	1	10
eth1	IPv6	up	dhcp	external	eth1	1	10
modem xbee_cellular			IPv4	up	modem	external	wwan1 3 10
modem xbee_cellular			IPv6	down	modem	external	wwan1 3 10

```
>
```

4. Enter **show network interface *name*** at the Admin CLI prompt to display additional information about a specific WAN. For example, to display information about ETH1, enter **show network interface *eth1***:

```
> show network interface eth1
```

```
wan1 Interface Status
```

```
-----
Device      : eth1
Zone        : external
```

```
IPv4 Status   : up
IPv4 Type     : dhcp
IPv4 Address(es) : 10.10.10.10/24
IPv4 Gateway   : 10.10.10.1
IPv4 MTU      : 1500
IPv4 Metric    : 1
IPv4 Weight    : 10
IPv4 DNS Server(s) : 10.10.10.2, 10.10.10.3
```

```
IPv6 Status   : up
IPv6 Type     : dhcpv6
IPv6 Address(es) : fe00:2404::240:f4ff:fe80:120/64
IPv6 Gateway   : ff80::234:f3ff:ff0e:4320
IPv6 MTU      : 1500
IPv6 Metric    : 1
IPv6 Weight    : 10
```

IPv6 DNS Server(s) : fd00:244::1, fe80::234:f3f4:fe0e:4320

>

5. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Delete a WWAN.

Follow this procedure to delete any WANs and WWANs that have been added to the system. You cannot delete the preconfigured WAN, **ETH1**, or the preconfigured WWAN, **Modem**.

Web

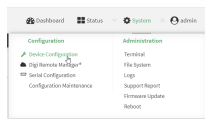
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

Remote Manager:

- a. Locate your device as described in [Use Digi Remote Manager to view and manage your device](#).
- b. Click the **Device ID**.
- c. Click **Settings**.
- d. Click to expand **Config**.

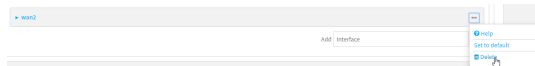
Local Web UI:

- a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



The **Configuration** window is displayed.

3. Click **Network > Interfaces**.
4. Click the menu icon (...) next to the name of the WAN or WWAN to be deleted and select **Delete**.



5. Click **Apply** to save the configuration and apply the change.

Command line

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the Xbee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Use the **del** command to delete the WAN or WWAN. For example, to delete a WWAN named **my_wwan**:

```
(config)> del network interface my_wwan
```

4. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

5. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Configure a Wide Area Network (WAN)

Configuring a Wide Area Network (WAN) involves configuring the following items:

Required configuration items

- A name for the interface.

Note If the interface name is more than eight characters, the name will be truncated in the underlying network interface to the first six characters followed by three digits, incrementing from 000. This affects any custom scripts or firewall rules that may be trying to adjust the interface or routing table entries.

- The interface type: **Ethernet**.
- The firewall zone: **External**.
- The network device that is used by the WAN.
- Configure the WAN as a DHCP client.

Additional configuration items

- Active recovery configuration. See [Configure SureLink active recovery to detect modem failures](#) for further information.
- Additional IPv4 configuration:
 - The type being the way to control how the modem in the Digi device obtains an IP address from the cellular network.
 - The metric for IPv4 routes associated with the WAN.
 - The relative weight for IPv4 routes associated with the WAN.
 - The IPv4 management priority of the WAN. The active interface with the highest management priority will have its address reported as the preferred contact address for central management and direct device access.
 - The IPv4 Maximum Transmission Unit (MTU) of the WAN.
 - Whether to assign a static IPv4 address to the WAN.
 - When to use DNS: always, never, or only when this interface is the primary default route.
 - When to use DNS servers for this interface.
 - Whether to include the XBee Hive device's hostname in DHCP requests.

- IPv6 configuration:
 - The type being the way to control how the modem in the Digi device obtains an IP address from the cellular network.
 - The metric for IPv6 routes associated with the WAN.
 - The relative weight for IPv6 routes associated with the WAN.
 - The IPv6 management priority of the WAN. The active interface with the highest management priority will have its address reported as the preferred contact address for central management and direct device access.
 - The IPv6 Maximum Transmission Unit (MTU) of the WAN.
 - Whether to assign a static IPv6 address to the WAN.
 - When to use DNS: always, never, or only when this interface is the primary default route.
 - When to use DNS servers for this interface.
 - Whether to include the XBee Hive device's hostname in DHCP requests.
- MAC address denylist and allowlist.

To create a new WAN or edit an existing WAN:

Web

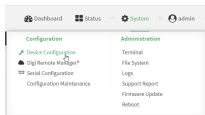
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

Remote Manager:

- a. Locate your device as described in [Use Digi Remote Manager to view and manage your device](#).
- b. Click the **Device ID**.
- c. Click **Settings**.
- d. Click to expand **Config**.

Local Web UI:

- a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

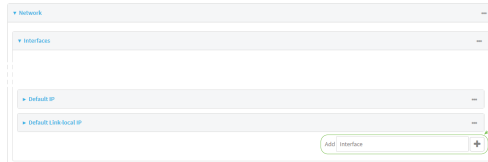


The **Configuration** window is displayed.

3. Click **Network > Interfaces**.

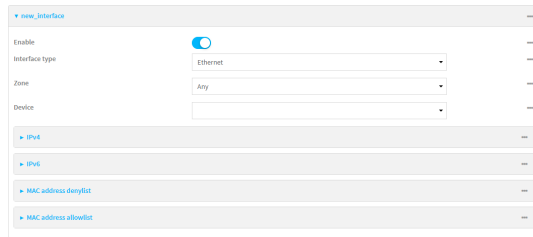
4. Create the WAN or select an existing WAN:

- To create a new WAN, for **Add interface**, type a name for the WAN and click 



- To edit an existing WAN, click to expand the WAN.

The Interface configuration window is displayed.



New WANs are enabled by default. To disable, toggle off **Enable**.

- For **Interface type**, leave at the default setting of **Ethernet**.
- For **Zone**, select **External**.
- For **Device**, select an Ethernet device, a Wi-Fi client,.
- (Optional) Click to expand **802.1x** to configure 802.1x port based network access control.

The XBee Hive can function as an 802.1x authenticator; it does not function as an 802.1x supplicant.

- Click to expand **Authentication**.
 - Click **Enable server** to enable the 802.1x authenticator on the XBee Hive device.
 - Set the **Reauth** period.
- Configure IPv4 settings:
 - Click to expand **IPv4**.
IPv4 support is enabled by default.
 - For **Type**, select **DHCP address**.
 - Optional IPv4 configuration items:
 - Set the **MTU**.
 - For **Use DNS**, select one of the following:
 - **Always**: DNS will always be used for this WAN; when multiple interfaces have the same DNS server, the interface with the lowest metric will be used for DNS requests.
 - **When primary default route**: Only use the DNS servers provided for this interface when the interface is the primary route.
 - **Never**: Never use DNS servers for this interface.
 - Enable **DHCP Hostname** to instruct the XBee Hive device to include the device's system name with DHCP requests as the Client FQDN option. The DHCP server

can then be configured to register the device's hostname and IP address with an associated DNS server.

- See [RFC4702](#) for further information about DHCP server support for the Client FQDN option.
 - See [Configure system information](#) for information about setting the XBee Hive device's system name.
 - d. Enable **Force link** to keep the network interface active even when the device link is down.
- 10. (Optional) Configure IPv6 settings:
 - a. Click to expand **IPv6**.
 - b. **Enable** IPv6 support.
 - c. For **Type**, select **DHCPv6 address**.
 - d. For **Prefix length**, type the minimum length of the prefix to assign to this LAN. If the minimum length is not available, then a longer prefix will be used.
 - e. For **Prefix ID**, type the identifier used to extend the prefix to the assigned length. Leave blank to use a random identifier.
 - f. Set the **MTU**.
 - g. For **Use DNS**:
 - **Always**: DNS will always be used for this WAN; when multiple interfaces have the same DNS server, the interface with the lowest metric will be used for DNS requests.
 - **When primary default route**: Only use the DNS servers provided for this interface when the interface is the primary route.
 - **Never**: Never use DNS servers for this interface.
 - h. Enable **DHCP Hostname** to instruct the XBee Hive device to include the device's system name with DHCP requests as the Client FQDN option. The DHCP server can then be configured to register the device's hostname and IP address with an associated DNS server.
 - See [RFC4702](#) for further information about DHCP server support for the Client FQDN option.
 - See [Configure system information](#) for information about setting the XBee Hive device's system name.
 - i. (Optional) To assign a static address to a network interface, click to expand **Static address**.
 - i. Click the slider to enable.
 - ii. For **Address**, type the name of the static address you want to use (for example, *tree::squirrel:tail/64*).
- 11. (Optional) Click to expand **MAC address denylist**.
Incoming packets will be dropped from any devices whose MAC addresses is included in the **MAC address denylist**.
 - a. Click to expand **MAC address denylist**.
 - b. For **Add MAC address**, click .
 - c. Type the **MAC address**.

12. (Optional) Click to expand **MAC address allowlist**.
If allowlist entries are specified, incoming packets will only be accepted from the listed MAC addresses.
 - a. Click to expand **MAC address allowlist**.
 - b. For **Add MAC address**, click .
 - c. Type the **MAC address**.
1. See [Configure SureLink active recovery to detect modem failures](#) for information about configuring **SureLink**.
13. Click **Apply** to save the configuration and apply the change.

Command line

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Create a new WAN or edit an existing one:

- To create a new WAN named **my_wan**:

```
(config)> add network interface my_wan
(config network interface my_wan)>
```

- To edit an existing WAN named **my_wan**, change to the **my_wan** node in the configuration schema:

```
(config)> network interface my_wan
(config network interface my_wan)>
```

4. Set the appropriate firewall zone:

```
(config network interface my_wan)> zone zone
(config network interface my_wan)>
```

See [Firewall configuration](#) for further information.

5. Select an Ethernet device, a Wi-Fi device,.
 - a. Enter **device ?** to view available devices and the proper syntax.

```
(config network interface my_wan)> device ?
```

Device: The network device used by this network interface.

Format:

/network/device/eth

/network/device/loopback

Current value:

```
(config network interface my_wan)> device
```

- b. Set the device for the LAN:

```
(config network interface my_wan)> device device  
(config network interface my_wan)>
```

6. Configure IPv4 settings:

- IPv4 support is enabled by default. To disable:

```
(config network interface my_wan)> ipv4 enable false  
(config network interface my_wan)>
```

- Configure the WAN to be a DHCP client:

```
(config network interface my_wan)> ipv4 type dhcp  
(config network interface my_wan)>
```

- a. Optional IPv4 configuration items:

- i. Set the MTU:

```
(config network interface my_wan)> ipv4 mtu num  
(config network interface my_wan)>
```

- ii. Configure how to use DNS:

```
(config network interface my_wan)> ipv4 use_dns value  
(config network interface my_wan)>
```

where *value* is one of:

- **always:** DNS will always be used for this WAN; when multiple interfaces have the same DNS server, the interface with the lowest metric will be used for DNS requests.
 - **primary:** Only use the DNS servers provided for this interface when the interface is the primary route.
 - **never:** Never use DNS servers for this interface.
- iii. Enable DHCP Hostname to instruct the XBee Hive device to include the device's system name with DHCP requests as the Client FQDN option. The DHCP server can then be configured to register the device's hostname and IP address with an associated DNS server.

```
(config network interface my_wan)> ipv4 dhcp_hostname true  
(config network interface my_wan)>
```

- See [RFC4702](#) for further information about DHCP server support for the Client FQDN option.
- See [Configure system information](#) for information about setting the XBee Hive device's system name.

- b. See [Configure WAN priority and default route metrics](#) for further information about metrics.

7. (Optional) Configure IPv6 settings:

- a. Enable IPv6 support:

```
(config network interface my_wan)> ipv6 enable true
(config network interface my_wan)>
```

- b. Set the IPv6 type to DHCP:

```
(config network interface my_wan)> ipv6 type dhcpv6
(config network interface my_wan)>
```

- c. Generally, the default settings for IPv6 support are sufficient. You can view the default IPv6 settings by using the question mark (?):

```
(config network interface my_wan)> ipv6 ?
```

IPv6

Parameters	Current Value	
dhcp_hostname	false	DHCP Hostname
enable	true	Enable
metric	0	Metric
mgmt	0	Management priority
mtu	1500	MTU
type	dhcpv6	Type
use_dns	always	Use DNS
weight	10	Weight

Additional Configuration

```
connection_monitor    Active recovery
```

```
(config network interface my_wan)>
```

- d. Modify any of the remaining default settings as appropriate.
- e. (Optional) To assign a static address to a network interface:

```
>config
(config)> network interfacemy_wan ipv6 static ?
```

Static address: IPv6 static address.

Parameters	Current value	
address		Address
enable	false	Enable

```
(config)> network interface my_wan ipv6 static address ?
```

Address: The IPv6 address to use.

Format: IPv6_address/prefix_length

Current value:

```
(config)>
```

8. (Optional) To configure 802.1x port based network access control:

Note The XBee Hive can function as an 802.1x authenticator; it does not function as an 802.1x supplicant.

- a. Enable the 802.1x authenticator on the XBee Hive device:

```
(config network interface my_wan)> 802_1x authentication enable true
(config network interface my_wan)>
```

- b. Set the frequency period for reauthorization:

```
(config network interface my_wan)> 802_1x authentication reauth_period value
(config network interface my_wan)>
```

where *value* is an integer between **0** and **86400**. The default is **3600**.

9. (Optional) Configure the MAC address deny list.

Incoming packets will be dropped from any devices whose MAC addresses is included in the MAC address denylist.

- a. Add a MAC address to the denylist:

```
(config network interface my_wan)> add mac_denylist end mac_address
(config network interface my_wan)>
```

where *mac_address* is a hyphen-separated MAC address, for example, 32-A6-84-2E-81-58.

- b. Repeat for each additional MAC address.

10. (Optional) Configure the MAC address allowlist.

If allowlist entries are specified, incoming packets will only be accepted from the listed MAC addresses.

- a. Add a MAC address to the allowlist:

```
(config network interface my_wan)> add mac_allowlist end mac_address
(config network interface my_wan)>
```

where *mac_address* is a hyphen-separated MAC address, for example, 32-A6-84-2E-81-58.

- b. Repeat for each additional MAC address.

11. See [Configure SureLink active recovery to detect modem failures](#) for information about configuring SureLink for active recovery.

12. Save the configuration and apply the change.

```
(config network interface my_wan)> save  
Configuration saved.  
>
```

13. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Local Area Networks (LANs)

The XBee Hive device is preconfigured with the following Local Area Networks (LANs):

Interface type	Preconfigured interfaces	Devices	Default configuration
Local Area Network (LAN)	▪ ETH	▪ Ethernet: ETH	▪ Firewall zone: Internal ▪ IPv4 > Type: DHCP address ▪ LAN priority: Metric=1
	▪ Loopback	▪ Ethernet: Loopback	▪ Firewall zone: Loopback ▪ IP address: 127.0.0.1/8
	▪ Setup IP	▪ Ethernet: ETH	▪ Firewall zone: Setup ▪ IP address 192.168.210.1/24
	▪ Setup Link-local IP	▪ Ethernet: ETH	▪ Firewall zone: Setup ▪ IP address 169.254.100.100/16

You can modify configuration settings for **ETH**, and you can create new LANs.

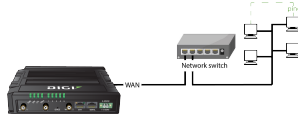
This section contains the following topics:

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Configure a LAN	190
Change the default LAN subnet	196
Change the LAN address type	197
Show LAN status and statistics	198
Delete a LAN	200
DHCP servers	202

About Local Area Networks (LANs)

A Local Area Network (LAN) connects network devices together, such as Ethernet or Wi-Fi, in a logical Layer-2 network.

The following diagram shows a LAN connected to the **ETH** Ethernet device and the **Digi AP** access point (available for Wi-Fi enabled models only). Once the LAN is configured and enabled, the devices connected to the network interfaces can communicate with each other, as demonstrated by the **ping** commands.



Configure a LAN

Configuring a Local Area Network (LAN) involves configuring the following items:

Required configuration items

(missing or bad snippet)

- The interface type: either **Ethernet**, **IP Passthrough**, or **PPPoE**.
- The firewall zone: **Internal**.
- The network device that is used by the LAN.
- The IPv4 address and subnet mask for the LAN. While it is not strictly necessary for a LAN to have an IP address, if you want to send traffic from other networks to the LAN, you must configure an IP address.

Note By default, the Xbee Hive is configured as a DHCP client, and will acquire an IP address from the network.

Additional configuration items

- Additional IPv4 configuration:
(missing or bad snippet)
 - IPv4 DHCP server configuration. See [DHCP servers](#) for more information.
- IPv6 configuration:(missing or bad snippet)
 - The IPv6 prefix length and ID.
 - IPv6 DHCP server configuration. See [DHCP servers](#) for more information.
- MAC address denylist and allowlist.

To create a new LAN or edit an existing LAN:

(missing or bad snippet)

(missing or bad snippet)

1. Click **Network > Interfaces**.

2. Create the LAN or select an existing LAN:
 - To create a new LAN, for **Add interface**, type a name for the LAN and click .
 - To edit an existing LAN, click to expand the LAN.

The Interface configuration window is displayed.

New LANs are enabled by default. To disable, toggle off **Enable**.

3. For **Interface type**, leave at the default setting of **Ethernet**.
4. For **Zone**, select the appropriate firewall zone. See [Firewall configuration](#) for further information.
5. For **Device**, select an Ethernet device, a Wi-Fi access point,.
6. (Optional) Click to expand **802.1x** to configure 802.1x port based network access control. The XBee Hive can function as an 802.1x authenticator; it does not function as an 802.1x supplicant.
 - a. Click to expand **Authentication**.
 - b. Click **Enable server** to enable the 802.1x authenticator on the XBee Hive device.
 - c. Set the **Reauth** period.
7. Configure IPv4 settings:
 - a. Click to expand **IPv4**.
IPv4 support is enabled by default.
 - b. For **Type**, select **Static IP address**.
 - c. For **Address**, type the IP address and subnet of the LAN interface. Use the format *IPv4_address/netmask*, for example, 192.168.2.1/24.
 - d. Optional IPv4 configuration items:
 - i. Set the **MTU**.
 - e. Enable the DHCP server:
 - i. Click to expand **DHCP server**.
 - ii. Click **Enable**.
See [DHCP servers](#) for information about configuring the DHCP server.
 - f. Enable **Force link** to keep the network interface active even when the device link is down.
8. See [Configure DHCP relay](#) for information about configuring **DHCP relay**.
9. (Optional) Configure IPv6 settings:
 - a. Click to expand **IPv6**.
 - b. **Enable** IPv6 support.
 - c. For **Type**, select **IPv6 prefix delegation**.
 - d. For **Prefix length**, type the minimum length of the prefix to assign to this LAN. If the minimum length is not available, then a longer prefix will be used.

- e. For **Prefix ID**, type the identifier used to extend the prefix to the assigned length. Leave blank to use a random identifier.
 - f. Set the **MTU**.
 - g. (Optional) To assign a static address to a network interface, click to expand **Static address**.
 - i. Click the slider to enable.
 - ii. For **Address**, type the name of the static address you want to use (for example, *tree::squirrel:tail/64*).
10. (Optional) Click to expand **MAC address denylist**.
Incoming packets will be dropped from any devices whose MAC addresses is included in the **MAC address denylist**.
- a. Click to expand **MAC address denylist**.
 - b. For **Add MAC address**, click 
 - c. Type the **MAC address**.
11. (Optional) Click to expand **MAC address allowlist**.
If allowlist entries are specified, incoming packets will only be accepted from the listed MAC addresses.
- a. Click to expand **MAC address allowlist**.
 - b. For **Add MAC address**, click 
 - c. Type the **MAC address**.
(missing or bad snippet)
- (missing or bad snippet)
- (missing or bad snippet)
1. Create a new LAN or edit an existing one:
 - To create a new LAN named **my_lan**:

```
(config)> add network interface my_lan
(config network interface my_lan)>
```

 - To edit an existing LAN named **my_lan**, change to the **my_lan** node in the configuration schema:

```
(config)> network interface my_lan
(config network interface my_lan)>
```

 2. Set the appropriate firewall zone:

```
(config network interface my_lan)> zone zone
(config network interface my_lan)>
```

See [Firewall configuration](#) for further information.

3. Select an Ethernet device, a Wi-Fi device,.
 - a. Enter **device ?** to view available devices and the proper syntax.

```
(config network interface my_lan)> device ?
(missing or bad snippet)
Current value:
```

```
(config network interface my_lan)> device
```

- b. Set the device for the LAN:

```
(config network interface my_lan)> device device
(config network interface my_lan)>
```

4. Configure IPv4 settings:

- IPv4 support is enabled by default. To disable:

```
(config network interface my_lan)> ipv4 enable false
(config network interface my_lan)>
```

- The LAN is configured by default to use a static IP address for its IPv4 configuration. To configure the LAN to be a DHCP client, rather than using a static IP address:

```
(config network interface my_lan)> ipv4 type dhcp
(config network interface my_lan)>
```

These instructions assume that the LAN will use a static IP address for its IPv4 configuration.

- a. Set the IPv4 address and subnet of the LAN interface. Use the format *IPv4_address/netmask*, for example, 192.168.2.1/24.

```
(config network interface my_lan)> ipv4 address ip_address/netmask
(config network interface my_lan)>
```

- b. Optional IPv4 configuration items:

- i. Set the MTU:

```
(config network interface my_lan)> ipv4 mtu num
(config network interface my_lan)>
```

- c. Enable the DHCP server:

```
(config network interface my_lan)> ipv4 dhcp_server enable true
```

See [DHCP servers](#) for information about configuring the DHCP server.

- d. See [Configure WAN priority and default route metrics](#) for further information about metrics.

5. (Optional) Configure IPv6 settings:

- a. Enable IPv6 support:

```
(config network interface my_lan)> ipv6 enable true
(config network interface my_lan)>
```

- b. Set the IPv6 type to DHCP:

```
(config network interface my_lan)> ipv6 type dhcpv6
(config network interface my_lan)>
```

- c. Generally, the default settings for IPv6 support are sufficient. You can view the default IPv6 settings by using the question mark (?):

```
(config network interface my_lan)> ipv6 ?
```

IPv6

Parameters	Current Value	
enable	true	Enable
metric	0	Metric
mgmt	0	Management priority
mtu	1500	MTU
prefix_id	1	Prefix ID
prefix_length	48	Prefix length
type	prefix_delegation	Type
weight	10	Weight

Additional Configuration

```
connection_monitor    Active recovery
dhcpv6_server         DHCPv6 server
```

```
(config network interface my_lan)>
```

View default settings for the IPv6 DHCP server:

```
(config network interface my_lan)> ipv6 dhcpv6_server ?
```

DHCPv6 server: The DHCPv6 server settings for this network interface.

Parameters	Current Value	
enable	true	Enable

```
(config network interface my_lan)>
```

- d. Modify any of the remaining default settings as appropriate.

- e. (Optional) To assign a static address to a network interface:

```
>config
(config)> network interface my_lan ipv6 static ?
```

Static address: IPv6 static address.

Parameters	Current value	
address		Address
enable	false	Enable

```
(config)> network interface my_lan ipv6 static address ?
```

Address: The IPv6 address to use.

Format: IPv6_address/prefix_length

Current value:

```
(config)>
```

6. (Optional) To configure 802.1x port based network access control:

Note The XBee Hive can function as an 802.1x authenticator; it does not function as an 802.1x supplicant.

- a. Enable the 802.1x authenticator on the XBee Hive device:

```
(config network interface my_lan)> 802_1x authentication enable true
(config network interface my_lan)>
```

- b. Set the frequency period for reauthorization:

```
(config network interface my_lan)> 802_1x authentication reauth_period value
(config network interface my_lan)>
```

where *value* is an integer between **0** and **86400**. The default is **3600**.

7. (Optional) Configure the MAC address deny list.

Incoming packets will be dropped from any devices whose MAC addresses is included in the MAC address denylist.

- a. Add a MAC address to the denylist:

```
(config network interface my_lan)> add mac_denylist end mac_address
(config network interface my_lan)>
```

where *mac_address* is a hyphen-separated MAC address, for example, 32-A6-84-2E-81-58.

- b. Repeat for each additional MAC address.

8. (Optional) Configure the MAC address allowlist.

If allowlist entries are specified, incoming packets will only be accepted from the listed MAC addresses.

- a. Add a MAC address to the allowlist:

```
(config network interface my_lan)> add mac_allowlist end mac_address
(config network interface my_lan)>
```

where *mac_address* is a hyphen-separated MAC address, for example, 32-A6-84-2E-81-58.

- b. Repeat for each additional MAC address.
(missing or bad snippet)

Change the default LAN subnet

You can change the XBee Hive default LAN subnet—192.168.2.1/24—to any range of private IPs. The local DHCP server range will also change to the range of the LAN subnet.

To change the LAN subnet:



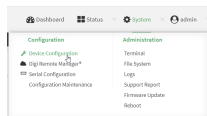
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

Remote Manager:

- a. Locate your device as described in [Use Digi Remote Manager to view and manage your device](#).
- b. Click the **Device ID**.
- c. Click **Settings**.
- d. Click to expand **Config**.

Local Web UI:

- a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



The **Configuration** window is displayed.

3. Click **Network > Interfaces > LAN > IPv4**.
4. For **Address**, change the IP address to an alternate private IP. You must also specify the subnet mask. It must have the syntax of *IPv4_address/netmask*.
5. Click **Apply** to save the configuration and apply the change.

Command line

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. At the config prompt, set the IP address to an alternate private IP:

```
(config)> network interface lan ipv4 address IPv4_address/netmask
(config)>
```

4. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

5. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Change the LAN address type

By default, the LAN interface uses a static IP address. To configure it to use a DHCP address instead:

Web

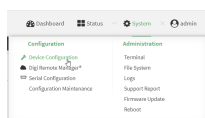
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

Remote Manager:

- a. Locate your device as described in [Use Digi Remote Manager to view and manage your device](#).
- b. Click the **Device ID**.
- c. Click **Settings**.
- d. Click to expand **Config**.

Local Web UI:

- a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



The **Configuration** window is displayed.

3. Click **Network > Interfaces > LAN > IPv4**.
4. For the **Type** option, select **DHCP address**.
5. Click **Apply** to save the configuration and apply the change.

Command line

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. At the config prompt, set the LAN to use a DHCP address:

```
(config)> network interface lan ipv4 type dhcp
```

4. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

5. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Show LAN status and statistics

Web

Log into the XBee Hive WebUI as a user with full Admin access rights.

1. From the menu, click **Status**.
2. Under **Networking**, click **Interfaces**.

Command line

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. Enter the **show network** command at the Admin CLI prompt:

```
> show network
```

```

Interface    Proto Status Address
-----
setupip      IPv4 up    192.168.210.1/24
setuplinklocalip IPv4 up    169.254.100.100/16
eth          IPv4 up    192.168.2.1/24
eth          IPv6 up    fd00:2704::1/48
loopback     IPv4 up    127.0.0.1/8
eth1         IPv4 up    10.10.10.10/24
eth1         IPv6 up    fe00:2404::240:f4ff:fe80:120/64
eth1         IPv4 up    10.10.10.10/24
eth1         IPv6 up    fe00:2404::240:f4ff:fe80:120/64
modem xbee_cellular IPv4 up    10.200.1.101/30
modem xbee_cellular IPv6 down

```

>

3. Additional information can be displayed by using the [show network verbose](#) command:

```
> show network verbose
```

```

Interface    Proto Status Type  Zone  Device  Metric Weight
-----
setupip      IPv4 up    static setup eth  10  10
setuplinklocalip IPv4 up    static setup eth  0  10
eth          IPv4 up    static internal eth  5  10
eth          IPv6 up    static internal eth  5  10
loopback     IPv4 up    static loopback loopback 0  10
eth1         IPv4 up    dhcp external eth1  1  10
eth1         IPv6 up    dhcp external eth1  1  10
eth1         IPv4 up    dhcp external eth1  1  10
eth1         IPv6 up    dhcp external eth1  1  10
modem xbee_cellular IPv4 up    modem external wwan1 3  10
modem xbee_cellular IPv6 down  modem external wwan1 3  10

```

>

4. Enter **show network interface *name*** at the Admin CLI prompt to display additional information about a specific LAN. For example, to display information about ETH, enter **show network interface *eth***:

```
> show network interface eth
```

```
lan1 Interface Status
```

```
-----
Device      : eth
Zone        : internal
```

```

IPv4 Status    : up
IPv4 Type      : static
IPv4 Address(es) : 192.168.2.1/24
IPv4 Gateway    :

```

```

IPv4 MTU      : 1500
IPv4 Metric   : 5
IPv4 Weight   : 10
IPv4 DNS Server(s) :

IPv6 Status    : up
IPv6 Type      : prefix
IPv6 Address(es) : fd00:2704::1/48
IPv6 Gateway   :
IPv6 MTU       : 1500
IPv6 Metric    : 5
IPv6 Weight    : 10
IPv6 DNS Server(s) :

>

```

5. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Delete a LAN

Follow this procedure to delete any LANs that have been added to the system. You cannot delete the preconfigured LAN, **LAN1**.

Web

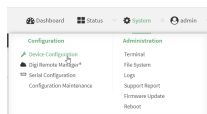
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

Remote Manager:

- a. Locate your device as described in [Use Digi Remote Manager to view and manage your device](#).
- b. Click the **Device ID**.
- c. Click **Settings**.
- d. Click to expand **Config**.

Local Web UI:

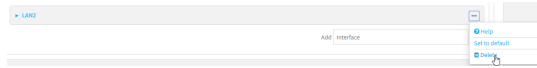
- a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



The **Configuration** window is displayed.

3. Click **Network > Interfaces**.

- Click the menu icon (...) next to the name of the LAN to be deleted and select **Delete**.



- Click **Apply** to save the configuration and apply the change.

Command line

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Use the **del** command to delete the LAN. For example, to delete a LAN named my_lan:

```
(config)> del network interface my_lan
```

4. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

5. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

DHCP servers

You can enable DHCP on your XBee Hive device to assign IP addresses to clients, using either:

- The DHCP server for the device's local network, which assigns IP addresses to clients on the device's local network. Addresses are assigned from a specified pool of IP addresses. For a local network, the device uses the DHCP server that has the IP address pool in the same IP subnet as the local network.

When a host receives an IP configuration, the configuration is valid for a particular amount of time, known as the lease time. After this lease time expires, the configuration must be renewed. The host renews the lease time automatically.

- A DHCP relay server, which forwards DHCP requests from clients to a DHCP server that is running on a separate device.

Configure a DHCP server

Note These instructions assume you are configuring the device to use its local DHCP server. For instructions about configuring the device to use a DHCP relay server, see [Configure DHCP relay](#).

Required configuration items

- Enable the DHCP server.

Additional configuration items

- The lease address pool: the range of IP addresses issued by the DHCP server to clients.
- Lease time: The length, in minutes, of the leases issued by the DHCP server.
- The Maximum Transmission Units (MTU).
- The domain name suffix appended to host names.
- The IP gateway address given to clients.
- The IP addresses of the preferred and alternate Domain Name Server (DNS), NTP servers, and WINS servers that are given to clients.
- The TFTP server name.
- The filepath and name of the bootfile on the TFTP server.
- Custom DHCP options. See [Configure DHCP options](#) for information about custom DHCP options.
- Static leases. See [Map static IP addresses to hosts](#) for information about static leases.

 Web

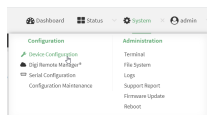
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

Remote Manager:

- a. Locate your device as described in [Use Digi Remote Manager to view and manage your device](#).
- b. Click the **Device ID**.
- c. Click **Settings**.
- d. Click to expand **Config**.

Local Web UI:

- a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



The **Configuration** window is displayed.

3. Click **Network > Interfaces**.
4. Click to expand an existing LAN, or create a new LAN. See [Configure a LAN](#).
5. Click to expand **IPv4 > DHCP server**.
6. **Enable** the DHCP server.
7. (Optional) For **Lease time**, type the amount of time that a DHCP lease is valid.
 Allowed values are any number of weeks, days, hours, minutes, or seconds, and take the format **number{w|d|h|m|s}**.
 For example, to set **Lease time** to ten minutes, enter **10m** or **600s**.

The default is 12 hours.

- By default, DHCP leases are persistent across reboots. You can disable persistent leases:
 - a. Click **Network > Advanced**.
 - b. Click to toggle off **DHCP persistent leases**.
- 8. (Optional) For **Lease range start** and **Lease range end**, type the lowest and highest IP address that the DHCP server will assign to a client. This value represents the low order byte of the address (the final triplet in an IPv4 address, for example, 192.168.2.xxx). The remainder of the IP address will be based on the LAN's static IP address as defined in the **Address** field.

Allowed values are between **1** and **254**, and the default is **100** for **Lease range start** and **250** for **Lease range end**.

- Sequential DHCP address allocation:

By default, DHCP addresses are assigned pseudo-randomly, using a hash of the client's MAC address to determine the IP address that gets assigned. You can configure the device to use sequential IP addresses instead:

 - a. Click **Network > Advanced**.
 - b. Click to enable **Sequential DHCP address allocation**.

Because sequential mode does not use a hash based on the client's MAC address, when DHCP lease expires, the client is not likely to get the same IP address assigned to it. Therefore, sequential DHCP address allocation generally should not be used.
- 9. Optional DHCP server settings:
 - a. Click to expand **Advanced settings**.
 - b. For **Gateway**, select either:
 - **None**: No gateway is broadcast by the DHCP server. Client destinations must be resolvable without a gateway.
 - **Automatic**: Broadcasts the XBee Hive device's gateway.
 - **Custom**: Allows you to identify the IP address of a **Custom gateway** to be broadcast.

The default is **Automatic**.

- c. For **MTU**, select an option:
 - **None**: An MTU of length **0** is broadcast. This is not recommended.
 - **Automatic**: No MTU is broadcast and clients will determine their own MTU.
 - **Custom**: Allows you to identify a **Custom MTU** to be broadcast.

The default is **Automatic**.

- d. For **Domain name suffix**, type the domain name that should be appended to host names.
- e. For **Primary** and **Secondary DNS**, **Primary** and **Secondary NTP server**, and **Primary** and **Secondary WINS server**, select either:
 - **None**: No server is broadcast.
 - **Automatic**: Broadcasts the XBee Hive device's server.
 - **Custom**: Allows you to identify the IP address of the server.

- f. Enable **BOOTP dynamic allocation** to automatically assign an IP address to a device on the server.



CAUTION! The IP address assigned to the device is leased forever and becomes permanently unavailable for other hosts to use.

- g. For **Bootfile name**, type the relative path and file name of the bootfile on the TFTP server.
- h. For **TFTP server name**, type the IP address or host name of the TFTP server.
- i. Enable
10. See [Configure DHCP options](#) for information about **Custom DHCP options**.
11. See [Map static IP addresses to hosts](#) for information about **Static leases**.
12. Click **Apply** to save the configuration and apply the change.

Command line

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Enable the DHCP server for an existing LAN. For example, to enable the DHCP server for a LAN named **my_lan**:

```
(config)> network interface my_lan ipv4 dhcp_server enable true
(config)>
```

See [Configure a LAN](#) for information about creating a LAN.

4. (Optional) Set the amount of time that a DHCP lease is valid:

```
(config)> network interface my_lan ipv4 dhcp_server lease_time value
(config)>
```

where *value* is any number of weeks, days, hours, minutes, or seconds, and takes the format **number{w|d|h|m|s}**.

For example, to set **network interface my_lan ipv4 dhcp_server lease_time** to ten minutes, enter either **10m** or **600s**:

```
(config)> network interface my_lan ipv4 dhcp_server lease_time 600s
(config)>
```

- By default, DHCP leases are persistent across reboots. You can disable persistent leases:

```
(config)> network advanced dhcp_persistent_lease false
(config)>
```

5. (Optional) Set the lowest IP address that the DHCP server will assign to a client. This value represents the low order byte of the address (the final triplet in an IPv4 address, for example, 192.168.2.**xxx**). The remainder of the IP address will be based on the LAN's static IP address as defined in the **address** parameter.

```
(config)> network interface my_lan ipv4 dhcp_server lease_start num
(config)>
```

Allowed values are between **1** and **254**, and the default is **100**.

6. (Optional) Set the highest IP address that the DHCP server will assign to a client:

```
(config)> network interface my_lan ipv4 dhcp_server lease_end num
(config)>
```

Allowed values are between **1** and **254**, and the default is **250**.

7. Sequential DHCP address allocation

By default, DHCP addresses are assigned psuedo-randomly, using a hash of the client's MAC address to determine the IP address that gets assigned. You can configure the device to use sequential IP addresses instead:

```
(config)> network advanced sequential_dhcp_allocation true
(config)>
```

Because sequential mode does not use a hash based on the client's MAC address, when DHCP lease expires, the client is not likely to get the same IP address assigned to it. Therefore, sentential DHCP address allocation generally should not be used.

8. Optional DHCP server settings:
 - a. Click to expand **Advanced settings**.
 - b. Determine how the DHCP server should broadcast the gateway server:

```
(config)> network interface my_lan ipv4 dhcp_server advanced gateway value
(config)>
```

where **value** is one of:

- **none**: No gateway is broadcast by the DHCP server. Client destinations must be resolvable without a gateway.
- **auto**: Broadcasts the XBee Hive device's gateway.
- **custom**: Allows you to identify the IP address of a custom gateway to be broadcast:

```
(config)> network interface my_lan ipv4 dhcp_server advanced gateway_custom ip_
address
(config)>
```

The default is **auto**.

- c. Determine how the DHCP server should broadcast the the MTU:

```
(config)> network interface my_lan ipv4 dhcp_server advanced mtu value
(config)>
```

where **value** is one of:

- **none**: An MTU of length **0** is broadcast. This is not recommended.
- **auto**: No MTU is broadcast and clients will determine their own MTU.
- **custom**: Allows you to identify a custom MTU to be broadcast:

```
(config)> network interface my_lan ipv4 dhcp_server advanced mtu_custom mtu
(config)>
```

The default is **auto**.

- d. Set the domain name that should be appended to host names:

```
(config)> network interface my_lan ipv4 dhcp_server advanced domain_suffix name
(config)>
```

- e. Set the IP address or host name of the primary and secondary DNS, the primary and secondary NTP server, and the primary and secondary WINS servers:

```
(config)> network interface my_lan ipv4 dhcp_server advanced primary_dns value
(config)> network interface my_lan ipv4 dhcp_server advanced secondary_dns value
(config)> network interface my_lan ipv4 dhcp_server advanced primary_ntp value
(config)> network interface my_lan ipv4 dhcp_server advanced secondary_ntp value
(config)> network interface my_lan ipv4 dhcp_server advanced primary_wins value
(config)> network interface my_lan ipv4 dhcp_server advanced secondary_wins value
(config)>
```

where **value** is one of:

- **none**: No server is broadcast.
- **auto**: Broadcasts the XBee Hive device's server.
- **custom**: Allows you to identify the IP address of the server. For example:

```
(config)> network interface my_lan ipv4 dhcp_server advanced primary_dns_custom ip_
address
(config)>
```

The default is **auto**.

- f. Set the IP address or host name of the TFTP server:

```
(config)> network interface my_lan ipv4 dhcp_server advanced nftp_server ip_address
(config)>
```

- g. Set the relative path and file name of the bootfile on the TFTP server:

```
(config)> network interface my_lan ipv4 dhcp_server advanced bootfile filename
(config)>
```

- h. Enable **BOOTP dynamic allocation** to automatically assign an IP address to a device on the server:



CAUTION! The IP address assigned to the device is leased forever and becomes permanently unavailable for other hosts to use.

```
(config)> network interface my_lan ipv4 dhcp_server advanced bootp_dynamic true
(config)>
```

9. See [Configure DHCP options](#) for information about custom DHCP options.
10. See [Map static IP addresses to hosts](#) for information about static leases.
11. Save the configuration and apply the change.

```
(config network interface my_lan ipv4 dhcp_server advanced static_lease 0)> save
Configuration saved.
>
```

12. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Map static IP addresses to hosts

You can configure the DHCP server to assign static IP addresses to specific hosts.

Required configuration items

- IP address that will be mapped to the device.
- MAC address of the device.

Additional configuration items

- A label for this instance of the static lease.

To map static IP addresses:



Web

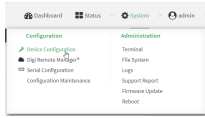
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

Remote Manager:

- a. Locate your device as described in [Use Digi Remote Manager to view and manage your device](#).
- b. Click the **Device ID**.
- c. Click **Settings**.
- d. Click to expand **Config**.

Local Web UI:

- a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



The **Configuration** window is displayed.

3. Click **Network > Interfaces**.
4. Click to expand an existing LAN, or create a new LAN. See [Configure a LAN](#).
5. Click to expand **IPv4 > DHCP server > Advanced settings > Static leases**.
6. For **Add Static lease**, click
7. Type the **MAC address** of the device associated with this static lease.
8. Type the **IP address** for the static lease.

Note The IP address here should be outside of the DHCP server's configured lease range. See [Configure a DHCP server](#) for further information about the lease range.

9. (Optional) For **Hostname**, type a label for the static lease. This does not have to be the device's actual hostname.
10. Repeat for each additional DHCP static lease.
11. Click **Apply** to save the configuration and apply the change.

Command line

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Add a static lease to the DHCP server configuration for an existing LAN. For example, to add static lease to a LAN named **my_lan**:

```
(config)> add network interface my_lan ipv4 dhcp_server advanced static_lease end
(config network interface my_lan ipv4 dhcp_server advanced static_lease 0)>
```

See [Configure a LAN](#) for information about creating a LAN.

4. Set the MAC address of the device associated with this static lease, using the colon-separated format:

```
(config network interface my_lan ipv4 dhcp_server advanced static_lease 0)> mac
00:40:D0:13:35:36
(config network interface my_lan ipv4 dhcp_server advanced static_lease 0)>
```

5. Set the IP address for the static lease:

```
(config network interface my_lan ipv4 dhcp_server advanced static_lease 0)> ip 10.01.01.10
(network interface my_lan ipv4 dhcp_server advanced static_lease 0)>
```

Note The IP address here should be outside of the DHCP server's configured lease range. See [Configure a DHCP server](#) for further information about the lease range.

6. (Optional) Set a label for this static lease:

```
(config network interface my_lan ipv4 dhcp_server advanced static_lease 0)> name label
(config network interface my_lan ipv4 dhcp_server advanced static_lease 0)>
```

7. Save the configuration and apply the change.

```
(config network interface my_lan ipv4 dhcp_server advanced static_lease 0)> save
Configuration saved.
>
```

8. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Show current static IP mapping

To view your current static IP mapping:

Web

1. Log into the XBee Hive WebUI as a user with full Admin access rights.
2. On the main menu, click **Status**
3. Under **Networking**, click **DHCP Leases**.

Command line

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Show the static lease configuration. For example, to show the static leases for a lan named **my_lan**:

```
(config)> show network interface my_lan ipv4 dhcp_server advanced static_lease
0
ip 192.168.2.10
mac BF:C3:46:24:0E:D9
```

```

no name
1
ip 192.168.2.11
mac E3:C1:1F:65:C3:0E
no name
(config)>

```

4. Type **cancel** to exit configuration mode:

```

(config)> cancel
>

```

5. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Delete static IP mapping entries

To delete a static IP entry:



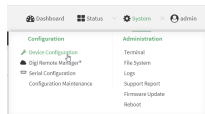
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

Remote Manager:

- a. Locate your device as described in [Use Digi Remote Manager to view and manage your device](#).
- b. Click the **Device ID**.
- c. Click **Settings**.
- d. Click to expand **Config**.

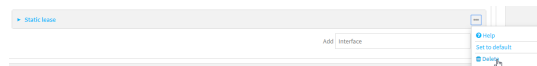
Local Web UI:

- a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



The **Configuration** window is displayed.

3. Click **Network > Interfaces**.
4. Click to expand an existing LAN.
5. Click to expand **IPv4 > DHCP server > Advanced settings > Static leases**.
6. Click the menu icon (...) next to the name of the static lease to be deleted and select **Delete**.



7. Click **Apply** to save the configuration and apply the change.

Command line

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Show the static lease configuration. For example, to show the static leases for a lan named **my_lan**:

```
(config)> show network interface my_lan ipv4 dhcp_server advanced static_lease
0
  ip 192.168.2.10
  mac BF:C3:46:24:0E:D9
  no name
1
  ip 192.168.2.11
  mac E3:C1:1F:65:C3:0E
  no name
(config)>
```

4. Use the **del index_number** command to delete a static lease. For example, to delete the static lease for the device listed in the above output with a mac address of BF:C3:46:24:0E:D9 (index number 0):

```
(config)> del network interface lan1 ipv4 dhcp_server advanced static_lease 0
(config)>
```

5. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

6. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Configure DHCP options

You can configure DHCP servers running on your Digi XBee Hive Gateway device to send certain specified DHCP options to DHCP clients. You can also set the user class, which enables you to specify which specific DHCP clients will receive the option. You can also force the command to be sent to the clients.

DHCP options can be set on a per-LAN basis, or can be set for all LANs. A total of 32 DHCP options can be configured.

Required configuration items

- DHCP option number.
- Value for the DHCP option.

Additional configuration items

- The data type of the value.
- Force the option to be sent to the DHCP clients.
- A label for the custom option.

Web

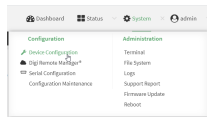
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

Remote Manager:

- a. Locate your device as described in [Use Digi Remote Manager to view and manage your device](#).
- b. Click the **Device ID**.
- c. Click **Settings**.
- d. Click to expand **Config**.

Local Web UI:

- a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



The **Configuration** window is displayed.

3. Click **Network > Interfaces**.
4. Click to expand an existing LAN, or create a new LAN. See [Configure a LAN](#).
5. Click to expand **IPv4 > DHCP server > Advanced settings > Custom DHCP option**.
6. For **Add Custom option**, click .

Custom options are enabled by default. To disable, toggle off **Enable**.
7. For **Option number**, type the DHCP option number.
8. For **Value**, type the value of the DHCP option.
9. (Optional) For **Label**, type a label for the custom option.
10. (Optional) If **Forced send** is enabled, the DHCP option will always be sent to the client, even if the client does not ask for it.
11. (Optional) For **Data type**, select the data type that the option uses. If the incorrect data type is selected, the device will send the value as a string.
12. Click **Apply** to save the configuration and apply the change.

Command line

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the Xbee Hive local command line as a user with full Admin access rights.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Add a custom DHCP option to the DHCP server configuration for an existing LAN. For example, to add static lease to a LAN named **my_lan**:

```
(config)> add network interface my_lan ipv4 dhcp_server advanced custom_option end
(config network interface my_lan ipv4 dhcp_server advanced custom_option 0)>
```

See [Configure a LAN](#) for information about creating a LAN.

4. Custom options are enabled by default. To disable:

```
(config network interface my_lan ipv4 dhcp_server advanced custom_option 0)> enable false
(config network interface my_lan ipv4 dhcp_server advanced custom_option 0)>
```

5. Set the option number for the DHCP option:

```
(config network interface my_lan ipv4 dhcp_server advanced custom_option 0)> option 210
(config network interface my_lan ipv4 dhcp_server advanced custom_option 0)>
```

6. Set the value for the DHCP option:

```
(config network interface my_lan ipv4 dhcp_server advanced custom_option 0)> value_str value
(network interface my_lan ipv4 dhcp_server advanced custom_option 0)>
```

7. (Optional) Set a label for this custom option:

```
(config network interface my_lan ipv4 dhcp_server advanced custom_option 0)> name label
(config network interface my_lan ipv4 dhcp_server advanced custom_option 0)>
```

8. (Optional) To force the DHCP option to always be sent to the client, even if the client does not ask for it:

```
(config network interface my_lan ipv4 dhcp_server advanced custom_option 0)> force true
(config network interface my_lan ipv4 dhcp_server advanced custom_option 0)>
```

9. (Optional) Set the data type that the option uses.

If the incorrect data type is selected, the device will send the value as a string.

```
(config network interface my_lan ipv4 dhcp_server advanced custom_option 0)> datatype value
(config network interface my_lan ipv4 dhcp_server advanced custom_option 0)>
```

where *value* is one of:

- 1byte
- 2byte
- 4byte
- hex
- ipv4
- str

The default is **str**.

10. Save the configuration and apply the change.

```
(config network interface my_lan ipv4 dhcp_server advanced custom_option 0)> save
Configuration saved.
>
```

11. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Configure DHCP relay

DHCP relay allows a router to forward DHCP requests from one LAN to a separate DHCP server, typically connected to a different LAN.

For the XBee Hive device, DHCP relay is configured by providing the IP address of a DHCP relay server, rather than an IP address range. If both the DHCP relay server and an IP address range are specified, DHCP relay is used, and the specified IP address range is ignored.

Multiple DHCP relay servers can be provided for each LAN. If multiple relay servers are provided, DHCP requests are forwarded to all servers without waiting for a response. Clients will typically use the IP address from the first DHCP response received.

Configuring DHCP relay involves the following items:

Required configuration items

- Disable the DHCP server, if it is enabled.
- IP address of the primary DHCP relay server, to define the relay server that will respond to DHCP requests.

Additional configuration items

- IP address of additional DHCP relay servers.



Web

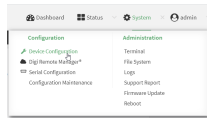
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

Remote Manager:

- a. Locate your device as described in [Use Digi Remote Manager to view and manage your device](#).
- b. Click the **Device ID**.
- c. Click **Settings**.
- d. Click to expand **Config**.

Local Web UI:

- a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



The **Configuration** window is displayed.

3. Click **Network > Interfaces**.
4. Click to expand an existing LAN, or create a new LAN. See [Configure a LAN](#).
5. Disable the DHCP server, if it is enabled:
 - a. Click to expand **IPv4 > DHCP server**.
 - b. Click **Enable** to toggle off the DHCP server.
6. Click to expand **DHCP relay**.
7. For **Add DHCP Server:**, click
8. For **DHCP server address**, type the IP address of the relay server.
9. Repeat for each additional DHCP relay server.
10. Click **Apply** to save the configuration and apply the change.

Command line

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Add a DHCP relay server to an existing LAN. For example, to add a server to a LAN named **my_lan**:

```
(config)> add network interface my_lan ipv4 dhcp_relay end
(config network interface lan1 my_lan dhcp_relay 0)>
```

See [Configure a LAN](#) for information about creating a LAN.

4. Set the IP address of the DHCP relay server:

```
(config network interface my_lan ipv4 dhcp_relay 0)> address 10.10.10.10
(config network interface my_lan ipv4 dhcp_relay 0)>
```

5. (Optional) Add additional DHCP relay servers:
 - a. Move back one step in the configuration schema by typing two periods (..):

```
(config network interface my_lan ipv4 dhcp_relay 0)> ..
(config network interface my_lan ipv4 dhcp_relay)>
```

- b. Add the next server:

```
(config network interface lan1 ipv4 dhcp_relay)> add end
(config network interface lan1 ipv4 dhcp_relay 1)>
```

- c. Set the IP address of the DHCP relay server:

```
(config network interface my_lan ipv4 dhcp_relay 1)> address 10.10.10.11
(config network interface my_lan ipv4 dhcp_relay 1)>
```

- d. Repeat for each additional relay server.

1. Disable the DHCP server, if it is enabled:

```
(config network interface my_lan ipv4 dhcp_relay 1)> ... dhcp_server enable false
(config network interface my_lan ipv4 dhcp_relay 1)>
```

6. Save the configuration and apply the change.

```
(config network interface lan1 ipv4 dhcp_relay 1)> save
Configuration saved.
>
```

7. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Show DHCP server status and settings

View DHCP status to monitor which devices have been given IP configuration by the Digi XBee Hive Gateway device and to diagnose DHCP issues.

Web

1. Log into the XBee Hive WebUI as a user with full Admin access rights.
2. On the main menu, click **Status**
3. Under **Networking**, click **DHCP Leases**.

Command line

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. Enter the **show dhcp-lease** command at the Admin CLI prompt:

```
> show dhcp-lease
```

IP Address	Hostname	Expires
192.168.2.194	MTK-ENG-USER1	
192.168.2.195	MTK-ENG-USER2	

>

3. Additional information can be returned by using the [show dhcp-lease verbose](#) command:

> show dhcp-lease verbose

IP Address	Hostname	Expires	Type	Active	MAC Address
192.168.2.194	MTK-ENG-USER1	May 19 08:25:11 UTC 2021	Dynamic	Yes	ba:ba:2c:13:8c:71
192.168.2.195	MTK-ENG-USER2	May 20 11:32:12 UTC 2021	Dynamic	Yes	09:eb:10:f0:bc:16

>

4. Type **exit** to exit the Admin CLI.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Virtual LANs (VLANs)

Virtual LANs (VLANs) allow splitting a single physical LAN into separate Virtual LANs. Each device on a VLAN can only access other devices on the same VLAN and each device is unaware of any other VLAN, which isolates networks from one another, even though they run over the same physical network.

Your XBee Hive device supports two VLANs modes:

- Trunking: Supports multiple VLANs per Ethernet port, which enables you to extend your VLAN across multiple switches through your entire network.
- Switchport: Each Ethernet port can have one or more VLAN IDs associated to it. Any untagged VLAN packets that come into a network interface are automatically tagged with the primary VLAN ID for that switchport. This allows devices on the network that aren't configured with a VLAN to act as if they are directly connected to the VLAN.

This section contains the following topics:

Create a trunked VLAN route	220
Create a VLAN using switchport mode	221

Create a trunked VLAN route

Required configuration items

- Device to be assigned to the VLAN.
- The VLAN ID. The TCP header uses the VLAN ID to identify the destination VLAN for the packet.

To create a VLAN:

Web

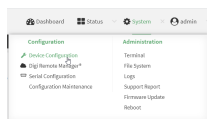
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

Remote Manager:

- a. Locate your device as described in [Use Digi Remote Manager to view and manage your device](#).
- b. Click the **Device ID**.
- c. Click **Settings**.
- d. Click to expand **Config**.

Local Web UI:

- a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



The **Configuration** window is displayed.

3. Click **Network > Virtual LAN**.
4. Type a name for the VLAN and click .
5. Select the **Device**.
6. Type or select a unique numeric **ID** for the VLAN ID.
7. Click **Apply** to save the configuration and apply the change.

Command line

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Add the VLAN:

```
(config)> add network vlan name
(config)>
```

4. Set the device to be used by the VLAN:

- a. View a list of available devices:

```
(config network vlan vlan1)> device ?

Device: The Ethernet device to use for this virtual LAN
Format:

/network/device/loopback
/network/vlan/vlan1
/network/wireless/ap/digi_ap
Current value:

(config network vlan vlan1)>
```

- b. Add the device:

```
(config network vlan vlan1)> device /network/device/
(config network vlan vlan1)>
```

5. Set the VLAN ID:

```
(config network vlan vlan1)> id value
```

where *value* is an integer between **1** and **4095**.

6. Save the configuration and apply the change.

```
(config network vlan vlan1)> save
Configuration saved.
>
```

7. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Create a VLAN using switchport mode

Required configuration items

- Device to be assigned to the VLAN.
- The VLAN ID. The TCP header uses the VLAN ID to identify the destination VLAN for the packet.

To create a VLAN using switchport mode:

Web

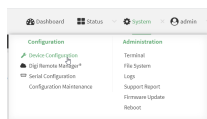
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

Remote Manager:

- a. Locate your device as described in [Use Digi Remote Manager to view and manage your device](#).
- b. Click the **Device ID**.
- c. Click **Settings**.
- d. Click to expand **Config**.

Local Web UI:

- a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



The **Configuration** window is displayed.

3. Click **Network > Bridges**.
4. For **Add Bridge**, type a name for the bridge and click .
5. Bridges are enabled by default. To disable, toggle off **Enable**.
6. For **Bridge type**, select **Switchport**.
7. (Optional) Enable Spanning Tree Protocol (STP).
STP is used when using multiple LANs on the same device, to prevent bridge loops and other routing conflicts.
 - a. Click **STP**.
 - b. Click **Enable**.
 - c. For **Forwarding delay**, enter the number of seconds that the device will spend in each of the listening and learning states before the bridge begins forwarding data. The default is **2** seconds.
8. For **Port**, type a name for the VLAN port and click . Generally, numbers are used for VLAN ports.
9. Select the **Device** that the port uses.
10. Configure Vlan IDs:
 - a. Click to expand **Vlan IDs**.
 - b. Click  for **Add Vlan ID**.
 - c. Type or select a unique numeric **Vlan ID**.
 - d. Click  for **Add Vlan ID** again to add additional VLAN IDs.

- Click **Apply** to save the configuration and apply the change.

Command line

- Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
- At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

- Add the VLAN:

```
(config)> add network vlan name
(config)>
```

- Set the device to be used by the VLAN:

- View a list of available devices:

```
(config network vlan vlan1)> device ?
```

Device: The Ethernet device to use for this virtual LAN
Format:

```
/network/device/loopback
/network/vlan/vlan1
/network/wireless/ap/digi_ap
Current value:

(config network vlan vlan1)>
```

- Add the device:

```
(config network vlan vlan1)> device /network/device/
(config network vlan vlan1)>
```

- Set the VLAN ID:

```
(config network vlan vlan1)> id value
```

where *value* is an integer between **1** and **4095**.

- Save the configuration and apply the change.

```
(config network vlan vlan1)> save
Configuration saved.
>
```

- Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Show SureLink status and statistics

You can show SureLink status for all interfaces, or for an individual interface. You can also show Surelink status for ipsec tunnels and OpenVPN clients.

SureLink status is only available from the Admin CLI.

Command line

Show SureLink State

To show the current state of SureLink for the XBee Hive device, use the [show surelink state](#) command:

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the Admin CLI prompt, type:

```
> show surelink state
```

```
Test on network.interface.eth1.ipv6 with condition: one
dns_configured (n);
```

```
network.interface.eth1.ipv6; -> update_routing_table
ACTION      ATTEMPTS  STATUS
restart_interface 00/01  [FAILED]
update_routing_table 00/01
```

```
Test on network.interface.modem xbee_cellular.ipv4 with condition: all
dns_configured (n);
```

```
network.interface.modem xbee_cellular.ipv4; -> restart_interface
ACTION      ATTEMPTS  STATUS
update_routing_table 00/03  [ BUSY ]
restart_interface 00/03
reset_modem   00/03
switch_sim    00/03
modem_power_cycle 00/03
restart_interface 00/03
```

```
>
```

Show SureLink status for all interfaces

To show the SureLink status all interfaces, use the [show surelink interface all](#) command:

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

- At the Admin CLI prompt, type :

```
> show surelink interface all
```

Interface	Test	Proto	Last Response	Status
eth1	Interface is up	IPv4	32 seconds	Passing
eth1	Interface's DNS servers (DNS)	IPv4	28 seconds	Passing
eth	Interface is up	IPv4	21 seconds	Passing
eth	Interface's DNS servers (DNS)	IPv4	20 seconds	Passing
modem xbee_cellular	Interface is up	IPv4	115 seconds	Passing
modem xbee_cellular	Interface's DNS servers (DNS)	IPv4	114 seconds	Passing

```
>
```

- Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Show SureLink status for a specific interface

To show the SureLink status a specific interface, use the `show surelink interface name name` command:

- Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
- Use the `show surelink interface name name` command to show the Surelink status of a specific interface, for example:

```
> show surelink interface name eth1
```

```
wan1 Surelink Status
```

```
-----
```

```
IPv4 Status : Passing
```

```
IPv6 Status : Failed
```

Test	Proto	Last Response	Status
Interface's DNS servers (DNS)	IPv6	15 seconds	Failed

```
>
```

- Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Show SureLink status for all IPsec tunnels

To show the SureLink status all IPsec tunnels, use the [show surelink ipsec all](#) command:

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the Admin CLI prompt, type :

```
> show surelink ipsec all
```

IPsec	Test	Last Response	Status
test	194.43.79.74 (Ping)	29 seconds	Passed
test	194.43.79.75 (Ping)	5 seconds	Passed
test1	194.43.79.74 (Ping)	21 seconds	Failed
test2	194.43.79.75 (Ping)	21 seconds	Waiting for result

```
>
```

3. Type **exit** to exit the Admin CLI.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Show SureLink status for a specific IPsec tunnel

To show the SureLink status a specific IPsec tunnel, use the [show surelink ipsec tunnel name](#) command:

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. Use the [show surelink ipsec tunnel name](#) command to show the Surelink status of a specific tunnel, for example:

```
> show surelink ipsec tunnel test
```

IPsec	Test	Last Response	Status
test	194.43.79.74 (Ping)	29 seconds	Passed
test	194.43.79.75 (Ping)	5 seconds	Passed

```
>
```

3. Type **exit** to exit the Admin CLI.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Show SureLink status for all OpenVPN clients

To show the SureLink status all OpenVPN clients, use the [show surelink openvpn client all](#) command:

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the Admin CLI prompt, type :

```
> show surelink openvpn all
```

OpenVPN Client	Test	Last Response	Status
test_client1	194.43.79.74 (Ping)	29 seconds	Passed
test_client1	194.43.79.75 (Ping)	5 seconds	Passed
test_client2	194.43.79.74 (Ping)	21 seconds	Failed
test_client2	194.43.79.75 (Ping)	21 seconds	Waiting for result

```
>
```

3. Type **exit** to exit the Admin CLI.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Show SureLink status for a specific OpenVPN client

To show the SureLink status a specific OpenVPN client, use the [show surelink openvpn client *name*](#) command:

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. Use the [show surelink openvpn client *name*](#) command to show the Surelink status of a specific OpenVPN client, for example:

```
> show surelink openvpn client test_client1
```

OpenVPN Client	Test	Last Response	Status
test_client1	194.43.79.74 (Ping)	29 seconds	Passed
test_client1	194.43.79.75 (Ping)	5 seconds	Passed

```
>
```

3. Type **exit** to exit the Admin CLI.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Serial port

XBee Hive devices have access to different features, depending on the serial port mode selection.

Default serial port configuration

You can review the [default serial port configuration](#) for your device.

Serial mode options

You can choose a serial mode option for each serial port, depending on the feature that you want to use.

- [Login](#): Allows the port to be used to log into the CLI.
- [Remote Access](#): Provides socket level access to ports.
- [Application](#): Provides access to the serial device from Python applications.
- [PPP dial-in](#): Allows the device to answer Point-to-Point Protocol (PPP) connections over serial ports.
- [RealPort](#): Exposes a serial port on a remote device as a standard COM/TTY port on a client computer.
- [UDP serial](#): Provides access to the serial port using UDP.
- [Modem emulator](#): Allows the device to act as a dial-up modem emulator for handling incoming AT dial-ins.

Add a USB serial port

Your XBee Hive can be configured to support USB-to-serial adapters for serial access to the device, or remote serial out-of-band (OOB) access to other devices, and for use in python applications. See [Add a USB serial port](#).

View serial port information

- [Show serial port status and statistics](#)
- [Review the serial port message log](#)

Serial port basics

Default serial port configuration

You can review the [default serial port configuration](#) for your device.

Serial mode options

You can choose a serial mode option for each serial port, depending on the feature that you want to use.

- [Login](#): Allows the port to be used to log into the CLI.
- [Remote Access](#): Provides socket level access to ports.
- [Application](#): Provides access to the serial device from Python applications.
- [PPP dial-in](#): Allows the device to answer Point-to-Point Protocol (PPP) connections over serial ports.
- [RealPort](#): Exposes a serial port on a remote device as a standard COM/TTY port on a client computer.

Add a USB serial port

Your XBee Hive can be configured to support USB-to-serial adapters for serial access to the device, or remote serial out-of-band (OOB) access to other devices, and for use in python applications. See [Add a USB serial port](#).

View serial port information

- [Show serial port status and statistics](#)
- [Review the serial port message log](#)

Default serial port configuration

The XBee Hive default serial port configuration is:

- **Enabled**
- **Serial mode**: Remote
- **Label**: None
- **Baud rate**: 9600
- **Data bits**: 8
- **Parity**: None
- **Stop bits**: 1
- **Flow control**: None

Configure Login mode for a serial port

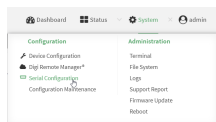
Login mode allows you to connect your PC to the port and to log into the CLI.

Using the appropriate cable for your device, connect the cable to your device and then to a serial port that is configured for **Login** mode. You can then use a terminal emulator program on your PC to establish the serial connection and log into the CLI.

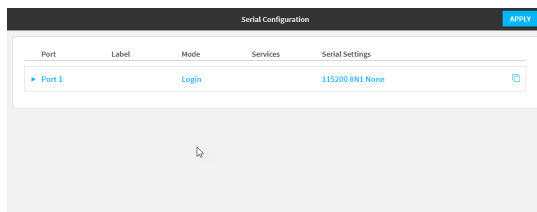
To change the configuration to match the serial configuration of the device to which you want to connect:



1. Log into the XBee Hive WebUI as a user with full Admin access rights.
2. On the menu, click **System**. Under **Configuration**, click **Serial Configuration**.

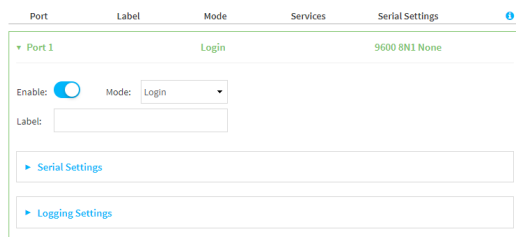


The **Serial Configuration** page is displayed.



Note You can also configure the serial port by using **Device Configuration > Serial**. Changes made by using either **Device Configuration** or **Serial Configuration** will be reflected in both.

3. Click the name of the port that you want to configure.



The serial port is enabled by default. To disable, toggle off **Enable**.

4. For **Mode**, select **Login**. This is the default.
5. (Optional) For **Label**, enter a label that will be used when referring to this port.
6. Expand **Serial Settings**.

The entries in the following fields must match the information for the power controller. Refer to your power controller manual for the correct entries.

- a. **Baud rate**: For **Baud rate**, select the baud rate used by the device to which you want to connect. The default is **9600**.
- b. **Data bits**: For **Data bits**, select the number of data bits used by the device to which you want to connect. The default is **8**.
- c. **Parity**: For **Parity**, select the type of parity used by the device to which you want to connect. The default is **None**.

- d. **Stop bits:** For **Stop bits**, select the number of stop bits used by the device to which you want to connect. The default is **1**.
- e. **Flow control:** For **Flow control**, select the type of flow control used by the device to which you want to connect. The default is **None**.
7. Expand **Logging Settings** to configure logging for this serial port.
 - a. To enable logging, click to toggle on **Enable**.
 - b. In the **Log file name** field, enter a descriptive name for the log file.
 - c. For **Log file size**, type the size of the log file. When the log file reaches the size limit, the current file is saved and a new file is created. The default is 65536 bytes.
 - d. From the **Type of data to log** list box, specify the type of data that should be saved.
 - **Received**
 - **Transmitted**
 - **Both**
 - **Both with arrows.** This is the default.
 - e. If you want to log the time at which data was received or transmitted, click the **Timestamps** toggle to **Enable**.
 - f. If you want to log the data as hexadecimal values, click the **Hexadecimal** toggle to **Enable**.

Note You can review the message log in the **Serial Port Log** page. See [Review the serial port message log](#).

8. Click **Apply** to save the configuration and apply the change.

Command line

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. The serial port is enabled by default. To disable:

```
(config)> serial port1 enable false
(config)>
```

4. Set the mode:

```
(config)> serial port1 mode login
(config)>
```

5. (Optional) Set a label that will be used when referring to this port.

```
(config)>path-paramlabel label
(config)>
```

6. Set the baud rate used by the device to which you want to connect:

```
(config)> serial port1 baudrate rate
(config)>
```

7. Set the number of data bits used by the device to which you want to connect:

```
(config)> serial port1 databits bits
(config)>
```

8. Set the type of parity used by the device to which you want to connect:

```
(config)> serial port1 parity parity
(config)>
```

Allowed values are:

- **even**
- **odd**
- **none**

The default is **none**.

9. Set the stop bits used by the device to which you want to connect:

```
(config)> serial port1 stopbits bits
(config)>
```

10. Set the type of flow control used by the device to which you want to connect:

```
(config)> serial port1 flow value
(config)>
```

where value is one of:

- **none**
- **rts/cts**
- **xon/xoff**

11. Configure serial port logging:

- a. Enable serial port logging:

```
(config)>serial port1 logging enable true
(config)>
```

- b. Set the file name:

```
(config)>serial port1 logging filename string
(config)>
```

- c. Set the maximum allowed log size for the serial port log when starting the log:

```
(config)>serial port1 logging size value
(config)>
```

where *value* is the size of the log file in bytes. The default is **65536**.

- d. Specify the data type:

```
(config)>serial port1 logging type value
(config)>
```

where *value* is one of:

- received
- transmitted
- both
- arrows. This is the default.

- e. Log the time at which date was received or transmitted:

```
(config)>serial port1 logging hex true
(config)>
```

- f. Log data as hexadecimal values:

```
(config)>serial port1 logging timestamp true
(config)>
```

12. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

13. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Configure Remote Access mode for a serial port

Remote Access mode allows for remote access to another device that is connected to the serial port. **Remote Access** mode exposes a serial port on a remote device as a standard COM/TTY port on a client computer.

To change the configuration to match the serial configuration of the device to which you want to connect:



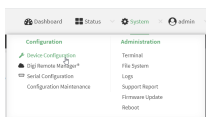
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

Remote Manager:

- a. Locate your device as described in [Use Digi Remote Manager to view and manage your device](#).
- b. Click the **Device ID**.
- c. Click **Settings**.
- d. Click to expand **Config**.

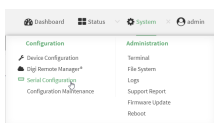
Local Web UI:

- a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

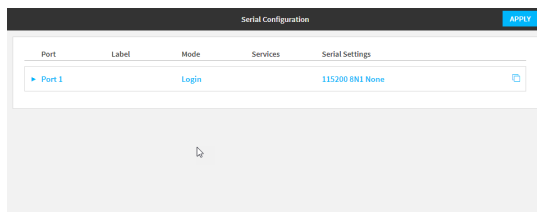


The **Configuration** window is displayed.

3. On the menu, click **System**. Under **Configuration**, click **Serial Configuration**.

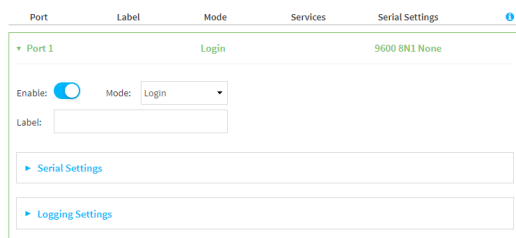


The **Serial Configuration** page is displayed.



Note You can also configure the serial port by using **Device Configuration > Serial**. Changes made by using either **Device Configuration** or **Serial Configuration** will be reflected in both.

4. Click the name of the port that you want to configure.



The serial port is enabled by default. To disable, toggle off **Enable**.

5. For **Serial mode**, select **Remote access (TCP)**.
6. (Optional) For **Label**, enter a label that will be used when referring to this port.
7. Expand **Serial Settings**.

The entries in the following fields must match the information for the power controller. Refer to your power controller manual for the correct entries.

- a. **Baud rate:** For **Baud rate**, select the baud rate used by the device to which you want to connect. The default is **9600**.
 - b. **Data bits:** For **Data bits**, select the number of data bits used by the device to which you want to connect. The default is **8**.
 - c. **Parity:** For **Parity**, select the type of parity used by the device to which you want to connect. The default is **None**.
 - d. **Stop bits:** For **Stop bits**, select the number of stop bits used by the device to which you want to connect. The default is **1**.
 - e. **Flow control:** For **Flow control**, select the type of flow control used by the device to which you want to connect. The default is **None**.
8. Click to expand **Data Framing**.
 - a. Click **Enable** to enable the data framing feature.
 - b. For **Maximum Frame Count**, enter the maximum size of the packet. The default is **1024**.
 - c. For **Idle Time**, enter the length of time the device should wait before sending the packet.
 - d. For **End Pattern**, enter the end pattern. The packet is sent when this pattern is received from the serial port.
 - e. Click **Strip End Pattern** if you want to remove the end pattern from the packet before it is sent.
 9. Expand **Service Settings**.

All service settings are disabled by default. Click available options to toggle them to enabled, and set the IP ports as appropriate.

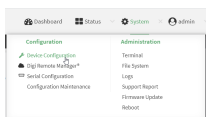
Service Settings			
Enable SSH:	☐	IP Port:	3001
Enable mDNS:	☐	Enable TCP keepalive:	☐
Enable TCP:	☐	IP Port:	4001
Connection Type:	Encrypted connection		
Enable mDNS:	☐	Enable TCP keepalive:	☐
Enable Telnet:	☐	IP Port:	2001
Enable mDNS:	☐	Enable TCP keepalive:	☐
		Enable TCP nodelay:	☐

Note If the Telnet service is enabled for the serial port, note that the **Telnet Login** option, when enabled, prompts the user to enter Telnet login credentials when accessing the serial port via Telnet. The **Telnet Login** option is enabled by default. To disable this option, navigate to **System > Device Configuration > Authentication > Serial** and disable **Telnet Login**.

For each type of service, you can also configure the access control.

To do this, you need to go to **Device Configuration**:

- a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



The **Configuration** window is displayed.

- b. Access the configuration for the appropriate type of service:
- Click to expand **Serial**.
 - Click to expand the appropriate serial port.
 - Click to expand the appropriate type of service.
 - Click to expand **Access Control List**.

For example, to set the Access Control List for the SSH connection for serial port 1, click to expand **Serial > Port 1 > SSH connection > Access Control List**:

 A screenshot of the 'SSH connection' configuration page. At the top, there's a toggle for 'Enable' and a text field for 'Port' with the value '3001'. Below this is the 'Access control list' section, which contains four expandable items: 'IPv4 Addresses', 'IPv6 Addresses', 'Interfaces', and 'Zones'. At the bottom of the page, there are three more toggle switches: 'Enable mDNS', 'Enable TCP keep-alive messages', and 'Enable TCP nodelay'.

- To limit access to specified IPv4 addresses and networks:
 - Click **IPv4 Addresses**.
 - For **Add Address**, click .
 - For **Address**, enter the IPv4 address or network that can access the device's service-type. Allowed values are:
 - A single IP address or host name.
 - A network designation in CIDR notation, for example, 192.168.1.0/24.
 - any**: No limit to IPv4 addresses that can access the service-type.
 - Click  again to list additional IP addresses or networks.

- To limit access to specified IPv6 addresses and networks:
 - i. Click **IPv6 Addresses**.
 - ii. For **Add Address**, click .
 - iii. For **Address**, enter the IPv6 address or network that can access the device's service-type. Allowed values are:
 - A single IP address or host name.
 - A network designation in CIDR notation, for example, 2001:db8::/48.
 - **any**: No limit to IPv6 addresses that can access the service-type.
 - iv. Click  again to list additional IP addresses or networks.
 - To limit access to hosts connected through a specified interface on the device:
 - i. Click **Interfaces**.
 - ii. For **Add Interface**, click .
 - iii. For **Interface**, select the appropriate interface from the dropdown.
 - iv. Click  again to allow access through additional interfaces.
 - To limit access based on firewall zones:
 - i. Click **Zones**. By default, there are three firewall zones already configured: Internal, Edge, and IPsec.
 - ii. For **Add Zone**, click .
 - iii. For **Zone**, select the appropriate firewall zone from the dropdown.
See [Firewall configuration](#) for information about firewall zones.
 - iv. Click  again to allow access through additional firewall zones.
- 10. Expand **Autoconnect Settings**. The autoconnect feature is used to initiate a connection to a remote server to directly access the serial port.
 - a. Click **Enable** to enable the autoconnect feature.
 - b. For **Connection Trigger**, select the option that describes the type of event that should trigger the connection.

If you select the **Data received matches a string** option, additional fields display.

 - a. In the **Data Match String** field, enter the received data string that should trigger the connection. The syntax is: *backslash escaped string*
 - b. The **Flush String** option determines whether the match string data sent from the remote server is discarded.
 - **Enable**: Discard the match string data. This is the default.
 - **Disable**: Do not discard the match string data.
 - c. For **Outbound Connection Type**, select the option that describes the method used to initiate the connection.

Note Additional autoconnect configuration options are available when you select the **SSH connection** option. These options can be configured in the [CLI](#) and in the [web UI Configuration](#) page.

 - d. For **Destination**, enter the host name or IP address of the remote server. When using SSH, this should be prefixed with the user name and followed by @, for example,

admin@192.168.1.1.

- e. For **IP port**, enter the TCP port of the remote server (1-65535).
- f. Click **Enable TCP keep-alive** to enable TCP keepalive on the connection.
- g. Click **Enable TCP nodelay** to enable TCP nodelay on the connection.
- h. For **Socket ID string**, type text to be transmitted to the remote server when the socket connects.

11. Expand **Session Settings**.

The screenshot shows the 'Session Settings' panel. It contains four configuration options: 'Exclusive Access' (a toggle switch currently turned off), 'Escape Sequence' (a text field containing '~b'), 'History Size' (a text field containing '4000'), and 'Idle Timeout' (a text field containing '15m').

- a. Enable **Exclusive access** to limit access to the serial port to a single active session. This option is disabled by default. When it is disabled, multiple users can connect using Telnet, TCP, and SSH.
- b. For **Escape sequence**, type the characters used to start an escape sequence. If no characters are defined, the escape sequence is disabled. The default is **~b**.
- c. For **History size**, type or select the number of bytes of output from the serial port that are written to buffer. These bytes are redisplayed when a user connects to the serial port. The default is **4000** bytes.
- d. For **Idle timeout**, type the amount of time to wait before disconnecting due to user inactivity.

12. Expand **Monitor Settings**.

- a. Enable **CTS** to monitor CTS (Clear to Send) changes on this port.
- b. Enable **DCD** to monitor DCD (Data Carrier Detect) changes on this port.

13. Expand **Logging Settings** to configure logging for this serial port.

- a. To enable logging, click to toggle on **Enable**.
- b. In the **Log file name** field, enter a descriptive name for the log file.
- c. For **Log file size**, type the size of the log file. When the log file reaches the size limit, the current file is saved and a new file is created. The default is 65536 bytes.
- d. From the **Type of data to log** list box, specify the type of data that should be saved.
 - **Received**
 - **Transmitted**
 - **Both**
 - **Both with arrows**. This is the default.
- e. If you want to log the time at which date was received or transmitted, click the **Timestamps** toggle to **Enable**.
- f. If you want to log the data as hexadecimal values, click the **Hexadecimal** toggle to **Enable**.

Note You can review the message log in the **Serial Port Log** page. See [Review the serial port message log](#).

14. Click **Apply** to save the configuration and apply the change.

Command line

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Serial ports is enabled by default. To disable:

```
(config)> serial port_number enable false
(config)>
```

Command line examples in this section will use port1 for the serial port. However, any port number can be used.

4. Set the mode:

```
(config)> serial port1 mode remoteaccess
(config)>
```

5. (Optional) Set a label that will be used when referring to this port.

```
(config)> serial port1 label label
(config)>
```

6. Set the baud rate used by the device to which you want to connect:

```
(config)> serial port1 baudrate rate
(config)>
```

7. Set the number of data bits used by the device to which you want to connect:

```
(config)> serial port1 databits bits
(config)>
```

8. Set the type of parity used by the device to which you want to connect:

```
(config)> serial port1 parity parity
(config)>
```

Allowed values are:

- **even**
- **odd**
- **none**

The default is **none**.

9. Set the stop bits used by the device to which you want to connect:

```
(config)> serial port1 stopbits bits
(config)>
```

10. Set the type of flow control used by the device to which you want to connect:

```
(config)> serial port1 flow value
(config)>
```

where value is one of:

- **none**
- **rts/cts**
- **xon/xoff**

11. Configure the session settings.

- a. Set the characters used to start an escape sequence:

```
(config)>serial port1 escape string
(config)
```

If no characters are defined, the escape sequence is disabled. The default is **~b**.

- b. Limit access to the serial port to a single active session:

```
(config)>serial port1 exclusive true
(config)
```

- c. Set the number of bytes of output from the serial port that are written to buffer. These bytes are redisplayed when a user connects to the serial port.

```
(config)>serial port1 history bytes
(config)
```

The default is **4000** bytes.

- d. Set the amount of time to wait before disconnecting due to user inactivity:

```
(config)>serial port1 idle_timeout value
(config)
```

where *value* is any number of weeks, days, hours, minutes, or seconds, and takes the format ***number*{w|d|h|m|s}**.

For example, to set **idle_timeout** to ten minutes, enter either **10m** or **600s**:

```
(config)>serial port1 idle_timeout 600s
(config)
```

The default is **15m**.

12. Configure monitor settings.

- a. (Optional) Enable monitoring of CTS (Clear to Send) changes on this port:

```
(config)>serial port1 monitor cts true
(config)
```

- b. (Optional) Enable monitoring of DCD (Data Carrier Detect) changes on this port:

```
(config)>serial port1 monitor dcd true
(config)
```

13. (Optional) Configure autoconnect:

- a. Enable autoconnect:

```
(config)>serial port1 autoconnect enable true
(config)>
```

- b. Set the option that will trigger the connection:

```
(config)>serial port1 autoconnect trigger value
(config)>
```

where *value* is one of:

- **always**
- **data**
- **dcd**
- **destination**
- **dsr**
- **match**

If **match** is selected:

- i. Set the string that, when received, will trigger the connection:

```
(config)>serial port1 autoconnect match_string string
(config)>
```

- ii. **flush_string** is enabled by default, which will discard the matched string from data sent to the server. To disable:

```
(config)>serial port1 autoconnect flush_string false
(config)>
```

The default is **always**.

- c. Set the option that initiates the connection:

```
(config)>serial port1 autoconnect conn_type value
(config)>
```

where *value* is one of:

- **ssh**
- **tcp**
- **telnet**

- **tls**
- **tls_auth**

The default is **tls**.

- d. Set the host name or IP address of the destination server:

```
(config)>serial port1 autoconnect destination hostname/IP_address
(config)>
```

When using SSH, this should be prefixed with the user name and followed by @, for example:

```
(config)>serial port1 autoconnect destination admin@192.168.1.1
(config)>
```

- e. Set the TCP port of the destination server:

```
(config)>serial port1 autoconnect port int
(config)>
```

where *int* is any integer between **1** and **65535**.

- f. To enable TCP keepalive:

```
(config)>serial port1 autoconnect keepalive true
(config)>
```

- g. To enable TCP nodelay:

```
(config)>serial port1 autoconnect nodelay true
(config)>
```

- h. Set the text to be transmitted to the remote server when the socket connects

```
(config)>serial port1 socketid string
(config)>
```

- i. Set the additional autoconnect options. These are available if you have set the `serial port1 autoconnect conn_type` option to `ssh`.

- i. Set the variable that determines from where the user name used for the connection should be read.

```
(config)>serial port1 autoconnect username_source value
(config)>
```

where *value* is one of the following:

- **config**: Define the user name. When you choose this option, you must also configure the static user name.

```
(config)>serial port1 autoconnect username string
(config)>
```

where *string* is the static user name

- **prompt:** The user is prompted to enter their user name when the trigger connection condition is met. This is the default.

- ii. Set the variable that determines whether you want to run in a mode more suitable for an interactive user session.

```
(config)>serial port1 autoconnect interactive true/false
(config)>
```

Set this to *true* to run the allocated pseudo-terminal in canonical mode, enable escape sequences, and output notifications from the ssh process. This is the default.

- iii. Set the value of the TERM environment variable that is sent to the remote server. The default is **vt100**.

```
(config)>serial port1 autoconnect terminal string
(config)>
```

14. (Optional) Configure data framing:

- a. Enable data framing:

```
(config)>serial port1 framing enable true
(config)
```

- b. Set the maximum size of the packet:

```
(config)>serial port1 framing max_count int
(config)
```

The default is **1024**.

- c. Set the length of time the device should wait before sending the packet:

```
(config)>serial port1 framing idle_time value
(config)
```

where *value* is in milliseconds (ms) or seconds (s). The maximum value is **60s**.

- d. Set the end pattern. The packet is sent when this pattern is received from the serial port:

```
(config)>serial port1 framing end_pattern backslash-escaped-string
(config)
```

- e. Set the strip end pattern if you want to remove the end pattern from the packet before it is sent:

```
(config)>serial port1 framing strip_pattern true
(config)
```

15. (Optional) Configure service settings:

a. Configure SSH settings:

i. Enable SSH:

```
(config)>serial port1 service ssh enable true
(config)>
```

ii. Set the port to be used for ssh communications:

```
(config)>serial port1 service ssh port int
(config)>
```

where *int* is any integer between **1** and **65535**. The default is **3001**.

iii. Enable TCP keep-alive messages:

```
(config)>serial port1 service ssh keepalive true
(config)>
```

iv. Enable TCP nodelay messages:

```
(config)>serial port1 service ssh nodelay true
(config)>
```

v. (Optional) Configure access control:

■ To limit access to specified IPv4 addresses and networks:

```
(config)> add serial port1 service ssh acl address end value
(config)>
```

Where *value* can be:

- A single IP address or host name.
- A network designation in CIDR notation, for example, 192.168.1.0/24.
- **any**: No limit to IPv4 addresses that can access the service-type.

Repeat this step to list additional IP addresses or networks.

■ To limit access to specified IPv6 addresses and networks:

```
(config)> add serial port1 service ssh acl address6 end value
(config)>
```

Where *value* can be:

- A single IP address or host name.
- A network designation in CIDR notation, for example, 2001:db8::/48.
- **any**: No limit to IPv6 addresses that can access the service-type.

Repeat this step to list additional IP addresses or networks.

■ To limit access to hosts connected through a specified interface on the XBee Hive device:

```
(config)> add serial port1 service ssh acl interface end value
(config)>
```

Where *value* is an interface defined on your device.

Display a list of available interfaces:

Use ... **network interface ?** to display interface information:

Repeat this step to list additional interfaces.

- To limit access based on firewall zones:

```
(config)> add serial port1 service ssh acl zone end value
(config)>
```

Where *value* is a firewall zone defined on your device, or the **any** keyword.

Display a list of available firewall zones:

Type ... **firewall zone ?** at the config prompt:

```
(config)> ... firewall zone ?
```

Zones: A list of groups of network interfaces that can be referred to by packet filtering rules and access control lists.

Additional Configuration

```
any
dynamic_routes
edge
external
internal
ipsec
loopback
setup
```

```
(config)>
```

Repeat this step to include additional firewall zones.

- vi. (Optional) Enable Multicast DNS (mDNS):

```
(config)>serial port1 service ssh mdns enable true
(config)>
```

- b. Configure TCP settings:

- i. Enable TCP:

```
(config)>serial port1 service tcp enable true
(config)>
```

- ii. Set the port to be used for ssh communications:

```
(config)>serial port1 service tcp port int
(config)>
```

where *int* is any integer between **1** and **65535**. The default is **4001**.

- iii. Enable TCP keep-alive messages:

```
(config)>serial port1 service tcp keepalive true
(config)>
```

- iv. Set the option that initiates the connection:

```
(config)>serial port1 service tcp conn_type value
(config)>
```

where *value* is one of:

- **tcp**
- **tls**
- **tls_auth**

The default is **tls**.

- v. Enable TCP nodelay messages:

```
(config)>serial port1 service tcp nodelay true
(config)>
```

- vi. (Optional) Configure access control:

- To limit access to specified IPv4 addresses and networks:

```
(config)> add serial port1 service tcp acl address end value
(config)>
```

Where *value* can be:

- A single IP address or host name.
- A network designation in CIDR notation, for example, 192.168.1.0/24.
- **any**: No limit to IPv4 addresses that can access the service-type.

Repeat this step to list additional IP addresses or networks.

- To limit access to specified IPv6 addresses and networks:

```
(config)> add serial port1 service tcp acl address6 end value
(config)>
```

Where *value* can be:

- A single IP address or host name.
- A network designation in CIDR notation, for example, 2001:db8::/48.
- **any**: No limit to IPv6 addresses that can access the service-type.

Repeat this step to list additional IP addresses or networks.

- To limit access to hosts connected through a specified interface on the XBee Hive device:

```
(config)> add serial port1 service tcp acl interface end value
(config)>
```

Where *value* is an interface defined on your device.

Display a list of available interfaces:

Use ... **network interface ?** to display interface information:

Repeat this step to list additional interfaces.

- To limit access based on firewall zones:

```
(config)> add serial port1 service tcp acl zone end value
(config)>
```

Where *value* is a firewall zone defined on your device, or the **any** keyword.

Display a list of available firewall zones:

Type ... **firewall zone ?** at the config prompt:

```
(config)> ... firewall zone ?
```

Zones: A list of groups of network interfaces that can be referred to by packet filtering rules and access control lists.

Additional Configuration

```
any
dynamic_routes
edge
external
internal
ipsec
loopback
setup
```

```
(config)>
```

Repeat this step to include additional firewall zones.

- vii. (Optional) Enable Multicast DNS (mDNS):

```
(config)>serial port1 service tcp mdns enable true
(config)>
```

- c. Configure telnet settings:

- i. Enable Telnet:

```
(config)>serial port1 service telnet enable true
(config)>
```

- ii. Set the port to be used for Telnet communications:

```
(config)>serial port1 service telnet port int
(config)>
```

where *int* is any integer between **1** and **65535**. The default is **3001**.

- iii. Enable TCP keep-alive messages:

```
(config)>serial port1 service telnet keepalive true
(config)>
```

iv. Enable TCP nodelay messages:

```
(config)>serial port1 service telnet nodelay true
(config)>
```

v. (Optional) Configure access control:

- To limit access to specified IPv4 addresses and networks:

```
(config)> add serial port1 service telnet acl address end value
(config)>
```

Where *value* can be:

- A single IP address or host name.
- A network designation in CIDR notation, for example, 192.168.1.0/24.
- **any**: No limit to IPv4 addresses that can access the service-type.

Repeat this step to list additional IP addresses or networks.

- To limit access to specified IPv6 addresses and networks:

```
(config)> add serial port1 service telnet acl address6 end value
(config)>
```

Where *value* can be:

- A single IP address or host name.
- A network designation in CIDR notation, for example, 2001:db8::/48.
- **any**: No limit to IPv6 addresses that can access the service-type.

Repeat this step to list additional IP addresses or networks.

- To limit access to hosts connected through a specified interface on the XBee Hive device:

```
(config)> add serial port1 service telnet acl interface end value
(config)>
```

Where *value* is an interface defined on your device.

Display a list of available interfaces:

Use ... **network interface ?** to display interface information:

Repeat this step to list additional interfaces.

- To limit access based on firewall zones:

```
(config)> add serial port1 service telnet acl zone end value
(config)>
```

Where *value* is a firewall zone defined on your device, or the **any** keyword.

Display a list of available firewall zones:

Type ... **firewall zone ?** at the config prompt:

```
(config)> ... firewall zone ?
```

Zones: A list of groups of network interfaces that can be referred to by packet filtering rules and access control lists.

Additional Configuration

```
any
dynamic_routes
edge
external
internal
ipsec
loopback
setup
```

```
(config)>
```

Repeat this step to include additional firewall zones.

- vi. (Optional) Enable Multicast DNS (mDNS):

```
(config)>serial port1 service telnet mdns enable true
(config)>
```

16. Configure serial port logging:

- a. Enable serial port logging:

```
(config)>serial port1 logging enable true
(config)>
```

- b. Set the file name:

```
(config)>serial port1 logging filename string
(config)>
```

- c. Set the maximum allowed log size for the serial port log when starting the log:

```
(config)>serial port1 logging size value
(config)>
```

where *value* is the size of the log file in bytes. The default is **65536**.

- d. Specify the data type:

```
(config)>serial port1 logging type value
(config)>
```

where *value* is one of:

- received
- transmitted

- both
 - arrows. This is the default.
- e. Log the time at which date was received or transmitted:

```
(config)>serial port1 logging hex true
(config)>
```

- f. Log data as hexadecimal values:

```
(config)>serial port1 logging timestamp true
(config)>
```

17. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

18. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Additional autoconnect settings for Remote Access mode

Additional autoconnect configuration options are available when you have configured a serial port for **Remote Access** mode and selected the **SSH connection** option for the **Outbound connection type**. You can configure these in the [CLI](#) and in the web UI.

For information about the complete **Remote Access** mode configuration, see [Configure Remote Access mode for a serial port](#).

Note These options described in this topic are not available in the [Serial Configuration page](#) of the web UI. They are only available in the **Configuration** page, as described below.

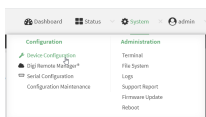
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

Remote Manager:

- a. Locate your device as described in [Use Digi Remote Manager to view and manage your device](#).
- b. Click the **Device ID**.
- c. Click **Settings**.
- d. Click to expand **Config**.

Local Web UI:

- a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



The **Configuration** window is displayed.

3. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

4. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

5. On the menu, click **System**. Under **Configuration**, click **Device Configuration**. The **Configuration** page displays.
6. Click **Serial** to expand the section.
7. Make sure **Enable** has been selected, and **Remote Access (TCP)** has been selected for **Serial mode**.
8. Click **Autoconnect** to expand the section.
- From the **Outbound connection type** list box, select **SSH connection**. Additional autoconnect configuration settings display at the bottom of the section.
 - From the **Username Source** list box, select an option to determine from where the user name used for the connection should be read. Options are:
 - **Static configuration:** Select this option if you want to define the user name. When you choose this option, the **Username** field displays. Enter the static user name in this field.
 - **Prompt for user name:** When this option is selected, the user is prompted to enter their user name when the **Connection Trigger** condition is met. This is the default.
 - The **Interactive Mode** option to determine whether you want to run in a mode more suitable for an interactive user session.
 - **Enable:** Enable this option to run the allocated pseudo-terminal in canonical mode, enable escape sequences, and output notifications from the ssh process. This is the default.
 - **Disable:** Disable this option to turn off the **Interactive Mode** option.
 - In the **Advertised Terminal Type** field, enter the value of the TERM environment variable that is sent to the remote server. The default is **vt100**.
9. Click **Apply** to save the configuration and apply the change.

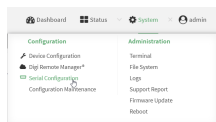
Configure Application mode for a serial port

Application mode provides access to the serial device from Python applications. See [Add a USB serial port](#) for information about creating serial ports in **Application** mode.

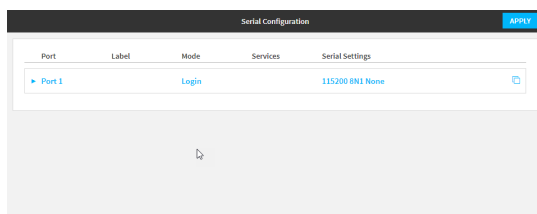
To change the configuration to match the serial configuration of the device to which you want to connect:

Web

1. Log into the XBee Hive WebUI as a user with full Admin access rights.
2. On the menu, click **System**. Under **Configuration**, click **Serial Configuration**.

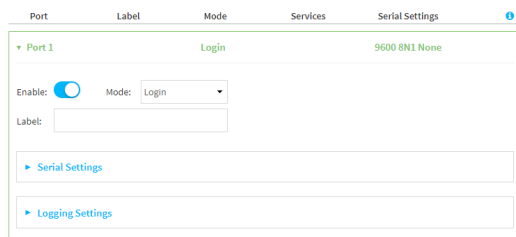


The **Serial Configuration** page is displayed.



Note You can also configure the serial port by using **Device Configuration > Serial**. Changes made by using either **Device Configuration** or **Serial Configuration** will be reflected in both.

3. Click the name of the port that you want to configure.



The serial port is enabled by default. To disable, toggle off **Enable**.

4. For **Mode**, select **Application**. The default is **Remote**.
5. (Optional) For **Label**, enter a label that will be used when referring to this port.
6. Click **Apply** to save the configuration and apply the change.

Command line

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

- At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

- The serial port is enabled by default. To disable:

```
(config)> serial port1 enable false
(config)>
```

- Set the mode:

```
(config)> serial port1 mode application
(config)>
```

- (Optional) Set a label that will be used when referring to this port.

```
(config)>path-paramlabel label
(config)>
```

- Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

- Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

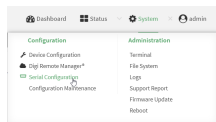
Configure UDP serial mode for a serial port

The **UDP** serial mode option in the serial port configuration provides access to the serial port using UDP.

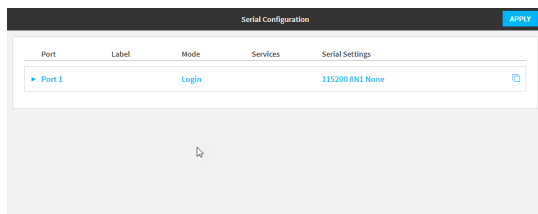
To change the configuration to match the serial configuration of the device to which you want to connect:



- Log into the XBee Hive WebUI as a user with full Admin access rights.
- On the menu, click **System**. Under **Configuration**, click **Serial Configuration**.

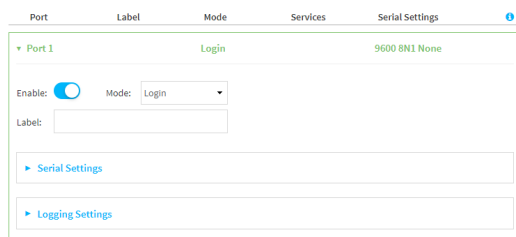


The **Serial Configuration** page is displayed.



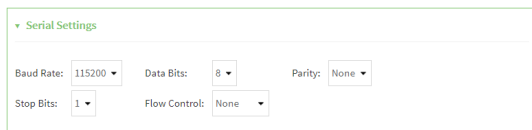
Note You can also configure the serial port by using **Device Configuration > Serial**. Changes made by using either **Device Configuration** or **Serial Configuration** will be reflected in both.

- Click to expand the port that you want to configure for UDP serial mode.

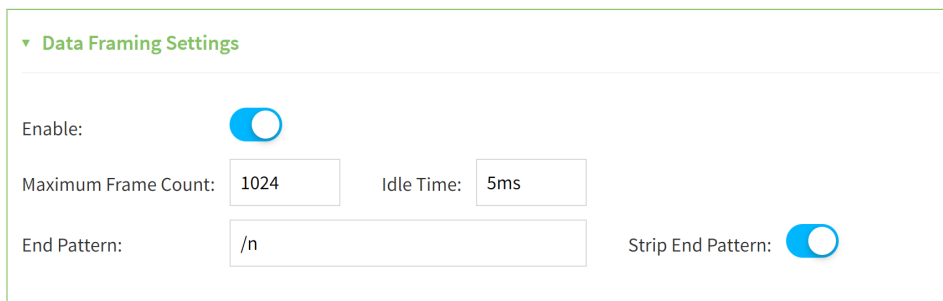


The serial port is enabled by default. To disable, toggle off **Enable**.

- For **Mode**, select **UDP serial**.
The default is **Remote**.
- (Optional) For **Label**, enter a label that will be used when referring to this port.
- Expand **Serial Settings**.



- For **Baud rate**, select the baud rate used by the device to which you want to connect.
- For **Data bits**, select the number of data bits used by the device to which you want to connect.
- For **Parity**, select the type of parity used by the device to which you want to connect.
- For **Stop bits**, select the number of stop bits used by the device to which you want to connect.
- For **Flow control**, select the type of flow control used by the device to which you want to connect.

7. Expand **Data Framing Settings**.


▼ **Data Framing Settings**

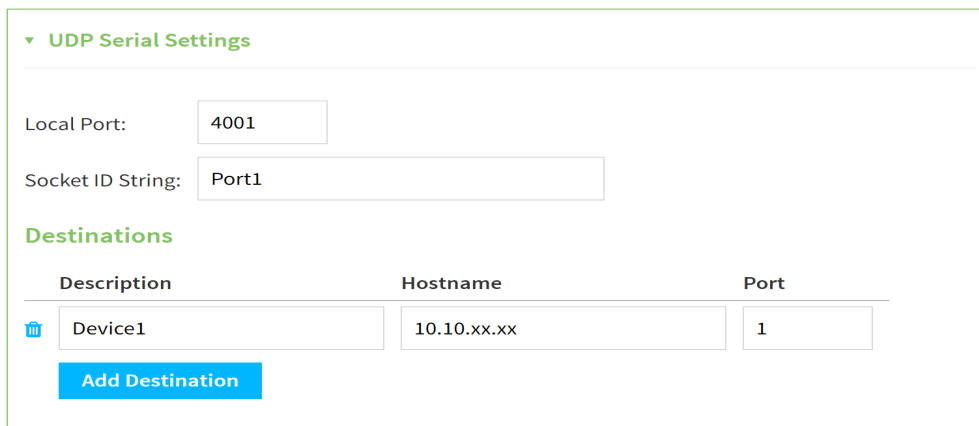
Enable: ☒

Maximum Frame Count: Idle Time:

End Pattern: Strip End Pattern: ☒

a. Click to expand **Data Framing**.

- i. Click **Enable** to enable the data framing feature.
- ii. For **Maximum Frame Count**, enter the maximum size of the packet. The default is **1024**.
- iii. For **Idle Time**, enter the length of time the device should wait before sending the packet.
- iv. For **End Pattern**, enter the end pattern. The packet is sent when this pattern is received from the serial port.
- v. Click **Strip End Pattern** if you want to remove the end pattern from the packet before it is sent.

8. Expand **UDP Serial Settings**.


▼ **UDP Serial Settings**

Local Port:

Socket ID String:

Destinations

	Description	Hostname	Port
	Device1	10.10.xx.xx	1

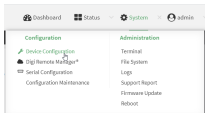
Add Destination

- a. For **Local port**, enter the UDP port. The default is 4001 or serial port 1, 4002 for serial port 2, etc.
- b. (Optional) For **Socket String ID**, enter a string that should be added at the beginning of each packet.
- c. For **Destinations**, you can configure the remote sites to which you want to send data. If you do not specify any destinations, the XBee Hive sends new data from the last IP address and port from which data was received. To add a destination:
 - i. Click **Add Destination**. A destination row is added.
 - ii. (Optional) For **Description**, enter a description of the destination.

- iii. For **Hostname**, enter the host name or IP address of the remote site to which data should be sent.
 - iv. For **Port**, enter the port number of the remote site to which data should be sent.
- You can also configure access control for the serial port.

To do this, you need to go to **Device Configuration**:

- a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



The **Configuration** window is displayed.

- b. Access the configuration for the appropriate type of service:
 - i. Click to expand **Serial**.
 - ii. Click to expand the appropriate serial port.
 - iii. Click to expand **UDP serial**.
 - iv. Click to expand **Access Control List**.

 A screenshot of the 'Port 1' configuration window in the Digi XBee Gateway web interface. The window has a header 'Port 1' with a dropdown arrow. Below the header, there are several configuration fields:

- Enable**: A toggle switch that is turned on.
- Serial mode**: A dropdown menu with 'UDP serial' selected.
- Label**: An empty text input field.
- Baud rate**: A dropdown menu with '115200' selected.
- Data bits**: A dropdown menu with '8' selected.
- Parity**: A dropdown menu with 'None' selected.
- Stop bits**: A dropdown menu with '1' selected.
- Flow control**: A dropdown menu with 'None' selected.

 Below these fields is a section titled 'Data framing' with a right-pointing arrow. Under 'Data framing', there is a section titled 'UDP serial' with a dropdown arrow. Below 'UDP serial', there is a 'Local port' field with the value '4001'. At the bottom, there is a section titled 'Access control list' with a dropdown arrow. Under 'Access control list', there are four expandable sections: 'IPv4 Addresses', 'IPv6 Addresses', 'Interfaces', and 'Zones', each with a right-pointing arrow.

- To limit access to specified IPv4 addresses and networks:
 - i. Click **IPv4 Addresses**.
 - ii. For **Add Address**, click .
 - iii. For **Address**, enter the IPv4 address or network that can access the device's service-type. Allowed values are:
 - A single IP address or host name.
 - A network designation in CIDR notation, for example, 192.168.1.0/24.
 - **any**: No limit to IPv4 addresses that can access the service-type.
 - iv. Click  again to list additional IP addresses or networks.
 - To limit access to specified IPv6 addresses and networks:
 - i. Click **IPv6 Addresses**.
 - ii. For **Add Address**, click .
 - iii. For **Address**, enter the IPv6 address or network that can access the device's service-type. Allowed values are:
 - A single IP address or host name.
 - A network designation in CIDR notation, for example, 2001:db8::/48.
 - **any**: No limit to IPv6 addresses that can access the service-type.
 - iv. Click  again to list additional IP addresses or networks.
 - To limit access to hosts connected through a specified interface on the device:
 - i. Click **Interfaces**.
 - ii. For **Add Interface**, click .
 - iii. For **Interface**, select the appropriate interface from the dropdown.
 - iv. Click  again to allow access through additional interfaces.
 - To limit access based on firewall zones:
 - i. Click **Zones**. By default, there are three firewall zones already configured: Internal, Edge, and IPsec.
 - ii. For **Add Zone**, click .
 - iii. For **Zone**, select the appropriate firewall zone from the dropdown.
See [Firewall configuration](#) for information about firewall zones.
 - iv. Click  again to allow access through additional firewall zones.
- 9. Expand **Logging Settings** to configure logging for this serial port.
 - a. To enable logging, click to toggle on **Enable**.
 - b. In the **Log file name** field, enter a descriptive name for the log file.
 - c. For **Log file size**, type the size of the log file. When the log file reaches the size limit, the current file is saved and a new file is created. The default is 65536 bytes.
 - d. From the **Type of data to log** list box, specify the type of data that should be saved.
 - **Received**
 - **Transmitted**
 - **Both**
 - **Both with arrows**. This is the default.

- e. If you want to log the time at which data was received or transmitted, click the **Timestamps** toggle to **Enable**.
- f. If you want to log the data as hexadecimal values, click the **Hexadecimal** toggle to **Enable**.

Note You can review the message log in the **Serial Port Log** page. See [Review the serial port message log](#).

10. Click **Apply** to save the configuration and apply the change.

Command line

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. The serial port is enabled by default. To disable:

```
(config)> serial port1 enable false
(config)>
```

4. Set the mode:

```
(config)> serial port1 mode udp
(config)>
```

5. (Optional) Set a label that will be used when referring to this port.

```
(config)>serial port1 label label
(config)>
```

6. Set the baud rate used by the device to which you want to connect:

```
(config)>serial port1 label baudrate rate
(config)>
```

7. Set the number of data bits used by the device to which you want to connect:

```
(config)>serial port1 label databits bits
(config)>
```

8. Set the type of parity used by the device to which you want to connect:

```
(config)>serial port1 label parity parity
(config)>
```

Allowed values are:

- **even**
- **odd**
- **none**

The default is **none**.

9. Set the stop bits used by the device to which you want to connect:

```
(config)>serial port1 label stopbits bits
(config)>
```

10. Set the type of flow control used by the device to which you want to connect:

```
(config)>serial port1 label flow type
(config)
```

Allowed values are:

- **none**
- **rts/cts**
- **xon/xoff**

The default is **none**.

11. (Optional) Configure data framing:

- a. Enable data framing:

```
(config)>serial port1 framing enable true
(config)
```

- b. Set the maximum size of the packet:

```
(config)>serial port1 framing max_count int
(config)
```

The default is **1024**.

- c. Set the length of time the device should wait before sending the packet:

```
(config)>serial port1 framing idle_time value
(config)
```

where *value* is in milliseconds (ms) or seconds (s). The maximum value is **60s**.

- d. Set the end pattern. The packet is sent when this pattern is received from the serial port:

```
(config)>serial port1 framing end_pattern backslash-escaped-string
(config)
```

- e. Set the strip end pattern if you want to remove the end pattern from the packet before it is sent:

```
(config)>serial port1 framing strip_pattern true
(config)
```

12. Set the UDP port:

```
(config)> serial port1 udp port port
(config)>
```

The default is **4001**.

13. (Optional) Enter a string that should be added at the beginning of each packet:

```
(config)> serial port1 udp socketid backslash-escaped-string
(config)>
```

14. Configure the remote sites to which you want to send data. If you do not specify any destinations, the XBee Hive send new data to the last hostname and port from which data was received. To add a destination:

- i. Add a destination:

```
(config)> add serial port1 udp destination end
(config serial port1 udp destination 0)>
```

- ii. (Optional) Enter a description of the destination:

```
(config serial port1 udp destination 0)> description string
(config serial port1 udp destination 0)>
```

- iii. Set the host name or IP address of the remote site to which data should be sent:

```
(config serial port1 udp destination 0)>hostname hostname-or-IP-address
(config serial port1 udp destination 0)>
```

- iv. Set the port number of the remote site to which data should be sent:

```
(config serial port1 udp destination 0)> port port
(config serial port1 udp destination 0)>
```

15. (Optional) Configure access control:

- a. Return to the root configuration prompt by typing ...:

```
(config serial port1 udp destination 0)> ...
(config)>
```

- b. Set the Access Control List:

- To limit access to specified IPv4 addresses and networks:

```
(config)> add serial port1 udp acl address end value
(config)>
```

Where *value* can be:

- A single IP address or host name.
- A network designation in CIDR notation, for example, 192.168.1.0/24.
- **any**: No limit to IPv4 addresses that can access the service-type.

Repeat this step to list additional IP addresses or networks.

- To limit access to specified IPv6 addresses and networks:

```
(config)> add serial port1 udp acl address6 end value
(config)>
```

Where *value* can be:

- A single IP address or host name.
- A network designation in CIDR notation, for example, 2001:db8::/48.
- **any**: No limit to IPv6 addresses that can access the service-type.

Repeat this step to list additional IP addresses or networks.

- To limit access to hosts connected through a specified interface on the XBee Hive device:

```
(config)> add serial port1 udp acl interface end value
(config)>
```

Where *value* is an interface defined on your device.

Display a list of available interfaces:

Use ... **network interface ?** to display interface information:

Repeat this step to list additional interfaces.

- To limit access based on firewall zones:

```
(config)> add serial port1 udp acl zone end value
(config)>
```

Where *value* is a firewall zone defined on your device, or the **any** keyword.

Display a list of available firewall zones:

Type ... **firewall zone ?** at the config prompt:

```
(config)> ... firewall zone ?
```

Zones: A list of groups of network interfaces that can be referred to by packet filtering rules and access control lists.

Additional Configuration

```
any
dynamic_routes
edge
external
internal
ipsec
loopback
setup
```

```
(config)>
```

Repeat this step to include additional firewall zones.

- To limit access to specified IPv4 addresses and networks:

```
(config)> add serial port1 udp acl address end value
(config)>
```

Where *value* can be:

- A single IP address or host name.
- A network designation in CIDR notation, for example, 192.168.1.0/24.
- **any**: No limit to IPv4 addresses that can access the service-type.

Repeat this step to list additional IP addresses or networks.

- To limit access to specified IPv6 addresses and networks:

```
(config)> add serial port1 udp acl address6 end value
(config)>
```

Where *value* can be:

- A single IP address or host name.
- A network designation in CIDR notation, for example, 2001:db8::/48.
- **any**: No limit to IPv6 addresses that can access the service-type.

Repeat this step to list additional IP addresses or networks.

- To limit access to hosts connected through a specified interface on the XBee Hive device:

```
(config)> add serial port1 udp acl interface end value
(config)>
```

Where *value* is an interface defined on your device.

Display a list of available interfaces:

Use ... **network interface ?** to display interface information:

Repeat this step to list additional interfaces.

- To limit access based on firewall zones:

```
(config)> add serial port1 udp acl zone end value
(config)>
```

Where *value* is a firewall zone defined on your device, or the **any** keyword.

Display a list of available firewall zones:

Type ... **firewall zone ?** at the config prompt:

```
(config)> ... firewall zone ?
```

Zones: A list of groups of network interfaces that can be referred to by packet filtering rules and access control lists.

Additional Configuration

any
dynamic_routes
edge
external
internal
ipsec
loopback
setup

(config)>

Repeat this step to include additional firewall zones.

16. Configure serial port logging:

a. Enable serial port logging:

```
(config)>serial port1 logging enable true
(config)>
```

b. Set the file name:

```
(config)>serial port1 logging filename string
(config)>
```

c. Set the maximum allowed log size for the serial port log when starting the log:

```
(config)>serial port1 logging size value
(config)>
```

where *value* is the size of the log file in bytes. The default is **65536**.

d. Specify the data type:

```
(config)>serial port1 logging type value
(config)>
```

where *value* is one of:

- received
- transmitted
- both
- arrows. This is the default.

e. Log the time at which data was received or transmitted:

```
(config)>serial port1 logging hex true
(config)>
```

f. Log data as hexadecimal values:

```
(config)>serial port1 logging timestamp true
(config)>
```

17. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

18. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Configure Modem emulator mode for a serial port

Modem emulator mode allows the device to act as a dial-up modem emulator for handling incoming AT dial-ins.

To change the configuration to match the serial configuration of the device to which you want to connect:



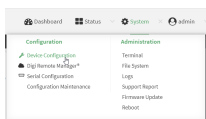
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

Remote Manager:

- a. Locate your device as described in [Use Digi Remote Manager to view and manage your device](#).
- b. Click the **Device ID**.
- c. Click **Settings**.
- d. Click to expand **Config**.

Local Web UI:

- a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



The **Configuration** window is displayed.

3. Click to expand the name of the port that you want to configure, for example, **Port 1**.
The serial port is enabled by default. To disable, toggle off **Enable**.
4. For **Mode**, select **Modem emulator**. The default is **Remote**.
5. (Optional) For **Label**, enter a label that will be used when referring to this port.
6. For **Baud rate**, select the baud rate used by the device to which you want to connect. The default is **9600**.

7. For **Data bits**, select the number of data bits used by the device to which you want to connect. The default is **8**.
8. For **Parity**, select the type of parity used by the device to which you want to connect. The default is **None**.
9. For **Stop bits**, select the number of stop bits used by the device to which you want to connect. The default is **1**.
10. For **Flow control**, select the type of flow control used by the device to which you want to connect. The default is **None**.
11. For **Idle timeout**, type the amount of time that the active session can be idle before the session is disconnected.
 Allowed values are any number of weeks, days, hours, minutes, or seconds, and take the format **number{w|d|h|m|s}**.
 For example, to set **Idle timeout** to ten minutes, enter **10m** or **600s**.
12. For **Escape character**, type the character to use in the escape sequence. Enter this character three times, followed by the escape delay and then an AT command to switch from data mode to command mode. The default is the plus sign (+).
13. For **Escape delay**, type the delay between the escape sequence and an AT command to switch from data mode to command mode. The default is **1s**.
14. For **Auto-answer rings**, type the number of rings to wait before auto-answering. Enter **0** (zero) to disable auto-answering.
15. **Command echo** is enabled by default. Commands sent to the port are echoed back to the user. Select to disable this feature.
16. For **Result codes**, select the type of result code that are displayed as responses to commands. Options are:
 - **None**: No result codes are displayed.
 - **Numeric**: Numeric result codes are displayed.
 - **Verbose**: Result codes are displayed in English, for example: OK, ERROR, CONNECT. This is the default.
17. (Optional) Click to expand **Phonebook** and create dial strings that can be used to connect to remote servers.
 - a. Click  to add a phone book entry.
 - b. For **Label**, type a descriptive name for the phone book entry.
 - c. (Required) For **Dialstring**, type the string to dial to connect to the remote server.
 - d. (Required) For **Connection destination**, type the hostname or IP address of the remote server.
 - e. (Required) For **Connection port**, type the TCP port of the remote server. Minimum is 1 and maximum is 65535.
18. Expand **TCP connection** to configure TCP connection for this serial port.
 - a. To enable a TCP connection, click to toggle on **Enable**.
 - b. For **Port**, type the TCP port for this service. The default is **4001**.
 - c. Expand **Access control list** to create a list of IP addresses, interfaces, and firewall zones from which this service may be accessed.

- To limit access to specified IPv4 addresses and networks:
 - i. Click **IPv4 Addresses**.
 - ii. For **Add Address**, click .
 - iii. For **Address**, enter the IPv4 address or network that can access the device's service-type. Allowed values are:
 - A single IP address or host name.
 - A network designation in CIDR notation, for example, 192.168.1.0/24.
 - **any**: No limit to IPv4 addresses that can access the service-type.
 - iv. Click  again to list additional IP addresses or networks.
 - To limit access to specified IPv6 addresses and networks:
 - i. Click **IPv6 Addresses**.
 - ii. For **Add Address**, click .
 - iii. For **Address**, enter the IPv6 address or network that can access the device's service-type. Allowed values are:
 - A single IP address or host name.
 - A network designation in CIDR notation, for example, 2001:db8::/48.
 - **any**: No limit to IPv6 addresses that can access the service-type.
 - iv. Click  again to list additional IP addresses or networks.
 - To limit access to hosts connected through a specified interface on the device:
 - i. Click **Interfaces**.
 - ii. For **Add Interface**, click .
 - iii. For **Interface**, select the appropriate interface from the dropdown.
 - iv. Click  again to allow access through additional interfaces.
 - To limit access based on firewall zones:
 - i. Click **Zones**. By default, there are three firewall zones already configured: Internal, Edge, and IPsec.
 - ii. For **Add Zone**, click .
 - iii. For **Zone**, select the appropriate firewall zone from the dropdown.
See [Firewall configuration](#) for information about firewall zones.
 - iv. Click  again to allow access through additional firewall zones.
 - d. Toggle on **Enable mDNS** to enable Multicast DNS (mDNS) reporting for this service. This feature is disabled by default.
19. Expand **Logging Settings** to configure logging for this serial port.
- a. To enable logging, click to toggle on **Enable**.
 - b. In the **Log file name** field, enter a descriptive name for the log file.
 - c. For **Log file size**, type the size of the log file. When the log file reaches the size limit, the current file is saved and a new file is created. The default is 65536 bytes.
 - d. From the **Type of data to log** list box, specify the type of data that should be saved.
 - **Received**
 - **Transmitted**

- **Both**
 - **Both with arrows.** This is the default.
- e. If you want to log the time at which data was received or transmitted, click the **Timestamps** toggle to **Enable**.
 - f. If you want to log the data as hexadecimal values, click the **Hexadecimal** toggle to **Enable**.

Note You can review the message log in the **Serial Port Log** page. See [Review the serial port message log](#).

20. Click **Apply** to save the configuration and apply the change.

Configure RealPort mode using the Digi Navigator

You can use RealPort mode to enable communication between a device and your computer. RealPort exposes a serial port on a remote device as a standard COM/TTY port on a client computer. You can install the **Digi Navigator**, which helps you to easily configure your devices and computer to use Realport.

With Digi Navigator, you can set serial ports on the device to RealPort mode as needed, and then also enable the RealPort service. The COM ports on your laptop are also configured. These processes ensure that RealPort is configured on the device and on your computer.

Note You can also configure your device and computer to use RealPort serial port mode without using the **Digi Navigator**. See [Advanced RealPort configuration without using the Digi Navigator](#).

Digi Navigator installation

The **Digi Navigator** can only be installed on a computer with a Windows OS. If you are using Linux, you can manually install and configure RealPort without **Digi Navigator**. For the Linux installation process, refer to the [Get started: Install RealPort for LINUX](#) in the **RealPort Installation User's Guide**.

Installation and configuration process

These steps explain how to install and configure the **Digi Navigator**.

Step 1: [Install the Digi Navigator](#)

Step 2: [Configure RealPort on a Digi device from the Digi Navigator](#)

Step 3: [Install and configure RealPort on your computer](#)

Note If you have Digi Navigator 1.0 already installed, Digi recommends that you uninstall it, as both versions of the Digi Navigator are not needed. See [Uninstall Digi Navigator 1.0](#).

Digi Navigator features

- [Digi Navigator application features](#)
- [Filter devices for display in the Digi Navigator](#)

- Filter the device list by service option
- Filter the device list for auto-discovered devices
- Filter the device list by RealPort configuration status
- Specify the IP address to discover a Digi device
- Set an IP address for a device
- Access a device's web UI from the Digi Navigator
- Manage the list of devices configured for RealPort
 - Refresh the RealPort device list
 - Review the COM ports configured for RealPort
 - Uninstall the RealPort device configuration from your computer
- Reconfigure RealPort on a device
- Generate a device setup script
- Review Digi Navigator version information
- Uninstall Digi Navigator 1.0

Install the Digi Navigator

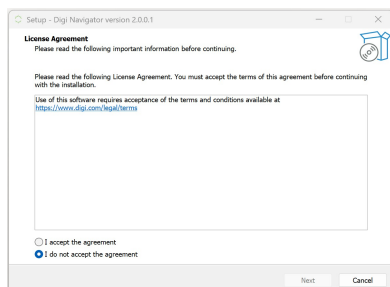
This section explains how to download and install the **Digi Navigator** application.

Note Microsoft Visual C++ is required for RealPort and is installed by default during the Digi Navigator install process.

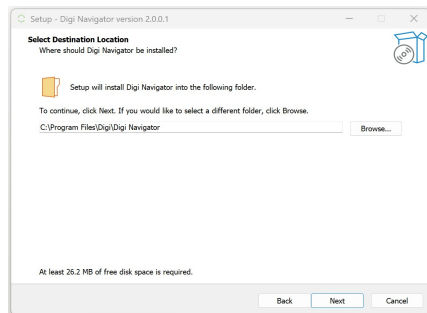
1. Navigate to the [Digi Navigator support page](#).

Note The **Digi Navigator** application can also be downloaded from your device's product support page.

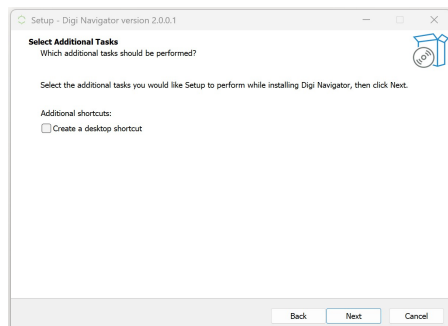
2. Scroll down to the **Product Resources** tab, and in the **Drivers & Patches** section, click **Digi Navigator**.
3. From the list box, select the appropriate Microsoft Windows option from the list of driver options.
4. Click the **download** link to download the **Digi Navigator** application.
5. When the download is complete, click on the downloaded .exe file. The **Digi Navigator Setup** wizard displays.
6. In the **License Agreement** page, review the agreement and select the **I accept the agreement** option.



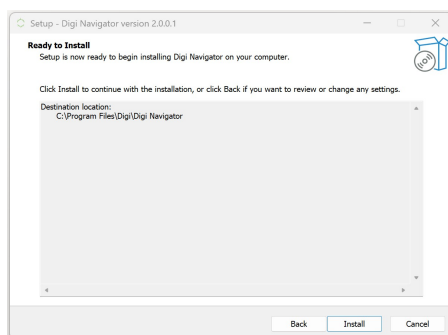
7. Click **Next**. The **Select Destination Location** page displays.
 - You can leave the installation location as the default, or click **Browse** to select a different location.



8. Click **Next**. The **Select Additional Tasks** page displays.
 - If you want to create a shortcut for the Digi Navigator, select the **Create a desktop shortcut** option.

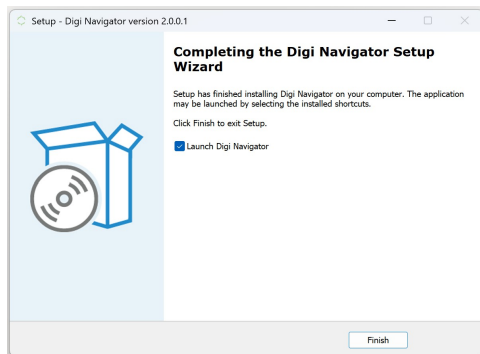


9. Click **Next**. The **Ready to Install** page displays.



10. Click **Install** to start the installation. When complete, the **Completing the Digi Navigator Setup Wizard** page displays.

The **Launch Digi Navigator** option is selected by default. De-select this option if you don't want the **Digi Navigator** to automatically launch each time you boot your computer.



11. Click **Finish** to complete the installation process. If the **Launch Digi Navigator** option was selected, the Digi Navigator launches.

NEXT STEP: Configure RealPort on a device. See [Configure RealPort on a Digi device from the Digi Navigator](#).

Configure RealPort on a Digi device from the Digi Navigator

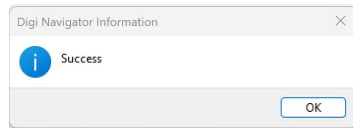
You can configure the XBee Hive to communicate with your computer using RealPort. In this step, you can select which serial ports on the device should be set to RealPort mode, and the RealPort service is enabled for the device.

Configuring RealPort on your device is the first step in a two-step process. To ensure communication between the device and your laptop, you must also [configure your computer](#) for RealPort after the first step is completed.

Note You can also manually configure the device for RealPort by logging into the device's web UI. See [Advanced RealPort configuration without using the Digi Navigator](#).

1. Make sure the XBee Hive is powered and connected your local network or computer with an Ethernet cable.
2. Launch the **Digi Navigator**.
3. A list of the devices [you have manually added](#) displays. You can add additional devices if needed.
4. Find the device that you want to configure and expand it to display the IP addresses for the device.
5. Use one of the following methods to begin configuring RealPort on the device:
 - **Configuration pane:** Click on the IP address to display options in the Configuration pane. Click **Configure Device for RealPort**. The **Enter Device Credentials** page displays.
 - **Shortcut menu:** Right-click on an IP address to display the shortcut menu, and click **Configure Device For RealPort**. The **Enter Device Credentials** page displays.
6. In the **Enter Device Credentials** page, enter the device's default user name and password in the **Username** and **Password** fields. The default user name is **admin** and the default password is the unique password printed on the label packaged with your device. If the defaults do not work, they may have been changed. Verify with your system administrator.

7. Click **OK**.
8. When RealPort configuration is complete, the **Success** message displays.



9. Click **OK** to close the message.
10. (Optional) If desired, you can verify the RealPort configuration. See [Configure the serial port for RealPort mode](#) and [Configure the RealPort service](#).

NEXT STEP: Install and configure RealPort on your computer. See [Install and configure RealPort on your computer](#).

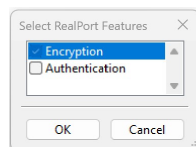
Install and configure RealPort on your computer

You can configure your computer to communicate with the XBee Hive using RealPort. In this step, RealPort is installed on your computer and communication with the device is configured.

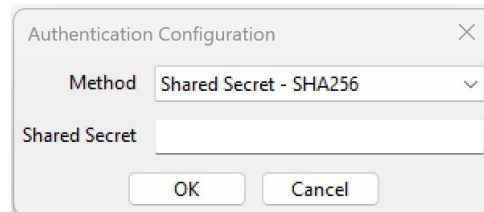
Configuring RealPort on your device is the second step in a two-step process. To ensure communication between the device and your laptop, you must also have configured your device for RealPort. See [Configure RealPort on a Digi device from the Digi Navigator](#).

Note You can also manually install and configure RealPort on your computer. See [Advanced RealPort configuration without using the Digi Navigator](#).

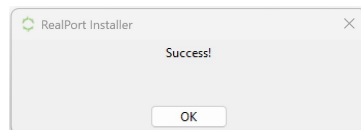
1. Make sure the XBee Hive is powered and connected your local network or computer with an Ethernet cable.
2. Launch the **Digi Navigator**.
3. A list of the devices [you have manually added](#) displays. You can add additional devices if needed.
4. Find the device that you want to access and expand it to display the IP addresses for the device.
5. Use one of the following methods to begin configuring RealPort on your computer:
 - **Configuration pane:** Click on the IP address to display options in the Configuration pane. Click **Configure this PC for RealPort**. The **Select RealPort Features** dialog displays.
 - **Shortcut menu:** Right-click on an IP address to display the shortcut menu, and click **Configure this PC for RealPort**. The **Select RealPort Features** dialog displays.
6. Configure features in the **Select RealPort Features** dialog.



- a. Enable **Encryption** to enable encryption of data. This is enabled by default.
- b. Enable **Authentication** to configure the authentication method the RealPort server uses to authenticate clients. The **Authentication Configuration** dialog displays.
 - From the **Method** list box, select the **Shared Secret - SHA256** option.
 - For **Shared Secret**, enter the authentication password to ensure secure communication. Leave this field blank to disable authentication.



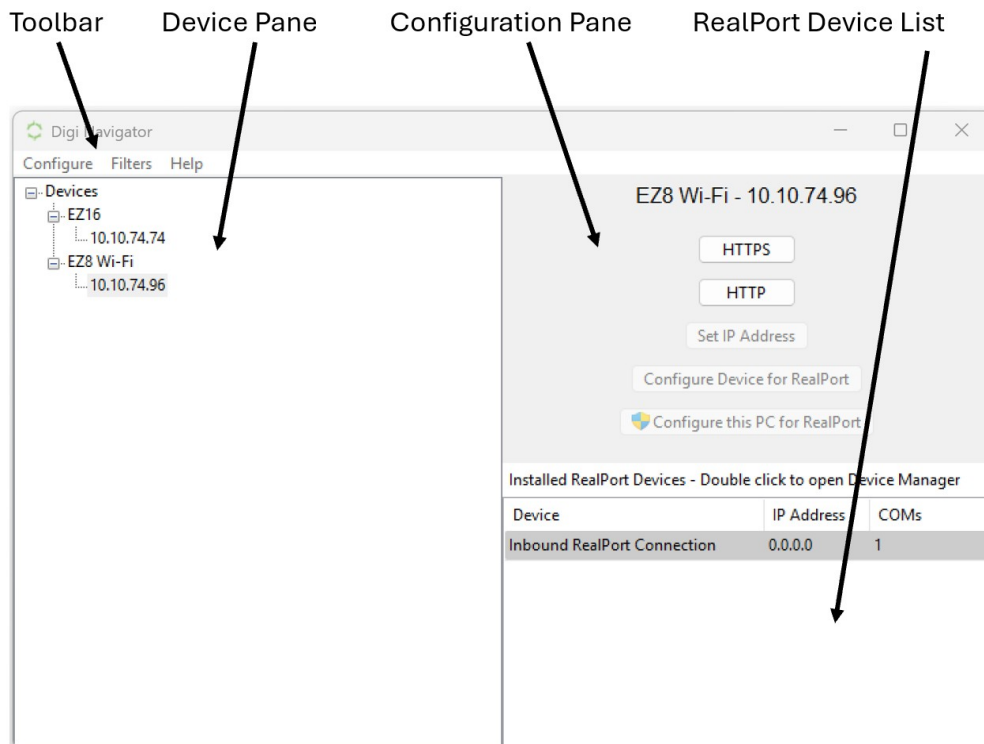
- c. Click **OK**.
7. The **Select Ports** dialog displays. By default, all of the ports on the device are selected to be configured for RealPort. De-select the ports that you don't want to configure for RealPort.
8. Click **OK**. The **COM Selection** dialog displays.
9. From the **Select starting COM** list box, select the first COM port that should be configured for RealPort. The first available COM port is selected by default. The number of COM ports configured matches the number of serial ports on the device.
10. Click **OK**. A series of progress messages displays.
11. When the configuration is complete, a message displays.



12. Click **OK** to close the message.
13. (Optional) After RealPort configuration on your laptop is complete, you can open the Windows **Properties** dialog for your computer.
 - a. Launch the **Digi Navigator** if it is not currently open. A list of devices that have RealPort enabled and configured displays in the **Installed RealPort Devices** section at the bottom of the screen.
 - b. Double-click on a device name. The Windows **Properties** dialog for your computer displays. and display the COM ports on your computer that are configured for RealPort. For more information, see [Review the COM ports configured for RealPort](#).

Digi Navigator application features

All features of the **Digi Navigator** are available from the main application screen.



Toolbar

The toolbar menus are used to configure Digi Navigator.

Menu item	Sub-menu item	Description
Configure	Known Devices	If a Digi device is not on the same network as your computer or the device is undiscoverable, you can manually add the device using that device's IP address. Specify the IP address to discover a Digi device
	Refresh Installed RealPort Device List	Use the Refresh Installed RealPort Device List feature to update the list of the Digi devices that have RealPort enabled and configured. The list displays in the RealPort Device List pane in the Digi Navigator. Refresh the RealPort device list
	Generate Device Setup Script	Use the Generate Device Setup Script feature to generate a script of the RealPort configuration of the local PC. The script can be saved and used as a backup. The script is generated as a .cmd file. Generate a device setup script

Menu item	Sub-menu item	Description
Filters	Services	You can limit the service options that display in the Configuration pane in the Digi Navigator . You can click on a service option in the Configuration pane to use that service to log in to the device. ▪ Filter the device list by service option
	IP Addresses	Not applicable for devices that do not support autodiscovery with Digi Navigator.
	Devices > Supported Services > RealPort	You can use the RealPort option to filter which devices are included in the device list, depending on the RealPort configuration status. ▪ Filter the device list by RealPort configuration status
	Devices > Discovered Devices	You can use the Discovered Devices option to filter which devices are included in the device list, depending on whether the device was auto-discovered. ▪ Filter the device list for auto-discovered devices
Help	About	Review the Digi Navigator version information. ▪ Review Digi Navigator version information

Device pane

A list of the discovered devices and those added to the known device list display in the Device pane. Expand each device to display the IP addresses associated with each device.

Filter the device list

You can apply filters to limit which devices display in the pane.

- [Filter the device list by service option](#)
- [Filter the device list for auto-discovered devices](#)
- [Filter the device list by RealPort configuration status](#)

Display configuration options for a device in the Configuration page

Expand a device and click on an IP address for the device to display related configurations options in the [Configuration pane](#).

Shortcut menu

You can right-click on the IP address for a device to display the shortcut menu options. The options are an easy way to use the features from the toolbar.

Item	Description
Add to Known Devices	If a Digi device is not on the same network as your computer or the device is undiscoverable, you can manually add the device using that device's IP address.

Item	Description
	Specify the IP address to discover a Digi device
HTTPS	You can use the HTTPS menu option to access the device's web UI using the HTTPS service. Access a device's web UI from the Digi Navigator
HTTP	You can choose the HTTP menu option to access the device's web UI using the HTTP service. Access a device's web UI from the Digi Navigator
SSH	You can use the SSH menu option to access the device's web UI using the SSH service. Access a device's web UI from the Digi Navigator
Set IP Address	You can reconfigure the IP address of a device to a DHCP address or a specified static address. Set an IP address for a device
Configure Device for RealPort	You can use the Configure Device for RealPort menu option to configure RealPort on the device. - Configure RealPort on a Digi device from the Digi Navigator - Reconfigure RealPort on a device
Configure this PC for RealPort	Use the Configure this PC for RealPort menu option to configure RealPort on your computer so that it can communicate with the device. Install and configure RealPort on your computer

Configuration pane

You can use the buttons in the Configuration pane to connect to a device's web UI, and configure RealPort on your device and on your computer.

Item	Description
HTTPS	You can click HTTPS to access the device's web UI using the HTTPS service. Access a device's web UI from the Digi Navigator
HTTP	You can click HTTP to access the device's web UI using the HTTP service. Access a device's web UI from the Digi Navigator
SSH	You can click SSH to access the device's web UI using the SSH service. Access a device's web UI from the Digi Navigator
Set IP Address	You can reconfigure the IP address of a device to a DHCP address or a specified static address.

Item	Description
	▪ Set an IP address for a device
Configure Device for RealPort	Click Configure Device for RealPort to configure RealPort on the device. ▪ Configure RealPort on a Digi device from the Digi Navigator ▪ Reconfigure RealPort on a device
Configure this PC for RealPort	Click Configure this PC for RealPort to configure RealPort on your computer so that it can communicate with the device. ▪ Install and configure RealPort on your computer

RealPort device list pane

The RealPort device list displays all of the devices in Digi Navigator that are configured for RealPort.

Item	Description
Open Device Manager	Click a name in the RealPort device list to open the Windows Properties dialog on your computer to access the configured COM ports. The number of COM ports configured for RealPort matches the number of serial ports on the device. ▪ Review the COM ports configured for RealPort
Uninstall Device	You can uninstall RealPort from the device and uninstall the RealPort configuration for this device from your computer if needed, using the Uninstall Device shortcut menu option. ▪ Uninstall the RealPort device configuration from your computer

Filter the device list displayed in the Digi Navigator

You can apply filters to limit which devices display in the device list.

Filter the device list by service option

You can filter the device list that displays in the Device page by service. This also determines which service buttons display in the Configuration pane.

The Digi Navigator uses the HTTPS service by default to discover the IP addresses for the Digi devices connected to your network. Other services can be used, if needed.

1. Make sure **Digi Navigator** is [installed](#) and the XBee Hive is powered and connected to your local network or computer with an Ethernet cable.
2. Launch the **Digi Navigator**.
3. Click **Filters > Services** from the toolbar to display the service options: **HTTPS**, **HTTP**, and **SSH**. To ensure that you can communicate with your device, at least one option should be selected.
4. Click on service option to select it or deselect it. A check mark displays next to a selected option.

The selected options are included in the configuration pane. You can click on a service option in the configuration pane to use that service to log in to the device.

Filter the device list for auto-discovered devices

You can use the **Discovered Devices** option to filter which devices are included in the device list, depending on whether the device was auto-discovered or is a device that was manually added to the known device list.

1. Make sure **Digi Navigator** is [installed](#) and the XBee Hive is powered and connected to your local network or to your computer with an Ethernet cable.
2. Launch the **Digi Navigator**.
3. From the toolbar, click **Filters > Devices**. Use the **Discovered Devices** menu option to filter the devices.
 - **Selected:** Both known and discovered devices are listed.
 - **Not selected:** Only known devices are listed.

Filter the device list by RealPort configuration status

You can use the **RealPort** option to filter which devices are included in the device list, depending on the RealPort configuration status.

1. Make sure **Digi Navigator** is [installed](#) and the XBee Hive is powered and connected to your local network or to your computer with an Ethernet cable.
2. Launch the **Digi Navigator**.
3. From the toolbar, click **Filters > Devices > Supported Services**. Use the **RealPort** menu option to filter the devices.
 - **Selected:** Only discovered devices that are configured for the RealPort service display. Known devices are included if the device is [configured for RealPort](#).
 - **Not selected:** All discovered devices on your network and all known devices display, regardless of RealPort service configuration status.

Specify the IP address to discover a Digi device

You can manually add a device to the known device list, using the device's IP address. This feature is useful if a device is not on the same network as your computer or the device is undiscoverable.

Before you begin

To add a device, you will need:

- The device's IP address.
- The user name and password for the device.

To add a device to the known device list:

1. Make sure **Digi Navigator** is [installed](#) and the XBee Hive is powered and connected to your local network or to your computer with an Ethernet cable.
2. Launch the **Digi Navigator**.
3. Click **Configure > Known Devices**.
4. Click **Add**. The **New Device** dialog displays.
 - a. In the **Name** field, enter a descriptive name for the device.
 - b. Click **Add**.
 - c. In the **IP Addresses** field, enter the IP address of the device.

If you want to enter more than one IP address for this device, click **Add** and enter another IP address.
 - d. Click the buttons for the services that you want to use to communicate with the device. The default port number for each service can be changed. After a service has been selected, you can click the button for the service to de-select it.

To ensure that you can communicate with your device, at least one option should be selected.

 - **HTTPS**: The **HTTPS** service is selected by default. The default port number is **443**.
 - **HTTP**: The default port number is **80**.
 - **SSH**: The default port number is **22**.
 - **RealPort**: Click **RealPort** to enable the RealPort service for the device. The default port number is **1027**.
5. Click **OK**. You are returned to the **Known Devices** dialog.
6. Click the **X** in the upper right corner to close the dialog.
7. The device you just added displays in the device list.

Set an IP address for a device

You can reconfigure the IP address of a device to a DHCP address or a specified static address.

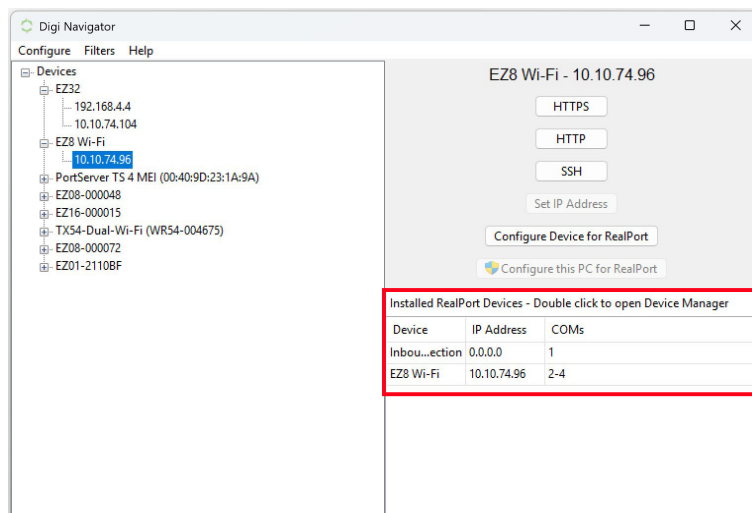
Note This feature can be used with only discovered devices. It is not enabled for known devices.

1. Make sure the XBee Hive is powered and connected your local network or computer with an Ethernet cable.
2. Launch the **Digi Navigator**.
3. A list of the devices [you have manually added](#) displays. You can add additional devices if needed.
4. Find the device that you want to configure and expand it to display the IP addresses for the device.

5. Use one of the following methods to begin reconfiguring the IP address:
 - **Configuration pane:** Click on the IP address to display options in the Configuration pane. Click **Set IP Address**. The **IP Address Configuration** dialog displays.
 - **Shortcut menu:** Right-click on an IP address to display the shortcut menu, and click **Set IP Address**. The **IP Address Configuration** dialog displays.
6. In the **IP Address Configuration** dialog, enter the required information:
 - **Type:** From the **Type** list box, select an option: **DHCP** or **Static IP address**.
 - **Address:** Enter the IP address.
 - **Default gateway:** Enter the default gateway that should be used.
7. Click **OK**.

Manage the list of devices configured for RealPort

After you have enabled and configured RealPort on at least one Digi device, a list of configured devices displays at the bottom of the **Digi Navigator**. You can refresh the list and easily access the COM port configuration on your computer.



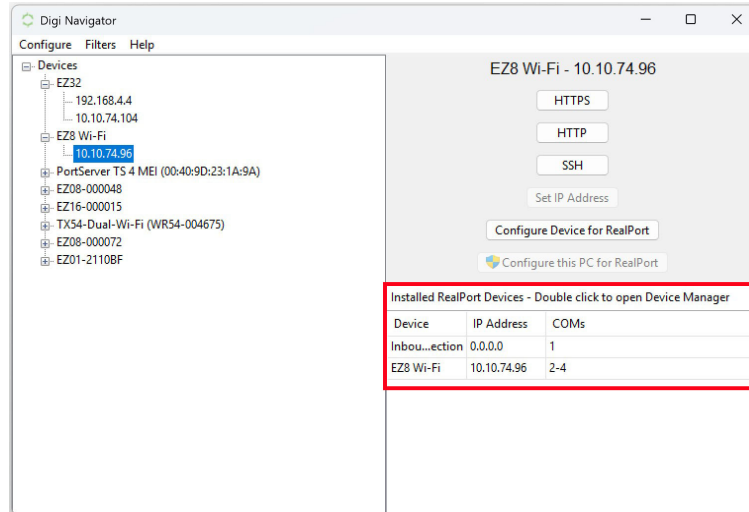
- **Refresh:** From the toolbar, choose **Configure > Refresh Installed RealPort Device List** to [update the list](#) of XBee Hive devices that have RealPort enabled and configured.
- **Device Manager:** Double-click on a device name in the list to open the Windows **Properties** dialog on your computer to [access the configured COM ports](#). The number of COM ports configured for RealPort matches the number of serial ports on the device.
- **Uninstall the RealPort configuration on your computer:** You can use the **Uninstall Device** option to [remove the RealPort device configuration](#) on your computer for a selected device. This ensures that your computer is not able to connect to the selected device.

Refresh the RealPort device list

You can refresh the list of the Digi devices that have RealPort enabled and configured. The list displays in the **Installed RealPort Devices** pane in the Digi Navigator.

1. Make sure **Digi Navigator** is [installed](#) and the XBee Hive is powered and connected to your local network or to your computer with an Ethernet cable.

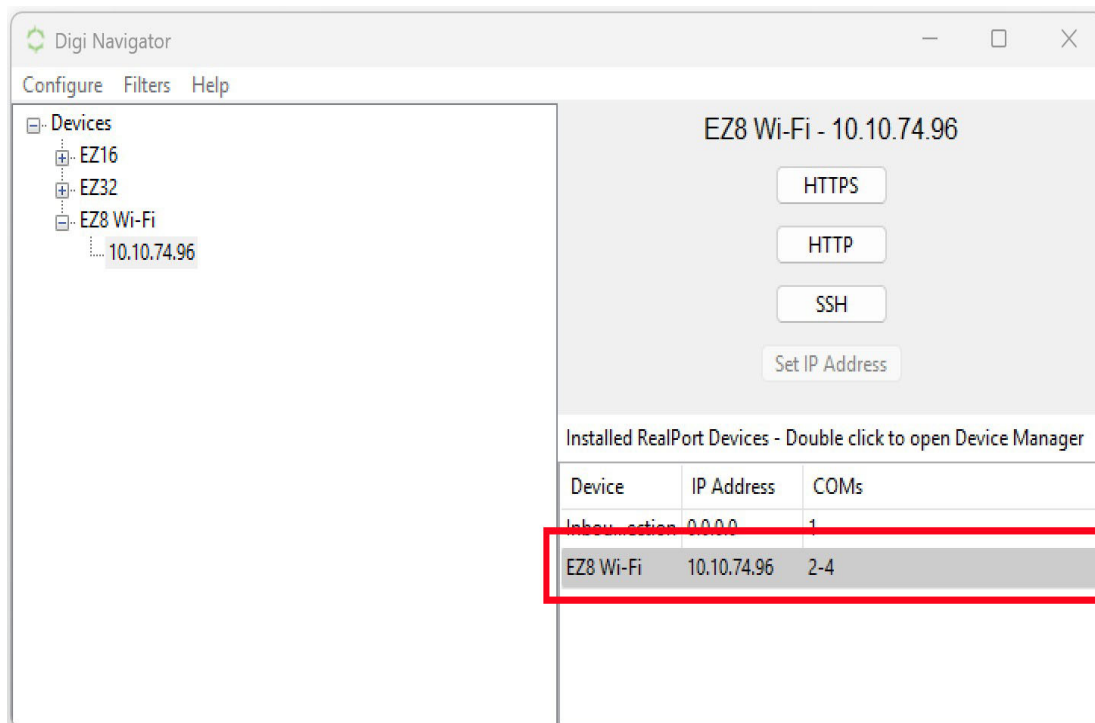
2. Launch the **Digi Navigator**.
3. Click **Configure > Refresh Installed RealPort Device List** to refresh the list.



Review the COM ports configured for RealPort

You can open the Windows **Properties** dialog on your computer to access the configured COM ports. The number of COM ports configured for RealPort matches the number of serial ports on the device.

1. Make sure **Digi Navigator** is [installed](#) and the XBee Hive is powered and connected to your local network or to your computer with an Ethernet cable.
2. Launch the **Digi Navigator**.
3. In the RealPort list section of the Digi Navigator, double-click on a name in the **Device** column.

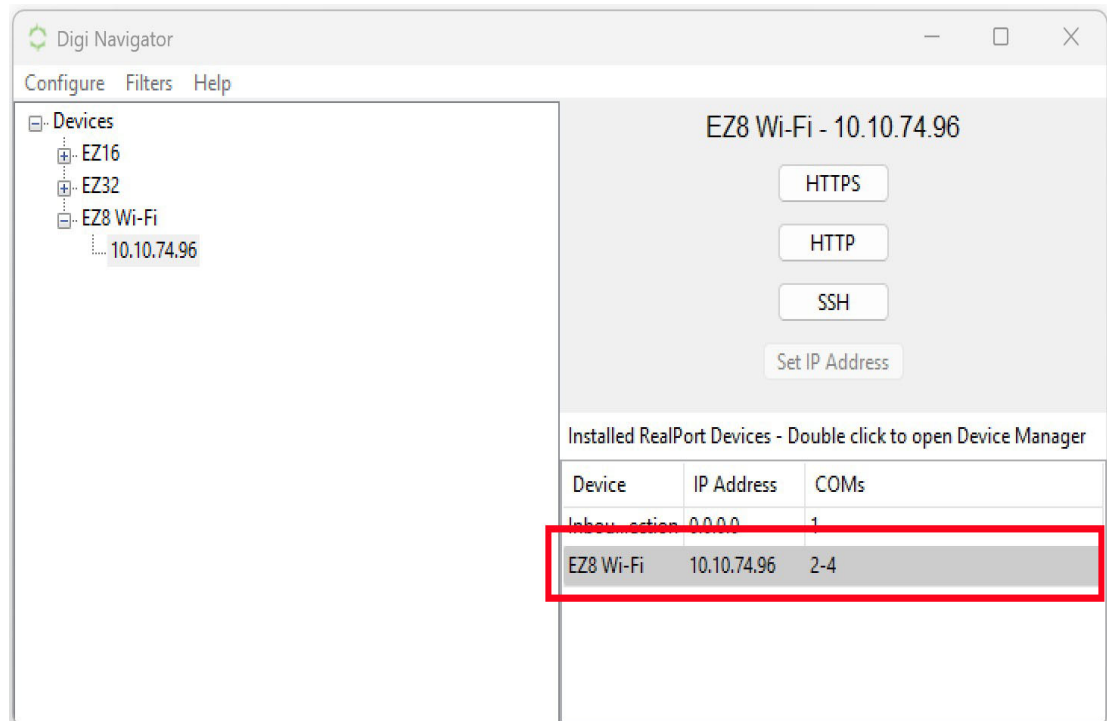


4. The standard Windows **Device Properties** dialog opens.
 - a. Click the **General** tab.
 - b. Click **Change settings**.
 - c. Click the **Advanced** tab.
 - d. Click **Properties**. The COM ports display.
 - e. Click **OK** or **Cancel** to close the dialog.

Uninstall the RealPort device configuration from your computer

You can use the **Uninstall Device** option to remove the RealPort device configuration on your computer for a selected device. This ensures that your computer is not able to connect to the selected device.

1. Make sure **Digi Navigator** is **installed** and the XBee Hive is powered and connected to your local network or to your computer with an Ethernet cable.
2. Launch the **Digi Navigator**.
3. In the RealPort list section of the **Digi Navigator**, find the device that you want to uninstall.



4. Right-click on an IP address in the list to display the shortcut menu.
5. Click **Uninstall Device** to remove the RealPort configuration for this device from your computer.
6. When the process is complete, a **Success** message displays in a confirmation dialog.
7. Click **OK** to close the dialog.

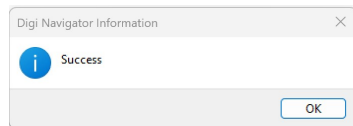
Reconfigure RealPort on a device

After you have initially configured RealPort on a device and established a connection with your computer, you can reconfigure RealPort on the device as needed.

Note If you reconfigure RealPort on a device, you do not need to reconfigure your computer.

1. Make sure the XBee Hive is powered and connected your local network or computer with an Ethernet cable.
2. Launch the **Digi Navigator**.
3. A list of the devices **you have manually added** displays. You can add additional devices if needed.
4. Find the device that you want to configure and expand it to display the IP addresses for the device.
5. Use one of the following methods to begin configuring RealPort on the device:
 - **Configuration pane:** Click on the IP address to display options in the Configuration pane. Click **Configure Device for RealPort**. The **Enter Device Credentials** page displays.

- **Shortcut menu:** Right-click on an IP address to display the shortcut menu, and click **Configure Device For RealPort**. The **Enter Device Credentials** page displays.
6. In the **Enter Device Credentials** page, enter the device's default user name and password in the **Username** and **Password** fields. The default user name is **admin** and the default password is the unique password printed on the label packaged with your device. If the defaults do not work, they may have been changed. Verify with your system administrator.
 7. Click **OK**.
 8. When RealPort configuration is complete, the **Success** message displays.



9. Click **OK** to close the message.
10. (Optional) If desired, you can verify the RealPort configuration. See [Configure the serial port for RealPort mode](#) and [Configure the RealPort service](#).

Access a device's web UI from the Digi Navigator

You can access the device's web UI and log in from the Configuration pane in the **Digi Navigator**, or from the shortcut menu for the device's IP address.

The service options are available in the Configuration pane or the shortcut menu if these conditions are met:

- The service button must be included in the **Services** filter. See [Filter the device list by service option](#).
- At least one device must be configured for the service. For known devices, see [Specify the IP address to discover a Digi device](#).

To access a device's web UI:

1. Make sure **Digi Navigator** is [installed](#) and the XBee Hive is powered and connected to your local network or to your computer with an Ethernet cable.
2. Launch the **Digi Navigator**.
3. A list of the devices [you have manually added](#) displays. You can add additional devices if needed.
4. Find the device that you want to access and expand it to display the IP addresses for the device.
5. Launch the web UI for the device using one of the following methods:
 - **Configuration pane:** Click on an IP address for the device to display the configured service button(s) in the Configuration pane. Click on any of the active buttons (**HTTP**, **HTTPS**, **SSH**) to access the web UI and log in.
 - **Shortcut menu:** Right-click on the IP address for a device to display the shortcut menu. Click on any of the service options (**HTTP**, **HTTPS**, **SSH**) to access the web UI and log in.

Generate a device setup script

You can generate a script of the RealPort configuration of the local PC. The script can be saved and used as a backup. The script is generated as a .cmd file.

1. Make sure **Digi Navigator** is [installed](#) and the XBee Hive is powered and connected to your local network or to your computer with an Ethernet cable.
2. Launch the **Digi Navigator**.
3. Click **Configure > Generate Device Setup Script**. The standard Windows dialog to name a file displays.
 - a. Select a location and enter a descriptive name.
 - b. Click **Save**.
4. The script is generated, a confirmation dialog displays when complete.
5. Click **OK** to close the dialog.

Review Digi Navigator version information

You can review the Digi Navigator version information.

1. Make sure **Digi Navigator** is [installed](#) and the XBee Hive is powered and connected to your local network or to your computer with an Ethernet cable.
2. Launch the **Digi Navigator**.
3. From the toolbar, click **Help > About**. The **About Digi Navigator** dialog displays.
4. Review the information.
5. Click **OK** to close the dialog.

Uninstall Digi Navigator 1.0

If you have Digi Navigator 1.0 installed, Digi recommends that you uninstall it, as both versions of the Digi Navigator are not needed.

1. If Digi Navigator 1.0 is open, close it before you begin.
2. Launch the Windows **Control Panel**.
3. Click the **Programs** option.
4. Click **Uninstall a Program**.
5. Scroll through the list of programs to find Digi Navigator 1.x.
6. Right-click on the program name to display the menu.
7. Click **Uninstall**. The **Digi Navigator Uninstall** wizard displays.
8. Click **Next**. The uninstall process begins.

Note If Digi Navigator 1.0 is open, a confirmation dialog with the message "Digi Navigator is running. Click OK to close it." displays. Click **OK** to continue with the uninstall process.

9. When complete, the **Completing Digi Navigator Uninstall** page displays.
10. Click **Finish** to complete the uninstall process.

Advanced RealPort configuration without using the Digi Navigator

You can configure the XBee Hive to communicate with your computer using RealPort. RealPort mode enables communication between a device and your computer by exposing a serial port on a remote device as a standard COM/TTY port on a client computer.

Windows Operating System

This method can be used if your computer has a Windows OS installed and you choose not to use the [Digi Navigator](#) to discover devices and configure RealPort.

To complete the RealPort configuration process for Windows:

Step 1: [Download the RealPort driver](#)

Step 2: [Configure RealPort on your computer](#)

Step 3: [Configure the serial port for RealPort mode](#)

Step 4: [Configure the RealPort service](#)

Linux Operating System

To complete the RealPort configuration process for Linux OS:

Step 1: [Download the RealPort driver](#)

Step 2: To complete the RealPort configuration process, refer to the [Get started: Install RealPort for LINUX](#) section in the **RealPort Installation User's Guide**.

Download the RealPort driver

The first step is to download the RealPort application and save it to a location that you can easily access.

1. Navigate to <https://hub.digi.com/support/products/realport/>.
2. Scroll down to the **Product Resources** tab, and in the **Drivers & Patches** section, click **RealPort Driver**.
3. From the list box, select the appropriate Microsoft Windows option from the list of driver options. The associated RealPort for Windows option displays.
4. Click the **download** link.
5. When the download is complete, navigate to your download folder. The application is in a .zip file.
6. You can leave the .zip file in the download folder, or copy the .zip file and paste it to a location that you can easily access.

Configure RealPort on your computer

RealPort must be installed on your computer, and then RealPort configured for the IP address of each device that should be allowed a RealPort connection.

You will run the RealPort Wizard for each device that you want to configure. RealPort is installed on your laptop the first time that you run the wizard. The installation process is ignored each subsequent time that you run the wizard.

Before you begin

- Download RealPort onto your laptop, and make note of the download location. See [Download the RealPort driver](#).
- Have the IP address of the device that you want to configure.

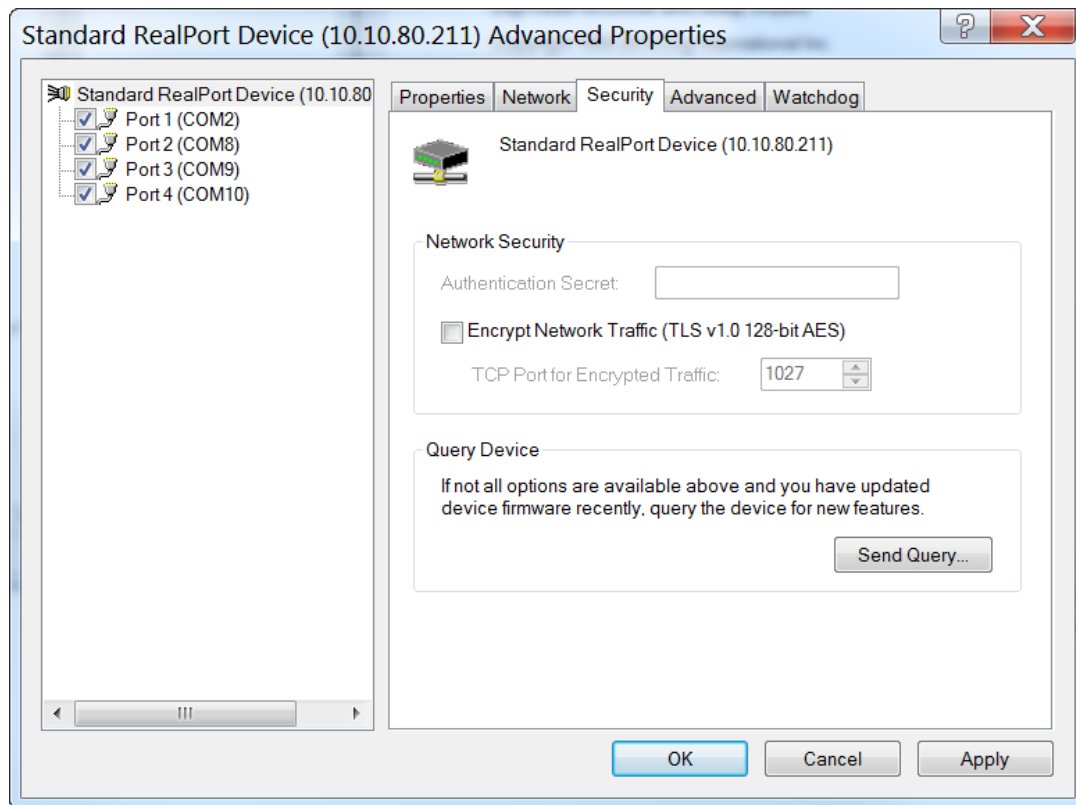
Step 1: Implement RealPort

1. Navigate to the downloaded Realport .zip file.
2. Open the .zip file.
3. Click on **setup.exe** to launch the RealPort wizard. The **Welcome to the Digi RealPort Setup Wizard** screen displays.
4. If this is not the first time you have run the wizard, select the **Add a New Device** option. If this is the first time running the wizard, no options are available on the screen.
5. Click **Next**. The **Select Device** screen displays.
 - a. From the list of device options, select the **Device not listed** option.
6. Click **Next**. The **Describe the Device** screen displays.
 - a. In the **Device Model Name** field, enter a descriptive name for the device.
 - b. In the **Network Settings** section, select the **IP** option and enter the IP address in the associated field.
 - c. In the **COM Port Settings** section, from the **No. Ports** list box, select the number of physical serial ports that you want to configure. You can specify from 1 to the maximum number of ports available on the device.
 - d. In the **Device Features** section, select both the **Encryption** and **Authentication** options.
7. Click **Finish** to complete the process and close the wizard.

Note If this is the first time that you have run the RealPort wizard, Realport is installed on your laptop. If it is not the first time or if RealPort is already installed, it is not installed again.

Step 2: Configure a RealPort connection on your laptop for your device

1. Follow the standard Windows process to access the **Device Manager** from your computer's operating system.
2. Select **Multi-port Serial Adapters**.
3. Right-click on your device. Click the **Properties** menu option. The **Properties** dialog appears.
4. Click the **Advanced** tab.
5. Click **Properties**. The **Advanced Properties** dialog appears
6. Click the **Security** tab.



7. Select the **Encrypt Network Traffic** check box to enable encrypted network traffic. When you select this option, the **TCP Port for Encrypted Traffic** field becomes available.
8. The **TCP Port for Encrypted Traffic** field has a default value of **1027**. The entry must match the device's TCP port setting.
9. (Optional) If you want to use authentication, configure the feature.
 - a. From the the **Authentication Method** list box, select the **Shared Secret - SHA256** option.
 - b. Enter the authentication password in the **Shared Secret** field.
10. Click **Apply**.
11. Click **OK** to close the **Advanced Properties** dialog.
12. Click **OK** to close the **Properties** window.

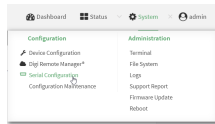
Configure the serial port for RealPort mode

RealPort mode allows you to use Realport.

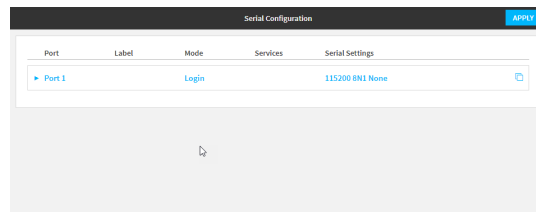
To change the configuration to match the serial configuration of the device to which you want to connect:



1. Log into the XBee Hive WebUI as a user with full Admin access rights.
2. On the menu, click **System**. Under **Configuration**, click **Serial Configuration**.

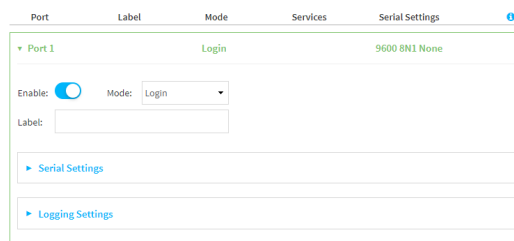


The **Serial Configuration** page is displayed.



Note You can also configure the serial port by using **Device Configuration > Serial**. Changes made by using either **Device Configuration** or **Serial Configuration** will be reflected in both.

3. Click the name of the port that you want to configure.



The serial port is enabled by default. To disable, toggle off **Enable**.

4. For **Mode**, select **RealPort**.
5. Select an option from the **Sharing Mode** list box to determine which user(s) can change the port settings, and whether users can receive data from the port.
 - **None**: Only the user that opened the port can change the port settings. All other users are rejected. No other users can receive data from the port. This is the default.
 - **Primary**: Only the user that opened the port can change the port settings. All other users that try to open the port receive all of the data read to the port.
 - **Peer**: Any user that tries to open the port can change the port settings. All users that try to open the port receive all of the data read to the port.
6. (Optional) For **Label**, enter a label that will be used when referring to this port.
7. For **Signalling**, select the electrical signaling interface type used on this serial port:
 - **RS-232**
 - **RS-485**
 - Enable **Termination** if you want to enable electrical termination on this serial port.

The default is **RS-232**.

8. Expand **Logging Settings** to configure logging for this serial port.
 - a. To enable logging, click to toggle on **Enable**.
 - b. In the **Log file name** field, enter a descriptive name for the log file.
 - c. For **Log file size**, type the size of the log file. When the log file reaches the size limit, the current file is saved and a new file is created. The default is 65536 bytes.
 - d. From the **Type of data to log** list box, specify the type of data that should be saved.
 - **Received**
 - **Transmitted**
 - **Both**
 - **Both with arrows**. This is the default.
 - e. If you want to log the time at which data was received or transmitted, click the **Timestamps** toggle to **Enable**.
 - f. If you want to log the data as hexadecimal values, click the **Hexadecimal** toggle to **Enable**.

Note You can review the message log in the **Serial Port Log** page. See [Review the serial port message log](#).

9. Click **Apply** to save the configuration and apply the change.

Command line

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. The serial port is enabled by default. To disable:

```
(config)> serial port1 enable false
(config)>
```

4. Set the mode:

```
(config)> serial port1 mode realport
(config)>
```

5. Set the sharing mode:

```
(config)> serial port1 sharing value
(config)>
```

where **value** is one of:

- **none**: Only the user that opened the port can change the port settings. All other users are rejected. No other users can receive data from the port. This is the default.

- **peer**: Any user that tries to open the port can change the port settings. All users that try to open the port receive all of the data read to the port.
- **primary**: Only the user that opened the port can change the port settings. All other users that try to open the port receive all of the data read to the port.

6. Set the signal mode:

```
(config)> serial port1 signal mode value
(config)>
```

where **value** is one of:

Set the signaling interface type used on this serial port:

- **rs-232**
- **rs-485**
 - Enable **termination** if you want to enable electrical termination on this serial port:

```
(config)> serial port1 termination true
(config)>
```

The default is **rs-232**.

7. Set a label that will be used when referring to this port.

```
(config)> serial port1 label label
(config)>
```

8. (Optional) Set a label that will be used when referring to this port.

```
(config)> serial port1 label label
(config)>
```

9. Configure serial port logging:

a. Enable serial port logging:

```
(config)>serial port1 logging enable true
(config)>
```

b. Set the file name:

```
(config)>serial port1 logging filename string
(config)>
```

c. Set the maximum allowed log size for the serial port log when starting the log:

```
(config)>serial port1 logging size value
(config)>
```

where *value* is the size of the log file in bytes. The default is **65536**.

d. Specify the data type:

```
(config)>serial port1 logging type value
(config)>
```

where *value* is one of:

- received
- transmitted
- both
- arrows. This is the default.

- e. Log the time at which data was received or transmitted:

```
(config)>serial port1 logging hex true
(config)>
```

- f. Log data as hexadecimal values:

```
(config)>serial port1 logging timestamp true
(config)>
```

10. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

11. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Configure the RealPort service

After you have configured RealPort mode on the XBee Hive, you must enable and configure the RealPort service. When this step is complete, all of the serial ports on the XBee Hive are configured to use the RealPort service.



1. Log into the XBee Hive WebUI as a user with full Admin access rights.
2. On the menu, click **System > Configuration > Device Configuration**.
3. Expand **Services**.
4. Expand **RealPort**.
5. Click **Enable** to enable the RealPort service.
6. For **RealPort Server Port**, enter **1027**. This is the default.
7. For **Minimum TLS version**, select the minimum TLS version that the RealPort service will accept. The default is TLS version 1.0.
8. Enable **Encryption** to enable encryption of data. This is enabled by default.
9. (Optional) Configure the authentication method the RealPort server uses to authenticate clients.
 - a. From the **Authentication Method** list box, select the **Shared Secret - SHA256** option.
 - b. For **Shared Secret**, enter the authentication password to ensure secure communication. Leave this field blank to disable authentication.

10. Enable **Exclusive Mode** to ensure that any connection from an IP address is closed when opening a new connection from the same IP address. This is disabled by default.
11. Enable **RealPort Keepalive** to send RealPort keepalive packets. This is enabled by default.
12. Enable **TCP Port Keepalive** to send TCP keepalive packets. This is disabled by default.
13. Enable **Device Initiated connections** so users can remotely connect to serial devices as if they had a native COM/TTY port on their PC. This is disabled by default.
14. Click **Apply** to save the configuration and apply the change.

Command line

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. RealPort is enabled by default. To disable:

```
(config)> service realport enable false
(config)>
```

4. Set the RealPort server port.

```
(config)> service realport port value
(config)>
```

where **value** is the port you want to use for the RealPort service. The default is **1027**.

5. Set the select the minimum TLS version that the RealPort service will accept:

```
(config)> service realport minimum_tls_version value
(config)>
```

where **value** is one of:

- **TLS-1_0**. This is the default.
- **TLS-1_1**
- **TLS-1_2**
- **TLS-1_3**

6. Data encryption is enabled by default. To disable:

```
(config)> service realport encryption false
(config)>
```

7. (Optional) Configure authentication.

```
(config)> service realport auth value
(config)>
```

where **value** is one of:

- **none**: Do not use authentication. This is the default.
- **shared_secret_sha256**: You must also define the authentication password to ensure secure communication. Leave this field blank to disable authentication.

```
(config)> service realport auth shared_secret_sha256 value
(config)
```

where **value** is the authentication password.

8. Exclusive mode is disabled by default. This mode ensures that any connection from an IP address is closed when opening a new connection from the same IP address. To enable:

```
(config)> service realport exclusive true
(config)
```

9. Use RealPort keepalive to send RealPort keepalive packets. This is enabled by default. To disable:

```
(config)> service realport realport_keepalive false
(config)>
```

10. TCP port keepalive to send TCP keepalive packets is disabled by default. To enable:

```
(config)> service realport tcp_keepalive true
(config)>
```

11. Device initiated connections allow users to remotely connect to serial devices as if they had a native COM/TTY port on their PC. This is disabled by default. To enable:

```
(config)> service realport device_initiated_enable true
(config)>
```

12. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

13. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Add a USB serial port

Your XBee Hive can be configured to support USB-to-serial adapters for serial access to the device, or remote serial out-of-band (OOB) access to other devices, and for use in python applications. The following USB-to-serial chipsets are supported:

- FTDI
- Prolific

To add a USB serial port:



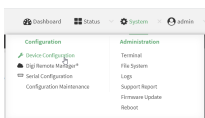
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

Remote Manager:

- a. Locate your device as described in [Use Digi Remote Manager to view and manage your device](#).
- b. Click the **Device ID**.
- c. Click **Settings**.
- d. Click to expand **Config**.

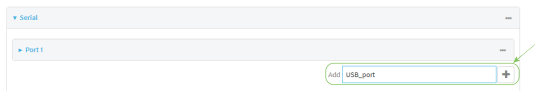
Local Web UI:

- a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



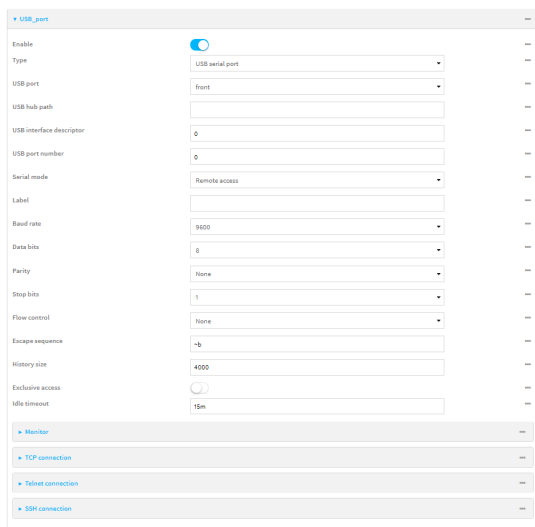
The **Configuration** window is displayed.

3. Click **Serial**.
4. For **Add Serial port**, type a name for the group and click **+**.



The serial port configuration window is displayed.

- The new USB serial port is **Enabled** by default.
- For **Type**, **USB serial port** is currently the only option.



5. For **Serial mode**, select one of the following options. The fields in the page change, depending on which option you select.

Note The **USB** fields are the same for all **Serial mode** option selections, and they are described in the following steps.

- **Login**: Allows the user to log into the device through the serial port. See [Configure Login mode for a serial port](#).
 - **Remote access**: Allows for remote access to another device that is connected to the serial port. See [Configure Remote Access mode for a serial port](#).
 - **Application**: Provides access to the serial device from Python applications.
 - **PPP Dial-in**: Allows the device to answer Point-to-Point Protocol (PPP) connections over serial ports. See [Configure PPP dial-in mode](#).
 - **Modem emulator**: Allows the device to act as a dial-up modem emulator for handling incoming AT dial-ins. See [Configure Modem emulator mode for a serial port](#).
 - **Realport**: Allows you to use Realport. See [Configure RealPort mode using the Digi Navigator](#).
 - **UDP serial**: Provides access to the device through a UDP serial port. See [Configure UDP serial mode for a serial port](#).
6. (Optional) For **Label**, type a descriptive label for this serial port.
 7. For **USB port**, select the USB port you want to use. For example, **front**.
 8. (Optional) If the device's USB port is connected to a USB hub, for **USB hub path**, type the path to a USB-to-serial adapter on the hub. Leave this field blank if the USB-to-serial adapter is connected directly to the device's USB port.
 9. (Optional) USB devices with multiple ports may identify ports by using an interface descriptor. For **USB interface descriptor**, type the appropriate descriptor number. Leave this option at the default of **0** for USB devices with only one serial port.
 10. (Optional) USB devices with multiple ports may identify ports by using a port number. For **USB port number**, type or select the appropriate port number. Leave this option at the default of **0** for USB devices with only one serial port.
 11. Expand **Authentication** to add the new USB serial port to a group, which enables a user to access the serial port by SSH, Terminal, WebUI, or Digi Remote Manager.
 - a. Click to expand **Groups**.
 - b. For **Group**, either select an existing group to which you want to add the USB serial port (for example, the **serial** group) or click  and type a name for the new USB serial port group.
 - c. For the group you just created, click to expand **acl**.
 - d. Click to expand **serial**.
 - e. Enable **Serial access**.
 - f. For **Serial ports**, click  and select the **Port** you created. The usb serial port will be added to the group.
 12. Once you have added the USB serial port to the authentication group, make sure that group is assigned to the user who will be logging into the device and using the USB serial port.

- a. Click **Users** to expand.
 - b. Click **User**, and then click the name of the user.
 - c. Click to expand **Groups** to confirm that the USB serial port is listed for the user.
13. Click **Apply** to save the configuration and apply the change.

Command line

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Add the serial port:

```
(config)> add serial USB_port
(config serial USB_port)>
```

4. Set the mode:

```
(config serial USB_port)> mode mode
(config serial USB_port)>
```

where *mode* is either:

- **login**: Allows the user to log into the device through the serial port. See [Configure Login mode for a serial port](#).
- **remote**: Allows for remote access to another device that is connected to the serial port. See [Configure Remote Access mode for a serial port](#).
- **application**: Provides access to the serial device from Python applications.
- **ppp_dialin**: Allows the device to answer Point-to-Point Protocol (PPP) connections over serial ports. See [Configure PPP dial-in mode](#).
- **modem_emulator**: Allows the device to act as a dial-up modem emulator for handling incoming AT dial-ins. See [Configure Modem emulator mode for a serial port](#).
- **udp**: Provides access to the device through a UDP serial port. See [Configure UDP serial mode for a serial port](#).

The default is **Remote**.

5. (Optional) Set a label that will be used when referring to this port.

```
(config serial USB_port)> label label
(config serial USB_port)>
```

6. Add the new USB serial port to a new or already-existing group, which enables a user to access the serial port by SSH, Terminal, WebUI, or Digi Remote Manager.

- a. To enable serial access:

```
(config auth group serial acl serial) enable
```

To add the USB serial port to a group:

```
(config auth group serial acl serial ports) add <path> <key | index > [value]
```

Where *value* is the serial port you want to add to the group.

7. Once you have added the USB serial port to the authentication group, make sure that group is assigned to the user who will be logging into the device and using the USB serial port.

```
(config auth users user [username]) add <path> <key | index > [value]
```

Where *value* is the name of the USB serial port group.

8. Save the configuration and apply the change.

```
(config serial USB_port)> save
Configuration saved.
>
```

9. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Disconnect a user from a serial port

From the **Serial Status** page, you can disconnect any users connected to a serial port configured for one of these modes: [Login](#), [Remote Access](#), [PPP Dial-in](#), or [Modem Emulator](#).



1. Log into the XBee Hive WebUI as a user with full Admin access rights.
2. On the menu, click **Status > Connections > Serial**. The **Serial Status** page displays.
3. Find the port for which you want to disconnect one or more users. Verify that the port is configured for one of the following modes: [Login](#), [Remote Access](#), [PPP Dial-in](#), or [Modem Emulator](#).
4. Click the down arrow next to the user name in the **Users** column to display a pop-up box.
5. A list of the users currently connected to the port display in the pop-up box. Information about each user's connection displays. If more than one user is connected, a check box displays for each user.
 - **User:** The user's log in name or a connection type, such as Telnet, TCP, or SSH.
 - **Remote IP:** The user's IP address.
 - **Connected:** The length of time that the user has been connected to the port. The time is measured in seconds.
 - **Idle:** The length of time that connection has been idle. The time is measured in seconds.

6. Determine the user(s) that you want to disconnect.
 - If only one user is listed, that user will be selected for the disconnect by default.
 - If more than one user is connected to the port, by default the check box for each user is selected. Click on a check box to deselect a user. Click **All** to deselect or select all of the users.
7. Click **Disconnect**. The single user or set of selected users are disconnected from the serial port.

Command line

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. (Optional) Review the users currently connected to the port.

```
show serial port
>
```

Where *port* is the port number you want to review, such as "port2"; a string, such as "console"; or the name of a user-configured serial port, such as USB.

3. (Optional) Review information about the disconnect command.

```
> system serial disconnect ?
>
```

4. Disconnect a specific user from a port.

```
>system serial disconnect port remoteip STRING user STRING
>
```

Where *port* is the port number you want to review, such as "port2"; a string, such as "console"; or the name of a user-configured serial port, such as USB.

Enter one or both of the following:

- *remoteip STRING*: The remote IP address to disconnect.
- *user*: The user name of the user that you want to disconnect.

5. Disconnect all users from a port.

```
system serial disconnect port
>
```

Where *port*: is the port number you want to review, such as "port2"; a string, such as "console"; or the name of a user-configured serial port, such as USB.

6. Type **exit** to exit the Admin CLI. Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Show serial port status and statistics

To show the status and statistics for the serial port:



1. Log into the XBee Hive WebUI as a user with full Admin access rights.
2. On the main menu, click **Status > Connections > Serial**. The **Serial Status** page displays. See [Serial Status page](#) for information about the features in this page.

Command line

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. Use the [show serial](#) command:

```
> show serial

Label  Port  Enable Mode  Baudrate
-----
Serial 1 port1 true  login 9600
>
```

3. Type **exit** to exit the Admin CLI.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Serial Status page

The **Serial Status** page contains status information about all of the serial ports available on the device.

To navigate to the **Serial Status** page, log into the device's web UI and click **Status > Connection > Serial**.

Item	Description
* configuration icon	Click the * (configuration) icon in the upper right corner of the page to access the Serial Configuration page. See Serial port for more information.
Status	Displays the connection status. ▪ CONNECTED: A telnet, terminal, SSH, or TCP session is active. ▪ DISABLED: The port is not enabled. ▪ NO SIGNAL: CTS or DCD is not active on the port.
Port	A list of the ports on the device. The port number and name displays as a link when the port is configured for remote access. You can click the port number or name to connect to the port in the terminal page. 1. Click the link to connect to the port in the terminal page. 2. In the terminal screen, enter ~b? to display additional commands. While you are connected to the terminal, the port status displays in the Status

Item	Description
	column as CONNECTED , and the name of the user logged into the device displays in the User column.
Label	A description for the port. You can change this from the Serial Configuration page. Click the * (configuration) icon in the upper right corner of the page to access that page. The port number and name displays as a link when the port is configured for remote access. You can click the port number or name to connect to the port in the terminal page. See the description for Port (above) for more information.
Log	If configured, you can open the Serial Port Log page for that port. Options are: ■ Green Log button: The serial port mode selected for the port supports serial port logging, and logging is enabled. Click the Log button to open the Serial Port Log page for that port. See Review the serial port message log for information about that page. ■ Gray Log button: The serial port mode selected for the port supports serial port logging, but logging is not enabled. ■ No button: The serial port mode selected for the port does not support serial port logging.
User	When the port is connected to a Telnet, terminal, SSH, or TCP connection the name of the user logged into the device displays. See the description for Port (above) for more information. If a serial port is configured for one of these modes: Login , Remote Access , PPP Dial-in , or Modem Emulator , you can disconnect one or more users from the serial port using the Disconnect feature. See Disconnect a user from a serial port .
TX/RX Bytes	Displays the total number of bytes that have been transmitted and received.
Signals	Indicates the types of communication that the device is ready to send. DCD: Carrier Detected CTS: Clear to Send DTR: Data Terminal Ready RTS: Ready to Dend

Review the serial port message log

Serial port messages can be reviewed from the **Serial Port Log** page.

A serial port message log is created and saved when serial port logging has been enabled and configured for one of the following serial port modes: [Login](#), [Remote Access](#), [RealPort](#), or [UDP Serial](#). You can view the log file from the **Log** column in the **Serial Status** page.

Web

1. Log into the XBee Hive WebUI as a user with full Admin access rights.
2. On the main menu, click **Status**
3. Under **Connections**, click **Serial**. The **Serial Status** page displays.

4. If a green **Log** button is displayed, the serial port mode selected for the port supports serial port logging, and logging is enabled. Click the **Log** button to open the **Serial Port Log** page for that port. The **Serial port log** window displays.

Note If the **Log** button is gray, the serial port mode selected for the port supports serial port logging, but logging is not enabled. If there is no **Log** button, the serial port mode selected for the port does not support serial port logging.

5. Review the messages in the window.
 - Click **Refresh** to refresh the log display.
 - Click **Download** to download the serial port log to your local device. The log file is saved to the /opt/serial directory. Because this is being save to the device's memory, you should use serial logging for diagnostic purposes, rather than having it permanently enabled.
 - Click **Restart** to clear and restart the serial port log.

Command line

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. To show the serial port's contents and logging status:

```
> system serial show port-number
Logging is active on port-number
>
```

3. To save the log to your local device:

```
> system serial save port-number path
>
```

If a relative path is provided, /etc/config/serial will be used as the root directory for the path and file. (Required)

The log file is saved to the /opt/serial directory. Because this is being save to the device's memory, you should use serial logging for diagnostic purposes, rather than having it permanently enabled.

4. To clear and restart the log:

```
> system serial clear port-number
>
```

5. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Wi-Fi

This chapter applies to the XBee HiveW Wi-Fi enabled model only.

This chapter contains the following topics:

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Wi-Fi configuration

The Wi-Fi enabled XBee HiveW device has one Wi-Fi radio. You can configure the Wi-Fi radio for Wi-Fi access point mode and Wi-Fi client mode.

Default Wi-Fi configuration

The default Wi-Fi configuration of the XBee HiveW device is:

Wi-Fi radio

	Default setting
Enabled or disabled	Enabled
Frequency band	2.4 GHz
TX power percentage	100
Access point mode	802.11b/g/n
Channel	1
Channel width	20 MHz
Beacon interval	100

Access point

	Default setting
Name	Digi AP
Enabled or disabled	Disabled
SSID	Empty
SSID broadcast	Enabled
Encryption	WAP2 Personal (PSK)
Group rekey interval	10 minutes
Isolate clients	Enabled

Client mode connections

None.

Configure the Wi-Fi radio's channel

By default, the Wi-Fi radio is configured to use the 2.4 GHz band, and the default channel is 1. You can configure a specific channel to use for the Wi-Fi radio by using the following steps.

- **2.4 GHz band**—Channels 1 to 11 are supported. Channels 12, 13, and 14 are not supported.
- **5 GHz band**—By default, only non-Dynamic Frequency Selection (DFS) channels are supported. You can also enable support for DFS channels in client mode. See [Configure the Wi-Fi radio to support DFS channels in client mode](#) for information about enabling DFS support.

Note You can configure the device to use the 5 GHz channel, but the XBee Hive does not support using both bands at the same time.

Web

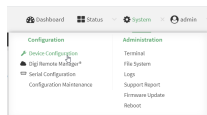
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

Remote Manager:

- a. Locate your device as described in [Use Digi Remote Manager to view and manage your device](#).
- b. Click the **Device ID**.
- c. Click **Settings**.
- d. Click to expand **Config**.

Local Web UI:

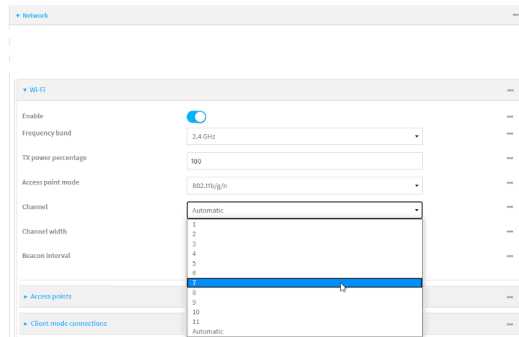
- a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



The **Configuration** window is displayed.

3. Click **Network > WiFi**.

- For **Channel**, select the channel. Only channels appropriate for the band are displayed.



- Click **Apply** to save the configuration and apply the change.

Command line

- Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
- At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

- Set the channel for the radio:
 - Determine the band for the radio:

```
(config)> network wifi radio phy0 band
2400mhz
(config)>
```

- Set the channel for the Wi-Fi radio:

```
(config)> network wifi radio phy0 2400mhz channel value
(config)>
```

where *value* is:

- For 2.4 GHz:
 - 1 through 11
- For 5 GHz:
 - 36
 - 40
 - 44
 - 48

4. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

5. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Configure the Wi-Fi radio to support DFS channels in client mode

Dynamic Frequency Selection (DFS) is a mechanism for Wi-Fi connections to use 5 GHz frequencies that are normally reserved for non-Wi-Fi proposes. In addition to the standard non-DFS channels (36, 40, 44, and 48), your XBee HiveW can be configured to have one or more Wi-Fi clients that can connect to external Wi-Fi access points that support DFS channels:

- DFS channels 52, 56, 60, 64, 100, 104, 108, 112, 116, 120, 124, 128, 132, 136, 140, and 144
- Higher 5GHz non-DFS channels 149, 153, 157, 161, and 165

The Wi-Fi access point must also support connections on these channels.

If DFS functionality is enabled, the XBee HiveW must be rebooted after saving the configuration changes to re-initialize the Wi-Fi module.

Note If DFS functionality is enabled, any access points enabled on the XBee HiveW device will not be started.

Required configuration items

- Enable DFS support.
- One or more configured Wi-Fi clients. See [Configure a Wi-Fi client and add client networks](#) for details.

Note Not all Digi devices currently support 5 GHz. Before you try to use this feature, verify that your device supports 5 GHz.

Web

1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

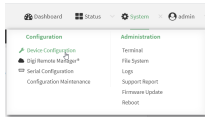
Remote Manager:

- a. Locate your device as described in [Use Digi Remote Manager to view and manage your device](#).

- b. Click the **Device ID**.
- c. Click **Settings**.
- d. Click to expand **Config**.

Local Web UI:

- a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



The **Configuration** window is displayed.

3. Click **Network > WiFi**.
4. For **Frequency band**, select **5 GHz**.
5. Click to enable **DFS Client Support**.

Note When **DFS Client Support** is enabled, any enabled access points that use this radio will not be started and cannot be used as access points.

6. Click **Apply** to save the configuration and apply the change.

Command line

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Set the channel for the radio:
 - a. Set the band for the radio to 5 GHz:

```
(config)> network wifi radio phy0 band 5000mhz
(config)>
```

- b. Enable DFS client support :

```
(config)> network wifi radio phy0 5000mhz dfs_client true
(config)>
```

Note When DFS client support is enabled, any enabled access points that use this radio will not be started and cannot be used as access points.

4. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

5. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Configure the Wi-Fi radio's band and protocol

For Wi-Fi radios that support both 2.4 GHz and 5 GHz modes, you can configure the band. **Wi-Fi radio** defaults to use 2.4 GHz b/g/n band

Note Not all Digi devices currently support 5 GHz. Before you try to use this feature, verify that your device supports 5 GHz.

Web

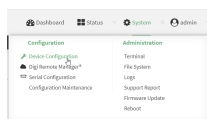
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

Remote Manager:

- a. Locate your device as described in [Use Digi Remote Manager to view and manage your device](#).
- b. Click the **Device ID**.
- c. Click **Settings**.
- d. Click to expand **Config**.

Local Web UI:

- a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



The **Configuration** window is displayed.

3. Click **Network > WiFi**.
4. For **Frequency band**, select either **2.4 GHz** or **5 GHz**.
5. For **Access point mode**, select the appropriate mode. Only modes appropriate for the selected band are displayed.

6. Click **Apply** to save the configuration and apply the change.

Command line

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Set channel for the radio:

- a. Set the band for the radio:

```
(config)> network wifi radio phy0 band value
(config)>
```

where *value* is either **2400mhz** or **5000mhz**.

- b. Set the mode for the Wi-Fi radio. For example:

- If the Wi-Fi radio has a band of **2400mhz**:

```
(config)> network wifi radio phy0 2400mhz mode value
(config)>
```

where *value* is one of **b**, **bg**, **bgn**, **g**, **gn**, or **n**.

- If the Wi-Fi radio has a band of **5000mhz**:

```
(config)> network wifi radio phy0 5000mhz mode value
(config)>
```

where *value* is one of **ac**, **acn**, or **n**.

4. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

5. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Configure an open Wi-Fi access point

This procedure configures a Wi-Fi access point that does not require a password for client connections.

By default, the XBee HiveW device does not come with any preconfigured access points, but there is an unconfigured access point, **Digi AP**. You cannot delete default access points, but you can modify them or you can create your own access points.

Required configuration items

- Enable the Wi-Fi access point
- The Service Set Identifier (SSID) for the access point.
- Configure open security for the access point.
- Wi-Fi access point assignment: Once you configure a Wi-Fi access point, you must assign the Wi-Fi access point.
 - LAN interface: See [Configure a LAN](#).
 - Bridge: See [Configure a bridge](#).

Additional configuration items

- Determine whether to broadcast the access point's SSID.
- Determine whether to isolate clients connected to this access point, so that they cannot communicate with each other.
- The amount of time to wait before changing the group key.

To configure a Wi-Fi access point with no security:

Web

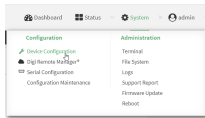
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

Remote Manager:

- a. Locate your device as described in [Use Digi Remote Manager to view and manage your device](#).
- b. Click the **Device ID**.
- c. Click **Settings**.
- d. Click to expand **Config**.

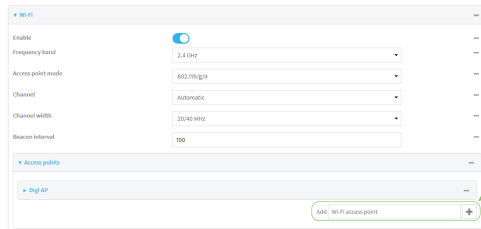
Local Web UI:

- a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



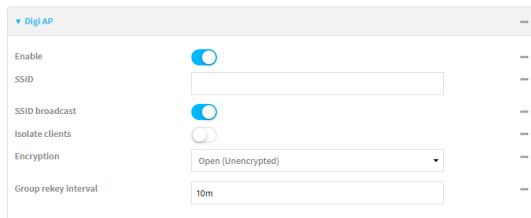
The **Configuration** window is displayed.

3. Click **Network > Wi-Fi > Access points**.
4. Create a new access point or modify an existing access point:
 - To create a new access point, for **Add WiFi access point**, type a name for the access point and click 



- To modify an existing access point, click to expand the access point.

The Wi-Fi access point configuration window is displayed.



5. For **SSID**, type the SSID. Up to 32 characters are allowed.
6. Enable **SSID broadcast** to configure the radio to broadcast the SSID.
7. (Optional) Enable **Isolate clients** if it isn't already enabled to prevent clients that are connected to this access point from communicating with each other. This setting is enabled by default. See [Isolate Wi-Fi clients](#) for information about how to prevent clients connected to different access points from communicating with each other.
8. For **Encryption**, select one of the following:
 - **Open (Unencrypted)** No encryption is used.
 - **WPA3 Enhanced Open (OWE)** Uses Opportunistic Wireless Encryption (OWE) technology to provide encryption for Wi-Fi networks that do not use password protection.

Note Only select **WPA3 Enhanced Open (OWE)** if you know that all Wi-Fi clients connecting to this device will have WPA3 capabilities.

9. (Optional) For **Group rekey interval**, type the amount of time to wait before changing the group key.

The group key is shared by all in clients of the access point, and after a client has disconnected, it will be able to use the group key to decrypt broadcast packets until the key is changed.

Allowed values are any number of days, hours, minutes, or seconds, and take the format **number{d|h|m|s}**.

For example, to set **Group rekey interval** to ten minutes, enter **10m** or **600s**.

Increasing the time between rekeys can improve connectivity issues in noisy environments. To disable group rekeys, set to **0**. This will allow any client that has previously connected to see all broadcast traffic on the wireless network until the Wi-Fi radio is restarted. The default is 10 minutes.

10. Assign the Wi-Fi access point to a LAN interface or to a bridge. See [Configure a LAN](#) and [Configure a bridge](#) for more information.

The access point must be assigned to an active LAN, or a bridge that is assigned to an active LAN.

11. Click **Apply** to save the configuration and apply the change.

Command line Configure a new access point

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Create a new access point:

```
(config)> add network wifi ap new_AP
(config network wifi ap new_AP)>
```

New access points are enabled by default.

4. Set the SSID for the Wi-Fi access point. Up to 32 characters are allowed.

```
(config network wifi ap new_AP)> ssid my_SSID
(config network wifi ap new_AP)>
```

SSID broadcasting is enabled by default for new access points.

5. Set the security for the access point to an open security method:

```
(config network wifi ap new_AP)> encryption type value
(config network wifi ap new_AP)>
```

where *value* is either:

- **none**: No encryption is used.
- **owe**: Uses WPA3 Enhanced Open, which uses Opportunistic Wireless Encryption (OWE) technology to provide encryption for Wi-Fi networks that do not use password

protection.

Note Only select **owe** if you know that all Wi-Fi clients connecting to this device will have WPA3 capabilities.

6. (Optional) Determine whether to prevent clients that are connected to this access point from communicating with each other:

```
(config)> network wifi ap digi_ap isolate_clients true
(config)>
```

See [Isolate Wi-Fi clients](#) for information about how to prevent clients connected to different access points from communicating with each other.

7. (Optional) Set the amount of time to wait before changing the group key.
The group key is shared by all in clients of the access point, and after a client has disconnected, it will be able to use the group key to decrypt broadcast packets until the key is changed.

```
(config network wifi ap new_AP)> encryption group_rekey value
(config network wifi ap new_AP)>
```

where *value* is any number of days, hours, minutes, or seconds, and takes the format **number{d|h|m|s}**.

For example, to set **group rekey interval** to ten minutes, enter either **10m** or **600s**:

```
(config network wireless ap new_AP)> encryption group_rekey 600s
(config network wireless ap new_AP)>
```

Increasing the time between rekeys can improve connectivity issues in noisy environments. To disable group rekeys, set to **0**. This will allow any client that has previously connected to see all broadcast traffic on the wireless network until the Wi-Fi radio is restarted. The default is 10 minutes.

1. Assign the Wi-Fi access point to a LAN interface or to a bridge. See [Configure a LAN](#) and [Configure a bridge](#) for more information.
The access point must be assigned to an active LAN, or a bridge that is assigned to an active LAN.
2. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

3. Type **exit** to exit the Admin CLI.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Edit an existing Access point

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Show available access points:

```
(config)> network wifi ap ?
```

```
Additional Configuration
```

```
-----
digi_ap          Digi AP
```

```
(config)>
```

4. Set the SSID for the appropriate access point:

```
(config)> network wifi ap digi_ap ssid my_SSID
(config)>
```

5. SSID broadcasting is enabled by default for the preconfigured access points. If SSID broadcasting is disabled:

```
(config)> network wifi ap digi_ap ssid_broadcast true
(config)>
```

6. Set the security for the access point to an open security method:

```
(config network wifi ap new_AP)> encryption type value
(config network wifi ap new_AP)>
```

where *value* is either:

- **none**: No encryption is used.
- **owe**: Uses WPA3 Enhanced Open, which uses Opportunistic Wireless Encryption (OWE) technology to provide encryption for Wi-Fi networks that do not use password protection.

Note Only select **owe** if you know that all Wi-Fi clients connecting to this device will have WPA3 capabilities.

7. (Optional) Determine whether to prevent clients that are connected to this access point from communicating with each other:

```
(config)> network wifi ap digi_ap isolate_client true
(config)>
```

See [Isolate Wi-Fi clients](#) for information about how to prevent clients connected to different access points from communicating with each other.

8. (Optional) Set the amount of time to wait before changing the group key.

The group key is shared by all in clients of the access point, and after a client has disconnected, it will be able to use the group key to decrypt broadcast packets until the key is changed.

```
(config)> network wifi ap digi_ap encryption group_rekey value
(config)>
```

where *value* is any number of days, hours, minutes, or seconds, and takes the format **number{d|h|m|s}**.

For example, to set **group rekey interval** to ten minutes, enter either **10m** or **600s**:

```
(config)> network wireless ap digi_ap encryption group_rekey 600s
(config)>
```

Increasing the time between rekeys can improve connectivity issues in noisy environments. To disable group rekeys, set to **0**. This will allow any client that has previously connected to see all broadcast traffic on the wireless network until the Wi-Fi radio is restarted. The default is 10 minutes.

1. Assign the Wi-Fi access point to a LAN interface or to a bridge. See [Configure a LAN](#) and [Configure a bridge](#) for more information.

The access point must be assigned to an active LAN, or a bridge that is assigned to an active LAN.

2. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

3. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Configure a Wi-Fi access point with personal security

The WPA and WPA2 personal security modes allow a Wi-Fi access point to authenticate clients by using a preshared key that the client enters when connecting to the access point.

By default, the XBee HiveW device does not come with any preconfigured access points, but there is an unconfigured access point, **Digi AP**. You cannot delete default access points, but you can modify them or you can create your own access points.

Required configuration items

- Enable the Wi-Fi access point
- The Service Set Identifier (SSID) for the access point.
- Configure security for the access point to use personal security.
- The password (preshared key) that clients will used to connect to the access point.
- Wi-Fi access point assignment: Once you configure a Wi-Fi access point, you must assign the Wi-Fi access point.

- LAN interface: See [Configure a LAN](#).
- Bridge: See [Configure a bridge](#).

Additional configuration items

- Determine whether to broadcast the access point's SSID.
- Determine whether to isolate clients connected to this access point, so that they cannot communicate with each other.
- The amount of time to wait before changing the group key.

To configure a Wi-Fi access point to use personal security:

Web

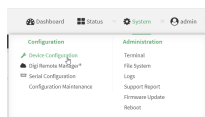
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

Remote Manager:

- a. Locate your device as described in [Use Digi Remote Manager to view and manage your device](#).
- b. Click the **Device ID**.
- c. Click **Settings**.
- d. Click to expand **Config**.

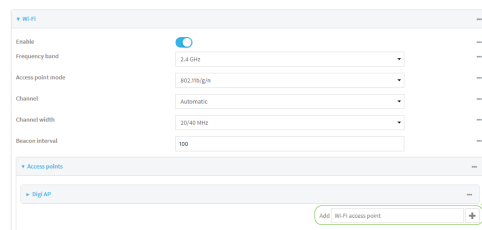
Local Web UI:

- a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



The **Configuration** window is displayed.

3. Click **Network > WiFi > Access points**.
4. Create a new access point or modify an existing access point:
 - To create a new access point, for **Add WiFi access point:**, type a name for the access point and click 



- To modify an existing access point, click to expand the access point.

The Wi-Fi access point configuration window is displayed.

5. For **SSID**, type the SSID. Up to 32 characters are allowed.
6. Enable **SSID broadcast** to configure the radio to broadcast the SSID.
7. (Optional) Enable **Isolate clients** if it isn't already enabled to prevent clients that are connected to this access point from communicating with each other. This setting is enabled by default. See [Isolate Wi-Fi clients](#) for information about how to prevent clients connected to different access points from communicating with each other.
8. For **Encryption**, select one of the following:
 - **WPA Personal (PSK)**: All Wi-Fi clients must support WPA to be able to authenticate.
 - **WPA/WPA2 Personal (PSK)**: Wi-Fi clients that support WPA and WPA2 are able to authenticate.
 - **WPA2 Personal (PSK)**: All Wi-Fi clients must support WPA2 to be able to authenticate.
 - **WPA2-PSK/WPA3-SAE mixed mode**: Wi-Fi clients that support WPA2 and WPA3 are able to authenticate.
 - **WPA3 Personal (SAE)**: All Wi-Fi clients must support WPA3 to be able to authenticate.

Note Only select **WPA3 Personal (SAE)** if you know that all Wi-Fi clients connecting to this device will have WPA3 capabilities.

9. For **Pre-shared key**, enter the password that clients will use when connecting to the access point.

Note If you need to configure a Wi-Fi passphrase with any non-printable ASCII characters, you can use the `wpa_passphrase` tool to generate the appropriate pre-shared key. The `wpa_passphrase` command is available in the shell console of a DAL OS Digi device. For details about the command, see the [wpa_passphrase Linux command](#).

10. (Optional) For **Group rekey interval**, type the amount of time to wait before changing the group key.

The group key is shared by all in clients of the access point, and after a client has disconnected, it will be able to use the group key to decrypt broadcast packets until the key is changed.

Allowed values are any number of days, hours, minutes, or seconds, and take the format **number{d|h|m|s}**.

For example, to set **Group rekey interval** to ten minutes, enter **10m** or **600s**.

Increasing the time between rekeys can improve connectivity issues in noisy environments. To disable group rekeys, set to **0**. This will allow any client that has previously connected to

see all broadcast traffic on the wireless network until the Wi-Fi radio is restarted. The default is 10 minutes.

11. Assign the Wi-Fi access point to a LAN interface or to a bridge. See [Configure a LAN](#) and [Configure a bridge](#) for more information.

The access point must be assigned to an active LAN, or a bridge that is assigned to an active LAN.

12. Click **Apply** to save the configuration and apply the change.

Command line

Configure a new access point

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Create a new access point:

```
(config)> add network wifi ap new_AP
(config network wifi ap new_AP)>
```

New access points are enabled by default.

4. Set the SSID for the Wi-Fi access point. Up to 32 characters are allowed.

```
(config network wifi ap new_AP)> ssid my_SSID
(config network wifi ap new_AP)>
```

SSID broadcasting is enabled by default for new access points.

5. Set the security for the access point to a personal security option:

```
(config network wifi ap new_AP)> encryption type value
(config network wifi ap new_AP)>
```

where *value* is one of:

- **psk**: Uses WPA Personal (PSK). All Wi-Fi clients must support WPA to be able to authenticate.

Note If you need to configure a Wi-Fi passphrase with any non-printable ASCII characters, you can use the `wpa_passphrase` tool to generate the appropriate pre-shared key. The `wpa_passphrase` command is available in the shell console of a DAL OS Digi device. For details about the command, see the [wpa_passphrase Linux command](#).

- **mixedpsk**: Uses mixed WPA/WPA2 Personal (PSK) mode. Wi-Fi clients that support WPA and WPA2 are able to authenticate.

- **psk2**: Uses WPA2 Personal (PSK) mode. All Wi-Fi clients must support WPA2 to be able to authenticate.
- **psk2sae**: Uses WPA2-PSK/WPA3-AES mixed mode. Wi-Fi clients that support WPA2 and WPA3 are able to authenticate.
- **sae**: Uses WPA3 Personal mode. All Wi-Fi clients must support WPA3 to be able to authenticate.

```
(config network wifi ap new_AP)> encryption type psk2sae
(config network wifi ap new_AP)>
```

6. (Optional) Determine whether to prevent clients that are connected to this access point from communicating with each other:

```
(config)> network wifi ap digi_ap isolate_clients true
(config)>
```

See [Isolate Wi-Fi clients](#) for information about how to prevent clients connected to different access points from communicating with each other.

7. Set the password that clients will use when connecting to the access point:

```
(config network wifi ap new_AP)> encryption key_type password
(config network wifi ap new_AP)>
```

where *key_type* varies depending on the selection for encryption **type**, above:

- If **type** is set to **psk**, *key_type* is **key_psk**.
- If **type** is set to **mixedpsk**, *key_type* is **key_mixedpsk**.
- If **type** is set to **psk2**, *key_type* is **key_psk2**.
- If **type** is set to **psk2sae**, *key_type* is **key_psk2sae**.
- If **type** is set to **sae**, *key_type* is **key_sae**.

For example, if **type** is set to **psk2sae**, set **key_psk2sae** to the appropriate password:

```
(config network wifi ap new_AP)> encryption type psk2sae
(config network wifi ap new_AP)> encryption key_psk2sae abcd1234
(config network wifi ap new_AP)>
```

Note The encryption key type must correspond to the configured encryption type. If you set an encryption key type that does not correspond to the configured encryption type, you will not be able to save the configuration.

8. (Optional) Set the amount of time to wait before changing the group key.
The group key is shared by all in clients of the access point, and after a client has disconnected, it will be able to use the group key to decrypt broadcast packets until the key is changed.

```
(config network wifi ap new_AP)> encryption group_rekey value
(config network wifi ap new_AP)>
```

where *value* is any number of days, hours, minutes, or seconds, and takes the format **number{d|h|m|s}**.

For example, to set **group rekey interval** to ten minutes, enter either **10m** or **600s**:

```
(config network wireless ap new_AP)> encryption group_rekey 600s
(config network wireless ap new_AP)>
```

Increasing the time between rekeys can improve connectivity issues in noisy environments. To disable group rekeys, set to **0**. This will allow any client that has previously connected to see all broadcast traffic on the wireless network until the Wi-Fi radio is restarted. The default is 10 minutes.

1. Assign the Wi-Fi access point to a LAN interface or to a bridge. See [Configure a LAN](#) and [Configure a bridge](#) for more information.

The access point must be assigned to an active LAN, or a bridge that is assigned to an active LAN.

2. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

3. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Edit an existing Access point

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Show available access points:

```
(config)> network wifi ap ?
```

```
Additional Configuration
```

```
-----
digi_ap          Digi AP
```

```
(config)>
```

4. Set the SSID for the appropriate access point:

```
(config)> network wifi ap digi_ap ssid my_SSID
(config)>
```

5. SSID broadcasting is enabled by default for the preconfigured access points. If SSID broadcasting is disabled:

```
(config)> network wifi ap digi_ap ssid_broadcast true
(config)>
```

6. Set the security for the access point to a personal security option:

```
(config network wifi ap new_AP)> encryption type value
(config network wifi ap new_AP)>
```

where *value* is one of:

- **psk**: Uses WPA Personal (PSK). All Wi-Fi clients must support WPA to be able to authenticate.

Note If you need to configure a Wi-Fi passphrase with any non-printable ASCII characters, you can use the `wpa_passphrase` tool to generate the appropriate pre-shared key. The `wpa_passphrase` command is available in the shell console of a DAL OS Digi device. For details about the command, see the [wpa_passphrase Linux command](#).

- **mixedpsk**: Uses mixed WPA/WPA2 Personal (PSK) mode. Wi-Fi clients that support WPA and WPA2 are able to authenticate.
- **psk2**: Uses WPA2 Personal (PSK) mode. All Wi-Fi clients must support WPA2 to be able to authenticate.
- **psk2sae**: Uses WPA2-PSK/WPA3-AES mixed mode. Wi-Fi clients that support WPA2 and WPA3 are able to authenticate.
- **sae**: Uses WPA3 Personal mode. All Wi-Fi clients must support WPA3 to be able to authenticate.

```
(config network wifi ap new_AP)> encryption type psk2sae
(config network wifi ap new_AP)>
```

7. (Optional) Determine whether to prevent clients that are connected to this access point from communicating with each other:

```
(config)> network wifi ap digi_ap isolate_client true
(config)>
```

See [Isolate Wi-Fi clients](#) for information about how to prevent clients connected to different access points from communicating with each other.

8. Set the password that clients will use when connecting to the access point:

```
(config)> network wifi ap digi_ap encryption key_psk2 password
(config)>
```

9. (Optional) Set the amount of time to wait before changing the group key.

The group key is shared by all in clients of the access point, and after a client has disconnected, it will be able to use the group key to decrypt broadcast packets until the key is changed.

```
(config)> network wifi ap digi_ap encryption group_rekey value
(config)>
```

where *value* is any number of days, hours, minutes, or seconds, and takes the format **number{d|h|m|s}**.

For example, to set **group rekey interval** to ten minutes, enter either **10m** or **600s**:

```
(config)> network wireless ap digi_ap encryption group_rekey 600s
(config)>
```

Increasing the time between rekeys can improve connectivity issues in noisy environments. To disable group rekeys, set to **0**. This will allow any client that has previously connected to see all broadcast traffic on the wireless network until the Wi-Fi radio is restarted. The default is 10 minutes.

1. Assign the Wi-Fi access point to a LAN interface or to a bridge. See [Configure a LAN](#) and [Configure a bridge](#) for more information.

The access point must be assigned to an active LAN, or a bridge that is assigned to an active LAN.

2. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

3. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Configure a Wi-Fi access point with enterprise security

The WPA2 enterprise security mode allows a Wi-Fi access point to authenticate clients by using one or more RADIUS servers. When the Wi-Fi access point receives a connection request from a client, it authenticates the client with the RADIUS server before allowing the client to connect.

Using enterprise security modes allows each client to have different usernames and passwords configured in the RADIUS server, rather than using preshared key on the XBee Hive device.

By default, the XBee HiveW device does not come with any preconfigured access points, but there is an unconfigured access point, **Digi AP**. You cannot delete default access points, but you can modify them or you can create your own access points.

Required configuration items

- Enable the Wi-Fi access point
- The Service Set Identifier (SSID) for the access point.
- Configure security for the access point to WPA2 enterprise.
- The IP address for one or more RADIUS servers.
- The secret key for one or more RADIUS servers.
- Wi-Fi access point assignment: Once you configure a Wi-Fi access point, you must assign the Wi-Fi access point.
 - LAN interface: See [Configure a LAN](#).
 - Bridge: See [Configure a bridge](#).

Additional configuration items

- Determine whether to broadcast the access point's SSID.
- Determine whether to isolate clients connected to this access point, so that they cannot communicate with each other.
- The server port for one or more RADIUS server.
- The amount of time to wait before changing the group key.

To configure a Wi-Fi access point with WPA2 enterprise security:

Web

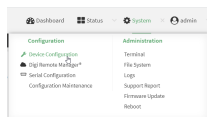
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

Remote Manager:

- a. Locate your device as described in [Use Digi Remote Manager to view and manage your device](#).
- b. Click the **Device ID**.
- c. Click **Settings**.
- d. Click to expand **Config**.

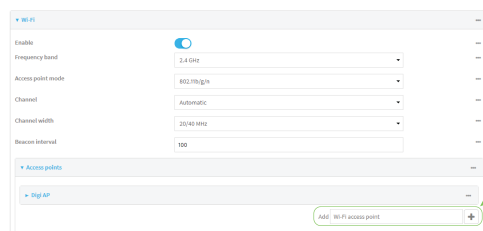
Local Web UI:

- a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



The **Configuration** window is displayed.

3. Click **Network > WiFi > Access points**.
4. Create a new access point or modify an existing access point:
 - To create a new access point, for **Add WiFi access point**, type a name for the access point and click 



- To modify an existing access point, click to expand the access point.
- The Wi-Fi access point configuration window is displayed.

5. For **SSID**, type the SSID. Up to 32 characters are allowed.
6. Enable **SSID broadcast** to configure the radio to broadcast the SSID.
7. (Optional) Enable **Isolate clients** if it isn't already enabled to prevent clients that are connected to this access point from communicating with each other. This setting is enabled by default. See [Isolate Wi-Fi clients](#) for information about how to prevent clients connected to different access points from communicating with each other.
8. For **Encryption**, select **WPA2 Enterprise**.
9. Configure one or more RADIUS servers:
 - a. Click to expand **RADIUS server list**.
 - b. Click to expand **RADIUS server**.
 - c. For **RADIUS IP/hostname**, type the IP address or hostname of the RADIUS server.
 - d. (Optional) Change the **RADIUS port**. The default port is 1812.
 - e. For **RADIUS secret key**, type the secret key as configured on the RADIUS server.

- f. To add additional RADIUS servers, click 

10. (Optional) For **Group rekey interval**, type the amount of time to wait before changing the group key.

The group key is shared by all in clients of the access point, and after a client has disconnected, it will be able to use the group key to decrypt broadcast packets until the key is changed.

Allowed values are any number of days, hours, minutes, or seconds, and take the format **number{d|h|m|s}**.

For example, to set **Group rekey interval** to ten minutes, enter **10m** or **600s**.

Increasing the time between rekeys can improve connectivity issues in noisy environments. To disable group rekeys, set to **0**. This will allow any client that has previously connected to see all broadcast traffic on the wireless network until the Wi-Fi radio is restarted. The default is 10 minutes.

11. Assign the Wi-Fi access point to a LAN interface or to a bridge. See [Configure a LAN](#) and [Configure a bridge](#) for more information.
The access point must be assigned to an active LAN, or a bridge that is assigned to an active LAN.
12. Click **Apply** to save the configuration and apply the change.

Command line Configure a new access point

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Create a new access point:

```
(config)> add network wifi ap new_AP
(config network wifi ap new_AP)>
```

New access points are enabled by default.

4. Set the SSID for the Wi-Fi access point. Up to 32 characters are allowed.

```
(config network wifi ap new_AP)> ssid my_SSID
(config network wifi ap new_AP)>
```

SSID broadcasting is enabled by default for new access points.

5. Set the security for the access point to **wpa2**:

```
(config network wifi ap new_AP)> encryption type wpa2
(config network wifi ap new_AP)>
```

6. (Optional) Determine whether to prevent clients that are connected to this access point from communicating with each other:

```
(config)> network wifi ap digi_ap isolate_clients true
(config)>
```

See [Isolate Wi-Fi clients](#) for information about how to prevent clients connected to different access points from communicating with each other.

7. Configure one or more RADIUS servers:

a. Set the IP address of the RADIUS server:

```
(config network wifi ap new_AP)> encryption radius_servers 0 host IP_address
(config network wifi ap new_AP)>
```

b. Set the secret key as configured on the RADIUS server:

```
(config network wifi ap new_AP)> encryption radius_servers 0 key secret_key
(config network wifi ap new_AP)>
```

c. (Optional) Set the RADIUS server's port. The default is 1812.

```
(config network wifi ap new_AP)> encryption radius_servers 0 port port
(config network wifi ap new_AP)>
```

d. (Optional) Add and configure additional radius servers:

i. Add a server:

```
(config network wifi ap new_AP)> add encryption radius_servers end
(config network wifi ap new_AP encryption radius_servers 1)>
```

ii. Configure the new server as described above. For example, set the server IP address:

```
(config network wifi ap new_AP encryption radius_servers 1)> host IP_address
(config network wifi ap new_AP encryption radius_servers 1)>
```

iii. Repeat for additional radius servers.

8. (Optional) Set the amount of time to wait before changing the group key.

The group key is shared by all in clients of the access point, and after a client has disconnected, it will be able to use the group key to decrypt broadcast packets until the key is changed.

```
(config network wifi ap new_AP)> encryption group_rekey value
(config network wifi ap new_AP)>
```

where *value* is any number of days, hours, minutes, or seconds, and takes the format ***number*{d|h|m|s}**.

For example, to set **group rekey interval** to ten minutes, enter either **10m** or **600s**:

```
(config network wireless ap new_AP)> encryption group_rekey 600s
(config network wireless ap new_AP)>
```

Increasing the time between rekeys can improve connectivity issues in noisy environments. To disable group rekeys, set to **0**. This will allow any client that has previously connected to see all broadcast traffic on the wireless network until the Wi-Fi radio is restarted. The default is 10 minutes.

1. Assign the Wi-Fi access point to a LAN interface or to a bridge. See [Configure a LAN](#) and [Configure a bridge](#) for more information.

The access point must be assigned to an active LAN, or a bridge that is assigned to an active LAN.

2. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

3. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Edit an existing Access point

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Show available access points:

```
(config)> network wifi ap ?
```

```
Additional Configuration
```

```
-----
digi_ap      Digi AP
```

```
(config)>
```

4. Set the SSID for the appropriate access point:

```
(config)> network wifi ap digi_ap ssid my_SSID
(config)>
```

5. SSID broadcasting is enabled by default for the preconfigured access points. If SSID broadcasting is disabled:

```
(config)> network wifi ap digi_ap ssid_broadcast true
(config)>
```

6. Set the security for the access point to **wpa2**:

```
(config network wifi ap new_AP)> encryption type wpa2
(config network wifi ap new_AP)>
```

7. (Optional) Determine whether to prevent clients that are connected to this access point from communicating with each other:

```
(config)> network wifi ap digi_ap isolate_client true
(config)>
```

See [Isolate Wi-Fi clients](#) for information about how to prevent clients connected to different access points from communicating with each other.

8. Set the IP address or hostname of the RADIUS server:

```
(config)> network wifi ap digi_ap encryption host_wpa2 hostname
(config)>
```

9. Set the secret key as configured on the RADIUS server:

```
(config)> network wifi ap digi_ap encryption key_wpa2 secret_key
(config)>
```

10. (Optional) Set the RADIUS server's port. The default is 1812.

```
(config)> network wifi ap digi_ap encryption port_wpa2 port
(config)>
```

11. (Optional) Set the amount of time to wait before changing the group key.

The group key is shared by all in clients of the access point, and after a client has disconnected, it will be able to use the group key to decrypt broadcast packets until the key is changed.

```
(config)> network wifi ap digi_ap encryption group_rekey value
(config)>
```

where *value* is any number of days, hours, minutes, or seconds, and takes the format **number{d|h|m|s}**.

For example, to set **group rekey interval** to ten minutes, enter either **10m** or **600s**:

```
(config)> network wireless ap digi_ap encryption group_rekey 600s
(config)>
```

Increasing the time between rekeys can improve connectivity issues in noisy environments. To disable group rekeys, set to 0. This will allow any client that has previously connected to see all broadcast traffic on the wireless network until the Wi-Fi radio is restarted. The default is 10 minutes.

1. Assign the Wi-Fi access point to a LAN interface or to a bridge. See [Configure a LAN](#) and [Configure a bridge](#) for more information.

The access point must be assigned to an active LAN, or a bridge that is assigned to an active LAN.

2. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

3. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Isolate Wi-Fi clients

Client isolation prevents wireless clients connected to the XBee HiveW device from communicating with other clients. There are two mechanisms for client isolation configuration:

- [Isolate clients connected to the same access point](#)
- [Isolate clients connected to different access points](#)

This section provides instructions for both mechanisms.

Isolate clients connected to the same access point

Web

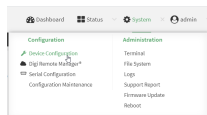
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

Remote Manager:

- a. Locate your device as described in [Use Digi Remote Manager to view and manage your device](#).
- b. Click the **Device ID**.
- c. Click **Settings**.
- d. Click to expand **Config**.

Local Web UI:

- a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



The **Configuration** window is displayed.

3. Click **Network > WiFi > Access points**.
4. Create a new access point or modify an existing access point. See [Configure an open Wi-Fi access point](#), [Configure a Wi-Fi access point with personal security](#), or [Configure a Wi-Fi access point with enterprise security](#).
5. Check to ensure that **Isolate clients** is enabled. This setting is enabled by default.
6. Click **Apply** to save the configuration and apply the change.

Command line

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

- At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

- Create a new access point or modify an existing access point. See [Configure an open Wi-Fi access point](#), [Configure a Wi-Fi access point with personal security](#), or [Configure a Wi-Fi access point with enterprise security](#).
- (Optional) Set the client isolation to true, if it is not already set. This is enabled by default.

```
(config)> network wifi ap digi_ap isolate_client true
(config)>
```

- Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

- Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Isolate clients connected to different access points

Isolating clients that are on different access points involves the following steps:

- Create new access points.
- Assign the access points to separate LAN interfaces.
- Assign those LAN interfaces to separate firewall zones.
- Create firewall filters to prevent traffic between the two firewall zones.

Web

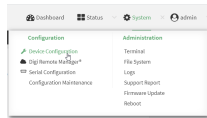
- Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
- Access the device configuration:

Remote Manager:

- Locate your device as described in [Use Digi Remote Manager to view and manage your device](#).
- Click the **Device ID**.
- Click **Settings**.
- Click to expand **Config**.

Local Web UI:

- a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

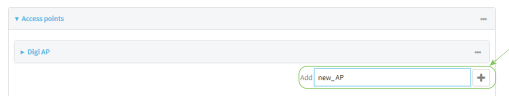


The **Configuration** window is displayed.

3. Create a new access point.

By default, the XBee HiveW comes with one preconfigured access point, named **Digi AP**. In these instructions, we will use the existing **Digi AP** access point and create another new access point, named **new_AP**.

- a. Click **Network > WiFi > Access points**.
- b. For **Add WiFi access point**, type a name for the access point and click **Y**.

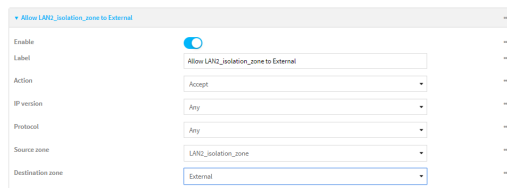


- c. For **SSID**, type the SSID. Up to 32 characters are allowed.
 - d. Select the appropriate type of **Encryption** and complete the encryption-related fields as appropriate. See [Configure an open Wi-Fi access point](#), [Configure a Wi-Fi access point with personal security](#), or [Configure a Wi-Fi access point with enterprise security](#) for details.
4. Configure the firewall:
 - a. Click **Firewall > Zones**.
 - b. In **Add Zone**, enter **LAN2_isolation_zone** for the name of the zone and click **Y**.

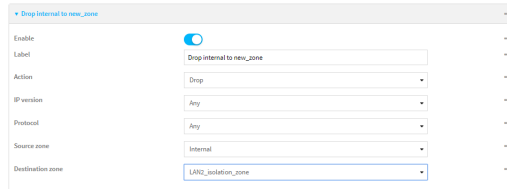


Note We will be creating **LAN2** later in the procedure.

- c. Create a firewall filter to provide internet access for the **LAN2_isolation_zone**:
 - i. For **Add packet filter**, click **Y**
 - ii. For **Label**, type **Allow LAN2_isolation_zone to External**.
 - iii. For **Source zone**, select **LAN2_isolation_zone**.
 - iv. For **Destination zone**, select **External**.



- d. Create a firewall filter to drop traffic from the **Internal** zone (used by the **LAN1** interface) to the **LAN2_isolation_zone**:
 - i. Click **Firewall > Packet filtering**.
 - ii. For **Add packet filter**, click .
 - iii. For **Label**, type **Drop traffic from Internal to LAN2_isolation_zone**.
 - iv. For **Action**, select **Drop**.
 - v. For **Source zone**, select **Internal**.
 - vi. For **Destination zone**, select **LAN2_isolation_zone**.



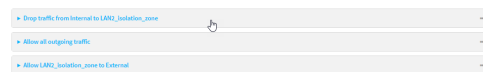
Enable	☒
Label	Drop internal to new_zone
Action	Drop
IP version	Any
Protocol	Any
Source zone	Internal
Destination zone	LAN2_isolation_zone

- e. Rearrange the firewall filters.

Firewall filters are applied in the order that they are listed. As a result, in order to drop traffic from the **Internal** zone to the **LAN2_isolation_zone**, this filter must be listed prior to the **Allow all outgoing traffic filter**, which allows the **Internal** zone to have access to any zone.

To move the **Drop traffic from Internal to LAN2_isolation_zone** filter to the top of the list:

- i. Click the filter title.
- ii. Drag-and-drop the filter to the top of the list.

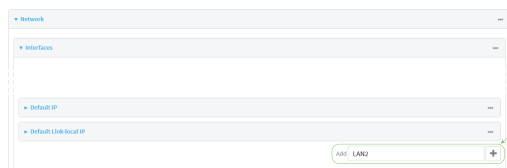


Drop traffic from Internal to LAN2_isolation_zone	
Allow all outgoing traffic	
Allow LAN2_isolation_zone to External	

5. Create a new LAN:

By default, the XBee HiveW device comes with one preconfigured LAN, which includes the default access point. We will use that LAN for the default access point, and create a new LAN for the second access point.

- a. Click **Configuration > Network > Interfaces**.
- b. For **Add interface**, type a name for the LAN and click .



- c. For **Zone**, select **LAN2_isolation_zone**.
- d. For **Device**, select the new Wi-Fi access point.
- e. Click to expand **IPv4**.
- f. For **Address**, type an IP address and subnet for the LAN.

- g. Click to expand **DHCP server**.
- h. **Enable** the DHCP server.
6. Click **Apply** to save the configuration and apply the change.

Command line

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Configure a new access point:

- a. Create a new access point:

```
(config)> add network wifi ap new_AP
(config network wifi ap new_AP)>
```

New access points are enabled by default.

- b. Set the SSID for the Wi-Fi access point. Up to 32 characters are allowed.

```
(config network wifi ap new_AP)> ssid my_SSID
(config network wifi ap new_AP)>
```

- c. Set the security for the access point:

```
(config network wifi ap new_AP)> encryption type value
(config network wifi ap new_AP)>
```

where value is one of:

- **none**
- **psk**
- **psk2**
- **wpa2:**

- d. Complete other encryption-related fields as appropriate based on the type of encryption. See [Configure an open Wi-Fi access point](#), [Configure a Wi-Fi access point with personal security](#), or [Configure a Wi-Fi access point with enterprise security](#) for details.

4. Configure the firewall:

- a. Return to the root config prompt by typing three periods (...):

```
(config network wifi ap new_AP)> ...
(config)>
```

- b. Add a new firewall zone named **LAN2_isolation_zone**. We will be creating **LAN2** later in the procedure.

```
(config)> add firewall zone LAN2_isolation_zone
(config firewall zone LAN2_isolation_zone)>
```

c. Create a firewall filter to provide internet access for the **LAN2_isolation_zone**.

- i. Return to the root config prompt by typing three periods (...):

```
(config firewall zone LAN2_isolation_zone)> ...
(config)>
```

- ii. Add the new packet filter:

```
(config)> add firewall filter end
(config firewall filter 1)>
```

- iii. Set the label for the filter:

```
(config firewall filter 1)> label "Allow LAN2_isolation_zone to External"
(config firewall filter 1)>
```

- iv. Set the source zone to **LAN2_isolation_zone**:

```
(config firewall filter 1)> src_zone LAN2_isolation_zone
(config firewall filter 1)>
```

- v. Set the destination zone to **external**:

```
(config firewall filter 1)> dst_zone external
(config firewall filter 1)>
```

d. Create a firewall filter to drop traffic from the **Internal** zone (used by the **LAN1** interface) to the **LAN2_isolation_zone**:

Firewall filters are applied in the order that they are listed. As a result, in order to drop traffic from the **Internal** zone to the **LAN2_isolation_zone**, this filter must be added before the **Allow all outgoing traffic** filter, which allows the **Internal** zone to have access to any zone. In this example, we will add the new to the first position in the list (index position **0**).

- i. Add the new packet filter:

```
(config firewall filter 1)> add .. 0
(config firewall filter 0)>
```

- ii. Set the label for the filter:

```
(config firewall filter 0)> label "Drop traffic from Internal to LAN2_isolation_zone"
(config firewall filter 0)>
```

- iii. Set the source zone to **internal**:

```
(config firewall filter 0)> src_zone internal
(config firewall filter 0)>
```

- iv. Set the destination zone to **LAN2_isolation_zone**:

```
(config firewall filter 0)> dst_zone LAN2_isolation_zone
(config firewall filter 0)>
```

- v. Set the filter to drop traffic between the zones:

```
(config firewall filter 0)> action drop
(config firewall filter 0)>
```

5. Create a new LAN:

By default, the XBee HiveW device comes with one preconfigured LAN, which includes the default access point. We will use that LAN for the default access point, and create a new LAN for the second access point.

- a. Return to the root config prompt by typing three periods (...):

```
(config firewall filter 0)> ...
(config)>
```

- b. Add the new LAN:

```
(config)> add network interface LAN2
(config network interface LAN2)>
```

- c. Set the device to the new Wi-Fi access point:

```
(config network interface LAN2)> device /network/wifi/ap/new_AP
(config network interface LAN2)>
```

- d. Set the zone to **LAN2_isolation_zone**:

```
(config network interface LAN2)> zone LAN2_isolation_zone
(config network interface LAN2)>
```

- e. Set the IP address and subnet mask of the LAN:

```
(config network interface LAN2)> ipv4 address address/mask
(config network interface LAN2)>
```

- f. Enable the DHCP server:

```
(config network interface LAN2)> ipv4 dhcp_server enable true
(config network interface LAN2)>
```

6. Save the configuration and apply the change.

```
(config network interface LAN2)> save
Configuration saved.
>
```

7. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Configure a Wi-Fi client and add client networks

Required configuration items

- Create the Wi-Fi client.
- The XBee HiveW device's Wi-Fi radio that the Wi-Fi client will use.
- SSID of the access point that the client will log into.
- The encryption type used by the access point:
 - If a personal or mixed mode option is selected, identify the Pre-shared key.
 - If an enterprise option is selected:
 - Select the Extensible Authentication Protocol (EAP), one of:
 - TLS: Client certificate authentication.
If TLS is selected, include:
 - The username.
 - The CA certificate in PEM format.
 - The client certificate in PEM format.
 - The private key in PEM format.
 - (Optional) The private key passphrase.
 - PEAP: Username/password authentication.
If PEAP is selected, identify the username and password.
 - SCEP certificates: Simple Certificate Enrollment Protocol (SCEP) certificate management.
If SCEP certificates is selected:
 - Identify the username.
 - Select the SCEP client. See [Configure a Simple Certificate Enrollment Protocol client](#) for information about SCEP clients.
- WAN assignment. Once you configure a Wi-Fi client, you must assign the Wi-Fi client to a WAN. See [Wide Area Networks \(WANs\)](#) and [Wireless Wide Area Networks \(WWANs\)](#) for further information.

Additional configuration items

- Enable and configure background scanning, which allows the Wi-Fi client to move between access points that have the same SSID as their signal strength varies.
- Additional access points that client will attempt to use. If connection to one access point fails, the device will attempt to connect to the next access point in the list.

To configure a Wi-Fi client:



Web

1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.

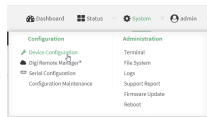
2. Access the device configuration:

Remote Manager:

- Locate your device as described in [Use Digi Remote Manager to view and manage your device](#).
- Click the **Device ID**.
- Click **Settings**.
- Click to expand **Config**.

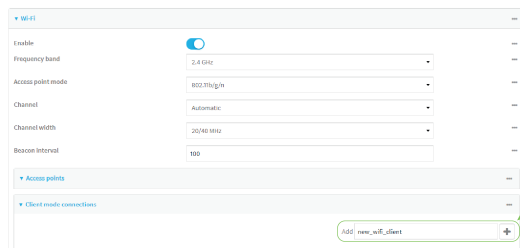
Local Web UI:

- On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

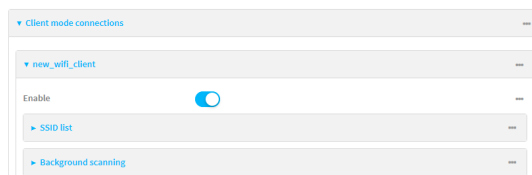


The **Configuration** window is displayed.

- Click **Network > WiFi > Client mode connections**.
- For **Add WiFi client**, type the name of the client and click **+**



The Wi-Fi client configuration window is displayed.



New Wi-Fi clients are enabled by default. To disable, toggle off **Enable**.

- Configure the Wi-Fi network that the client will use:
 - Click to expand **SSID list**.
 - Enter the **SSID** of the access point that the client will use to connect to the Wi-Fi network.
 - Select the type of **Encryption** used by the access point.
 - If a personal or mixed mode is selected, for **Pre-shared key**, enter the password that the client will use to connect to the access point.

Note If you need to configure a Wi-Fi passphrase with any non-printable ASCII characters, you can use the `wpa_passphrase` tool to generate the appropriate pre-shared key. The `wpa_passphrase` command is available in the shell console of a DAL OS Digi device. For details about the command, see the [wpa_passphrase Linux command](#).

- If **WPA2 Enterprise** is selected:
 - Select the **Extensible Authentication Protocol (EAP)**, one of:
 - **TLS**: Client certificate authentication.
If **TLS** is selected, include:
 - The **Username**.
 - The **CA certificate** in PEM format.
 - The **Client certificate** in PEM format.
 - The **Private key** in PEM format.
 - (Optional) The **Private key passphrase**.
 - **PEAP**: Username/password authentication.
If **PEAP** is selected, identify the **Username** and **Password**.
 - **SCEP certificates**: Simple Certificate Enrollment Protocol (SCEP) certificate management.
If **SCEP certificates** is selected:
 - Identify the **Username**.
 - Select the **SCEP Client**. See [Configure a Simple Certificate Enrollment Protocol client](#) for information about SCEP clients.

6. (Optional) Configure **Background scanning**.

Background scanning allows the device to scan for nearby access points and to move between access points that have the same SSID that is configured for the client connection, based on the signal strength of the access points.

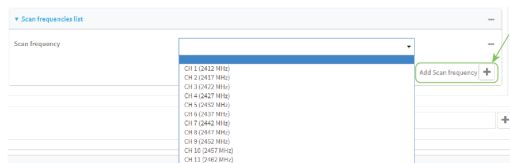
- a. Click to expand **Background scanning**.

- b. Click **Enable background scanning** to enable.
- c. For **Scan threshold**, enter a value in dB that is used to determine the scanning frequency. The allowed value is an integer between -113 and 0.

The **Scan threshold** works with the **Short interval** and **Long interval** options to determine how often the device should scan for available access points:

- If the signal strength from the access point to which the client is currently connected is below the **Scan threshold**, it will use the **Short interval** to determine how often to scan for available access points.

- If the signal strength from the access point to which the client is currently connected is stronger the **Scan threshold**, it will use the **Long interval** to determine how often to scan for available access points.
 - If **Short interval** and **Long interval** are set to the same value, **Scan threshold** is ignored. For example, the default configuration has both **Short interval** and **Long interval** set to 1 second, which means that the device will scan for access points once per second regardless of the **Scan threshold**.
- d. For **Short interval**, type the number of seconds to wait between scans for access points, when the signal strength from the access point to which the client is currently connected is below the **Scan threshold**.
 - e. For **Long interval**, type the number of seconds to wait between scans for access points, when the signal strength from the access point to which the client is currently connected is stronger than the **Scan threshold**.
 - f. Click to expand **Scan frequencies list**. You must add one or more frequency to scan:
 - i. Click  to add a scan frequency.
 - ii. Select a frequency.
 - iii. Repeat for additional frequencies.
 - g. To add a channel, click **Add Scan frequency** and select the appropriate channel.



7. Click **Apply** to save the configuration and apply the change.

After you configure a Wi-Fi client, you must assign the Wi-Fi client to a WAN. See [Wide Area Networks \(WANs\) and Wireless Wide Area Networks \(WWANs\)](#) for further information.

Command line

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Create a new Wi-Fi client:

```
(config)> add network wifi client new_client
(config network wifi client new_client)>
```

New clients are enabled by default.

4. Configure the Wi-Fi network that the client will use:
 - a. Set the SSID of the access point that the client will use to connect to the Wi-Fi network:

```
(config network wifi client new_client)> ssid 0 ssid value
(config network wifi client new_client)>
```

where *value* is the SSID of the access point.

- b. Set the encryption type for the access point:

```
(config network wifi client new_client)> ssid 0 encryption type value
(config network wifi client new_client)>
```

where *value* is the type of encryption used by the access point. Allowed values are:

- **none**: no encryption.
 - **owe**: WPA3 Enhanced Open, which uses Opportunistic Wireless Encryption (OWE) technology to provide encryption for Wi-Fi networks that do not use password protection.
 - **psk**: WPA personal encryption.
 - **mixedpsk**: Uses both WPA and WPA2 personal encryption.
 - **psk2**: WPA2 personal encryption.
 - **psk2sae**: Uses WPA2-PSK/WPA3-AES mixed mode.
 - **sae**: Uses WPA3 Personal mode.
 - **wpa2**: WPA2 enterprise encryption.
- c. If the type of encryption is set to:
 - **psk**, **mixedpsk**, **psk2**, **psk2sae**, or **sae**, set the password that the client will use to connect to the access point:

```
(config network wifi client new_client)> ssid 0 encryption key_psk2 password
(config network wifi client new_client)>
```

Note If you need to configure a Wi-Fi passphrase with any non-printable ASCII characters, you can use the `wpa_passphrase` tool to generate the appropriate pre-shared key. The `wpa_passphrase` command is available in the shell console of a DAL OS Digi device. For details about the command, see the [wpa_passphrase Linux command](#).

- **wpa2**:
 - i. Set the Extensible Authentication Protocol (EAP):

```
(config network wifi client new_client)> ssid 0 encryption eap_type value
(config network wifi client new_client)>
```

where *value* is one of:

- **peap**: Username/password authentication. If **peap** is set:

- Set the username:

```
(config network wifi client new_client)> ssid 0 encryption id_wpa2
username
(config network wifi client new_client)>
```

- Set the password:

```
(config network wifi client new_client)> ssid 0 encryption password_wpa2
password
(config network wifi client new_client)>
```

- **scep**: Simple Certificate Enrollment Protocol (SCEP) certificate management. If **scep** is set:

- Set the username:

```
(config network wifi client new_client)> ssid 0 encryption id_wpa2
username
(config network wifi client new_client)>
```

- Set the SCEP client:

- Use the **?** to determine available SCEP clients:

```
(config network wifi client new_client)> ssid 0 encryption scep_client ?
```

SCEP Client: The SCEP client which this Wi-Fi client will use to download the necessary keys and certificates from the SCEP server.

Format:

SCEP_test_client

SCEP_test_client1

Current value:

```
(config network wifi client new_client)>
```

- Set the SCEP client, for example:

```
(config network wifi client new_client)> ssid 0 encryption scep_client
SCEP_test_client
(config network wifi client new_client)>
```

See [Configure a Simple Certificate Enrollment Protocol client](#) for information about SCEP clients.

- **tls**: Client certificate authentication. If **tls** is selected:

- i. Set the username:

```
(config network wifi client new_client)> ssid 0 encryption id_wpa2
username
(config network wifi client new_client)>
```

- ii. Set the CA certificate by using the **ca_cert** parameter and pasting the certificate in PEM format:

```
(config network wifi client new_client)> ssid 0 encryption ca_cert certificate
(config network wifi client new_client)>
```

- iii. Set the client certificate by using the **client_cert** parameter and pasting the certificate in PEM format:

```
(config network wifi client new_client)> ssid 0 encryption client_cert
certificate
(config network wifi client new_client)>
```

- iv. Set the private key by using the **private_key** parameter and pasting the private key in PEM format:

```
(config network wifi client new_client)> ssid 0 encryption private_key key
(config network wifi client new_client)>
```

- v. (Optional) Set the private key passphrase:

```
(config network wifi client new_client)> ssid 0 encryption private_key_
passphrase passphrase
(config network wifi client new_client)>
```

5. (Optional) Configure background scanning.

Background scanning allows the device to scan for nearby access points and to move between access points that have the same SSID that is configured for the client connection, based on the signal strength of the access points.

- a. Enable background scanning:

```
(config network wifi client new_client)> background_scanning enable true
(config network wifi client new_client)>
```

- b. Set the scan threshold (**bgscan_strength**), in dB, that is used to determine the scanning frequency.

```
(config network wifi client new_client)> bgscan_strength value
(config network wifi client new_client)>
```

where *value* is an integer between **-113** and **0**.

The scan threshold works with the short and long intervals (**bgscan_short_interval** and **bgscan_long_interval**) to determine how often the device should scan for available access points:

- If the signal strength from the access point to which the client is currently connected is below the value of **bgscan_strength**, it will use **bgscan_short_interval** to determine how often to scan for available access points.
 - If the signal strength from the access point to which the client is currently connected is stronger than the value of **bgscan_strength**, it will use **bgscan_long_interval** to determine how often to scan for available access points.
 - If **bgscan_short_interval** and **bgscan_long_interval** are set to the same value, **bgscan_strength** is ignored. For example, the default configuration has both **bgscan_short_interval** and **bgscan_long_interval** set to 1 second, which means that the device will scan for access points once per second regardless of the value of **bgscan_strength**.
- c. Set the number of seconds to wait between scans for access points, when the signal strength from the access point to which the client is currently connected is below the value of **bgscan_strength**:

```
(config network wifi client new_client)> bgscan_short_interval value
(config network wifi client new_client)>
```

where value is any integer greater than 0. The default is 1.

- d. Set the number of seconds to wait between scans for access points, when the signal strength from the access point to which the client is currently connected is greater than the value of **bgscan_strength**:

```
(config network wifi client new_client)> bgscan_long_interval value
(config network wifi client new_client)>
```

where value is any integer greater than 0. The default is 1.

- e. To delete a preconfigured frequencies:
- i. Use the **show** command to determine the index number of the channel to be deleted:

```
(config network wifi client new_client)> show background_scanning scan_freq
0 2412
1 2437
2 2462
(config network wifi client new_client)>
```

- ii. Use the appropriate index number to delete the channel. For example, to delete the 2412 frequency:

```
(config network wifi client new_client)> del 0
(config network wifi client new_client)>
```

- f. To add a frequency:

- i. Use the **?** with an existing index number to determine the allowed values for frequencies:

```
(config network wifi client new_client)> background_scanning scan_freq 1
```

Scan frequency: Enable this frequency in the background scan.

Format:

2412

2417

2422

2427

2432

2437

2442

2447

2452

2457

2462

Current value: 2437

- ii. Add the appropriate frequency. For example, to add the **2457** frequency to the end of the list:

```
(config network wifi client new_client)> add background_scanning scan_freq end 2457
(config network wifi client new_client)>
```

6. Save the configuration and apply the change.

```
(config network wireless client new_client)> save
Configuration saved.
>
```

7. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

After you configure a Wi-Fi client, you must assign the Wi-Fi client to a WAN. See [Wide Area Networks \(WANs\) and Wireless Wide Area Networks \(WWANs\)](#) for further information.

Show Wi-Fi access point status and statistics

You can show summary status for all Wi-Fi access points, and detailed status and statistics for individual Wi-Fi access points.



Web

1. Log into the XBee Hive WebUI as a user with full Admin access rights.
2. On the main menu, click **Status**.
3. Under **Connections**, click **Wi-Fi > Access Points**.

Command line

Show summary of Wi-Fi access points

To show the status and statistics for Wi-Fi access points, use the [show wifi ap](#) command.

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the Admin CLI prompt, type **show wifi ap**:

```
> show wifi ap
```

AP	Enabled	Status	SSID	BSSID
my_AP	true	up	my_SSID	01:41:D1:14:36:37
digi_ap	true	up	Digi2	00:40:D0:13:35:36

```
>
```

3. To view information about both active and inactive access points, include the **all** parameter:

```
> show wifi ap all
```

AP	Enabled	Status	SSID	BSSID
my_AP	true	up	my_SSID	01:41:D1:14:36:37
digi_ap	true	up	Digi2	00:40:D0:13:35:36
digi_ap2	false	down		

```
>
```

Show detailed status and statistics of a specific Wi-Fi access point

To show a detailed status and statistics of a Wi-Fi access point, use the **show wifi ap name *name*** command.

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the Admin CLI prompt, type **show wifi ap name *name***:

```
> show wifi ap name my_AP
```

```
my_AP Access Point Status
```

```
Enabled      : true
Status       : up

SSID         : my_AP
Security     : none

Channel      :
Channel Width :
Radio        : wifi
BSSID       : 01:41:D1:14:36:37
```

Client	Signal	RX Bytes	TX Bytes	Uptime
cc:c0:78:34:d5:a2	-68	260997	279481	801

>

Show Wi-Fi client status and statistics

You can show summary status for all Wi-Fi clients, and detailed status and statistics for individual Wi-Fi clients.



1. Log into the XBee Hive WebUI as a user with full Admin access rights.
2. On the main menu, click **Status**.
3. Under **Connections**, click **Wi-Fi > Clients**.

Command line

Show summary of Wi-Fi clients

To show the status and statistics for Wi-Fi client, use the [show wifi client](#) command.

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the Admin CLI prompt, type **show wifi client**:

```
> show wifi client
```

Client	Enabled	SSID	Status	Signal	MAC Address
my_client	true	my_SSID	up	-43	91:fe:86:d1:0e:81

>

3. To view information about both active and inactive clients, include the **all** parameter:

```
> show wifi client all
```

Client	Enabled	SSID	Status	Signal	MAC Address
my_client	true	my_SSID	up	-43	91:fe:86:d1:0e:81
client2	true	SSID2	down		

>

Show detailed status and statistics of a specific Wi-Fi client

To show a detailed status and statistics of a Wi-Fi client, use the **show wifi client name *name*** command.

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the Admin CLI prompt, type **show wifi cleint name *name***:

```
> show wifi client name my_client
```

```
Client      : my_client
Enabled     : true
SSID       : my_SSID
Status      : up
Signal      : -43
MAC Address : 91:fe:86:d1:0e:81
Channel     : 48
Radio       : wifi1
TX Power    : 23
Link Quality : 67/70
BSSID       : 6D:B9:DD:BD:EE:C4
```

```
>
```

Routing

This chapter contains the following topics:

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IP routing

The XBee Hive device uses IP routes to decide where to send a packet it receives for a remote network. The process for deciding on a route to send the packet is as follows:

1. The device examines the destination IP address in the IP packet, and looks through the IP routing table to find a match for it.
2. If it finds a route for the destination, it forwards the IP packet to the configured IP gateway or interface.
3. If it cannot find a route for the destination, it uses a default route.
4. If there are two or more routes to a destination, the device uses the route with the longest mask.
5. If there are two or more routes to a destination with the same mask, the device uses the route with the lowest metric.

This section contains the following topics:

Configure a static route	351
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Example: Dual WAN policy-based routing	364
Example: Domain-based routing with dual WAN	367
Example: Route traffic to a specific WAN interface based on the client MAC address	371
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Configure a static route

A static route is a manually configured routing entry. Information about the route is manually entered rather than obtained from dynamic routing traffic.

Required configuration items

- The destination address or network.
- The interface to use to reach the destination.

Additional configuration items

- A label used to identify this route.
- The IPv4 address of the gateway used to reach the destination.
- The metric for the route. When multiple routes are available to reach the same destination, the route with the lowest metric is used.
- The Maximum Transmission Units (MTU) of network packets using this route.

To configure a static route:



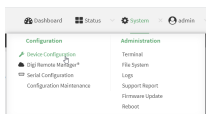
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

Remote Manager:

- a. Locate your device as described in [Use Digi Remote Manager to view and manage your device](#).
- b. Click the **Device ID**.
- c. Click **Settings**.
- d. Click to expand **Config**.

Local Web UI:

- a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



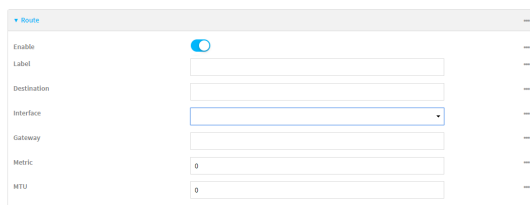
The **Configuration** window is displayed.

3. Click **Network > Routes > Static routes**.

- Click the  to add a new static route.



The new static route configuration page is displayed:



New static route configurations are enabled by default. To disable, toggle off **Enable**.

- (Optional) For **Label**, type a label that will be used to identify this route.
- For **Destination**, type the IP address or network of the destination of this route.
For example, to route traffic to the 192.168.47.0 network that uses a subnet mask of 255.255.255.0, type **192.168.47.0/24**. The **any** keyword can also be used to route packets to any destination with this static route.
- For **Interface**, select the interface on the XBee Hive device that will be used with this static route.
- (Optional) For **Gateway**, type the IPv4 address of the gateway used to reach the destination. Set to blank if the destination can be accessed without a gateway.
- (Optional) For **Metric**, type the metric for the route. When multiple routes are available to reach the same destination, the route with the lowest metric is used.
- (Optional) For **MTU**, type the Maximum Transmission Units (MTU) of network packets using this route.
- Click **Apply** to save the configuration and apply the change.

Command line

- Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
- At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Add a new static route:

```
(config)> add network route static end
(config network route static 0)>
```

New static route instances are enabled by default. To disable:

```
(config network route static 0)> enable false
(config network route static 0)>
```

4. (Optional) set a label that will be used to identify this route. For example:

```
(config network route static 0)> label "route to accounting network"
(config network route static 0)>
```

5. Set the IP address or network of the destination of this route. For example:

```
(config network route static 0)> destination ip_address[/netmask]
(config network route static 0)>
```

For example, to route traffic to the 192.168.47.0 network that uses a subnet mask of 255.255.255.0:

```
(config network route static 0)> dst 192.168.47.0/24
(config network route static 0)>
```

The **any** keyword can also be used to route packets to any destination with this static route.

6. Set the interface on the XBee Hive device that will be used with this static route:
 - a. Use the ? to determine available interfaces:
 - b. Set the interface. For example:

```
(config network route static 0)> interface /network/interface/eth1
(config network route static 0)>
```

7. (Optional) Set the IPv4 address of the gateway used to reach the destination. Set to blank if the destination can be accessed without a gateway.

```
(config network route static 0)> gateway IPv4_address
(config network route static 0)>
```

8. (Optional) Set the metric for the route. When multiple routes are available to reach the same destination, the route with the lowest metric is used.

```
(config network route static 0)> metric value
(config network route static 0)>
```

where *value* is an interger between **0** and **65535**. The default is **0**.

9. (Optional) Set the Maximum Transmission Units (MTU) of network packets using this route:

```
(config network route static 0)> mtu integer
(config network route static 0)>
```

10. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

11. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Delete a static route



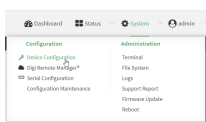
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

Remote Manager:

- a. Locate your device as described in [Use Digi Remote Manager to view and manage your device](#).
- b. Click the **Device ID**.
- c. Click **Settings**.
- d. Click to expand **Config**.

Local Web UI:

- a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



The **Configuration** window is displayed.

3. Click **Network > Routes > Static routes**.
4. Click the menu icon (...) for a static route and select **Delete**.



5. Click **Apply** to save the configuration and apply the change.

Command line

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBees Hive local command line as a user with full Admin access rights.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Determine the index number of the static route to be deleted:

```
(config)> show network route static
0
  dst 10.0.0.1
  enable true
  no gateway
  interface /network/interface/lan1
  label new_static_route
  metric 0
  mtu 0
1
  dst 192.168.5.1
  enable true
  gateway 192.168.5.1
  interface /network/interface/lan2
  label new_static_route_1
  metric 0
  mtu 0
(config)>
```

4. Use the index number to delete the static route:

```
(config)> del network route static 0
(config)>
```

5. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

6. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Policy-based routing

Normally, a routing device determines how to route a network packet based on its destination address. However, you can use policy-based routing to forward the packet based on other criteria, such as the source of the packet. For example, you can configure the XBee Hive device so that high-priority traffic is routed through the cellular connection, while all other traffic is routed through an Ethernet (WAN) connection.

Policy-based routing for the XBee Hive device uses the following criteria to determine how to route traffic:

- Firewall zone (for example, internal/outbound traffic, external/inbound traffic, or IPSec tunnel traffic).
- Network interface (for example, the cellular connection, the WAN, or the LAN).
- IPv4 address.
- IPv6 address.
- MAC address.
- Domain.
- Protocol type (TCP, UDP, ICMP, or all).

The order of the policies is important. Routing policies are processed sequentially; as a result, if a packet matches an earlier policy, it will be routed using that policy's rules. It will not be processed by any subsequent rules.

Configure a routing policy

Required configuration items

- The packet matching parameters. It can any combination of the following:
 - Source interface.
 - Source address. This can be a firewall zone, an interface, a single IPv4/IPv6 address or network, or a MAC address.
 - Destination address. This can be a firewall zone, an interface, a single IPv4/IPv6 address or network, or a domain.
 - Protocol. This can be **any**, **tcp**, **udp** or **icmp**.
 - Source port. This is only used if the protocol is set to **tcp** or **udp**.
 - Destination port. This is only used if protocol is set to **tcp** or **udp**.
- The network interface used to reach the destination.

Additional configuration items

- A label for the routing policy.
- Whether packets that match this policy should be dropped when the gateway interface is disconnected, rather than forwarded through other interfaces.

To configure a routing policy:



Web

1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

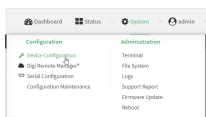
Remote Manager:

- a. Locate your device as described in [Use Digi Remote Manager to view and manage your device](#).
- b. Click the **Device ID**.

- c. Click **Settings**.
- d. Click to expand **Config**.

Local Web UI:

- a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



The **Configuration** window is displayed.

3. Click **Network > Routes > Policy-based routing**.
4. Click the  to add a new route policy.



The new route policy page is displayed:

New route policies are enabled by default. To disable, toggle off **Enable**.

5. (Optional) For **Label**, type a label that will be used to identify this route policy.
6. For **Interface**, select the interface on the XBee Hive device that will be used with this route policy.
7. (Optional) Enable **Exclusive** to configure the policy to drop packets that match the policy when the gateway interface is disconnected, rather than forwarded through other interfaces.
8. For **IP version**, select **Any**, **IPv4**, or **IPv6**.
9. For **Protocol**, select **Any**, **TCP**, **UDP**, or **ICMP**.
 - If **TCP** or **UDP** is selected for **Protocol**, type the port numbers of the **Source port** and **Destination port**, or set to **any** to match for any port.
 - If **ICMP** is selected for **Protocol**, type the ICMP type and optional code, or set to **any** to match for any ICMP type.
10. For **DSCP**, type the 6-bit hexadecimal Differentiated Services Code Point (DSCP) field match criteria. This will match packets based on the DSCP field within the ToS field of the IP header.
11. Configure source address information:
 - a. Click to expand **Source address**.
 - b. For **Type**, select one of the following:
 - **Zone**: Matches the source IP address to the selected firewall zone. See [Firewall configuration](#) for more information about firewall zones.
 - **Interface**: Matches the source IP address to the selected interface's network address.

- **IPv4 address:** Matches the source IP address to the specified IP address or network. Use the format *IPv4_address[/netmask]*, or use **any** to match any IPv4 address.
 - **IPv6 address:** Matches the source IP address to the specified IP address or network. Use the format *IPv6_address[/prefix_length]*, or use **any** to match any IPv6 address.
 - **MAC address:** Matches the source MAC address to the specified MAC address.
- 12. Configure the destination address information:
 - a. Click to expand **Destination address**.
 - b. For **Type**, select one of the following:
 - **Zone:** Matches the destination IP address to the selected firewall zone. See [Firewall configuration](#) for more information about firewall zones.
 - **Interface:** Matches the destination IP address to the selected interface's network address.
 - **IPv4 address:** Matches the destination IP address to the specified IP address or network. Use the format *IPv4_address[/netmask]*, or use **any** to match any IPv4 address.
 - **IPv6 address:** Matches the destination IP address to the specified IP address or network. Use the format *IPv6_address[/prefix_length]*, or use **any** to match any IPv6 address.
 - **Domain:** Matches the destination IP address to the specified domain names. To specify domains:
 - i. Click to expand **Domains**.
 - ii. Click the  to add a domain.
 - iii. For **Domain**, type the domain name.
 - iv. Repeat to add additional domains.
 - **Default route:** Matches packets destined for the default route, excluding routes for local networks.
- 13. Click **Apply** to save the configuration and apply the change.

Command line

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Add a new routing policy:

```
(config)> add network route policy end
(config network route policy 0)>
```

New route policies are enabled by default. To disable:

```
(config network route policy 0)> enable false
(config network route policy 0)>
```

4. (Optional) Set the label that will be used to identify this route policy:

```
(config network route policy 0)> label "New route policy"
(config network route policy 0)>
```

5. Set the interface on the XBee Hive device that will be used with this route policy:

- a. Use the **?** to determine available interfaces:
- b. Set the interface. For example:

```
(config network route policy 0)> interface /network/interface/eth1
(config network route policy 0)>
```

6. (Optional) Enable **exclusive** to configure the policy to drop packets that match the policy when the gateway interface is disconnected, rather than forwarded through other interfaces:

```
(config network route policy 0)> exclusive true
(config network route policy 0)>
```

7. Select the IP version:

```
(config network route policy 0)> ip_version value
(config network route policy 0)>
```

where *value* is one of **any**, **ipv4**, or **ipv6**.

8. Set the protocol:

```
(config network route policy 0)> protocol value
(config network route policy 0)>
```

where *value* is one of:

- **any**: All protocols are matched.
- **tcp**: Source and destination ports are matched:
 - a. Set the source port:

```
(config network route policy 0)> src_port value
(config network route policy 0)>
```

where *value* is the port number, or the keyword **any** to match any port as the source port.

- b. Set the destination port:

```
(config network route policy 0)> dst_port value
(config network route policy 0)>
```

where *value* is the port number, or the keyword **any** to match any port as the destination port.

- **udp**: Source and destination ports are matched:

- a. Set the source port:

```
(config network route policy 0)> src_port value
(config network route policy 0)>
```

where *value* is the port number, or the keyword **any** to match any port as the source port.

- b. Set the destination port:

```
(config network route policy 0)> dst_port value
(config network route policy 0)>
```

where *value* is the port number, or the keyword **any** to match any port as the destination port.

- **icmp**: The ICMP protocol is matched. Identify the ICMP type:

```
(config network route policy 0)> icmp_type value
(config network route policy 0)>
```

where *value* is the ICMP type and optional code, or set to **any** to match for any ICMP type.

9. Set the source address type:

```
(config network route policy 0)> src type value
(config network route policy 0)>
```

where *value* is one of:

- **zone**: Matches the source IP address to the selected firewall zone. Set the zone:

- a. Use the **?** to determine available zones:

```
(config network route policy 0)> src zone ?
```

Zone: Match the IP address to the specified firewall zone.

Format:

```
any
dynamic_routes
edge
external
internal
ipsec
loopback
setup
```

Default value: any

Current value: any

```
(config network route policy 0)> src zone
```

- b. Set the zone. For example:

```
(config network route policy 0)> src zone external
(config network route policy 0)>
```

See [Firewall configuration](#) for more information about firewall zones.

- **interface:** Matches the source IP address to the selected interface's network address. Set the interface:

- a. Use the **?** to determine available interfaces:
- b. Set the interface. For example:

```
(config network route policy 0)> src interface /network/interface/eth1
(config network route policy 0)>
```

- **address:** Matches the source IPv4 address to the specified IP address or network. Set the address that will be matched:

```
(config network route policy 0)> src address value
(config network route policy 0)>
```

where value uses the format **IPv4_address[/netmask]**, or **any** to match any IPv4 address.

- **address6:** Matches the source IPv6 address to the specified IP address or network. Set the address that will be matched:

```
(config network route policy 0)> src address6 value
(config network route policy 0)>
```

where value uses the format **IPv6_address[/prefix_length]**, or **any** to match any IPv6 address.

- **mac:** Matches the source MAC address to the specified MAC address. Set the MAC address to be matched:

```
(config network route policy 0)> src mac MAC_address
(config network route policy 0)>
```

10. Set the destination address type:

```
(config network route policy 0)> dst type value
(config network route policy 0)>
```

where value is one of:

- **zone:** Matches the destination IP address to the selected firewall zone. Set the zone:
 - a. Use the **?** to determine available zones:

```
(config network route policy 0)> dst zone ?
```

Zone: Match the IP address to the specified firewall zone.

Format:

any

```
dynamic_routes
edge
external
internal
ipsec
loopback
setup
```

Default value: any

Current value: any

```
(config network route policy 0)> dst zone
```

- b. Set the zone. For example:

```
(config network route policy 0)> dst zone external
(config network route policy 0)>
```

See [Firewall configuration](#) for more information about firewall zones.

- **interface:** Matches the destination IP address to the selected interface's network address. Set the interface:
 - a. Use the **?** to determine available interfaces:
 - b. Set the interface. For example:

```
(config network route policy 0)> dst interface /network/interface/eth1
(config network route policy 0)>
```

- **address:** Matches the destination IPv4 address to the specified IP address or network. Set the address that will be matched:

```
(config network route policy 0)> dst address value
(config network route policy 0)>
```

where value uses the format **IPv4_address[/netmask]**, or **any** to match any IPv4 address.

- **address6:** Matches the destination IPv6 address to the specified IP address or network. Set the address that will be matched:

```
(config network route policy 0)> dst address6 value
(config network route policy 0)>
```

where value uses the format **IPv6_address[/prefix_length]**, or **any** to match any IPv6 address.

- **mac:** Matches the destination MAC address to the specified MAC address. Set the MAC address to be matched:

```
(config network route policy 0)> dst mac MAC_address
(config network route policy 0)>
```

11. Save the configuration and apply the change.

```
(config)> save  
Configuration saved.  
>
```

12. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Example: Dual WAN policy-based routing

This example routes traffic to a specific IP address to go through the cellular WWAN interface, while all other traffic uses the Ethernet WAN interface.

Web

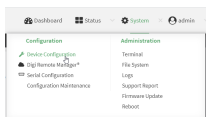
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

Remote Manager:

- a. Locate your device as described in [Use Digi Remote Manager to view and manage your device](#).
- b. Click the **Device ID**.
- c. Click **Settings**.
- d. Click to expand **Config**.

Local Web UI:

- a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



The **Configuration** window is displayed.

3. Click **Network > Routes > Policy-based routing**.
4. Click the  to add a new route policy.



5. For **Label**, type **Route through cellular**.
6. For **Interface**, select .
7. Configure the source address:
 - a. Click to expand **Source address**.
 - b. For **Type**, select **Zone**.
 - c. For **Zone**, select **Internal**.
8. Configure the destination address:
 - a. Click to expand **Destination address**.
 - b. For **Type**, select **IPv4 address**.

- c. For **IPv4 address**, type the IP address that will be the destination for outgoing traffic routed through the WWAN interface. In the above example, this is 241.236.162.59.

9. Click **Apply** to save the configuration and apply the change.

Command line

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Create the route policy:
 - a. Add a new routing policy:

```
(config)> add network route policy end
(config network route policy 0)>
```

- b. Set the label that will be used to identify this route policy:

```
(config network route policy 0)> label "Route through cellular"
(config network route policy 0)>
```

- c. Set the interface:

```
(config network route policy 0)> interface /network/interface/
(config network route policy 0)>
```

- d. Configure the source address:

- i. Set the source type to **zone**:

```
(config network route policy 0)> src type zone
(config network route policy 0)>
```

- ii. Set the zone to **internal**:

```
(config network route policy 0)> src zone internal  
(config network route policy 0)>
```

- e. Configure the destination address:

- i. Set the destination to use an IPv4 address:

```
(config network route policy 0)> dst type address  
(config network route policy 0)>
```

- ii. Set the IP address that will be the destination for outgoing traffic routed through the WWAN interface. In the above example, this is 241.236.162.59.

```
(config network route policy 0)> dst address 241.236.162.59  
(config network route policy 0)>
```

- 4. Save the configuration and apply the change.

```
(config)> save  
Configuration saved.  
>
```

- 5. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Example: Domain-based routing with dual WAN

This example routes traffic destined for a specific domain to the WAN Ethernet port, and never through the cellular modem.

Web

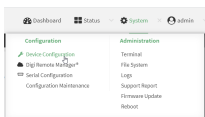
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

Remote Manager:

- a. Locate your device as described in [Use Digi Remote Manager to view and manage your device](#).
- b. Click the **Device ID**.
- c. Click **Settings**.
- d. Click to expand **Config**.

Local Web UI:

- a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



The **Configuration** window is displayed.

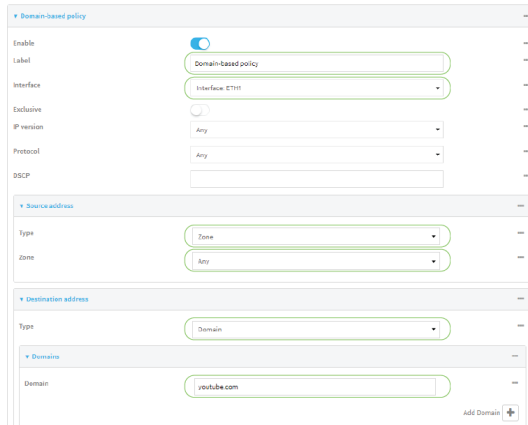
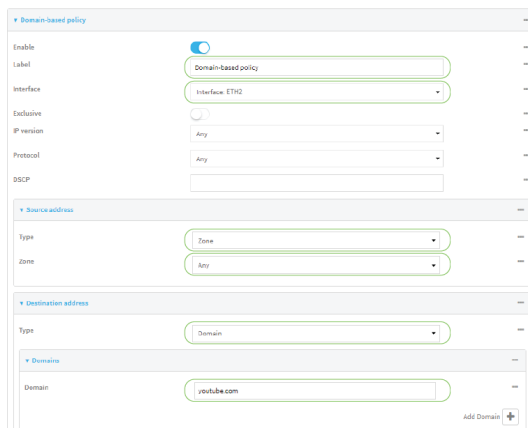
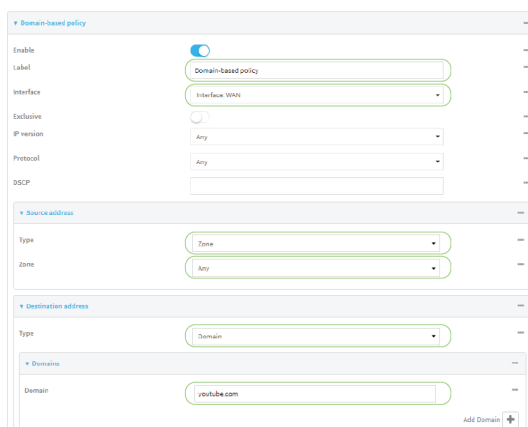
3. Click **Network > Routes > Policy-based routing**.
4. Click the  to add a new route policy.



5. For **Label**, type **Domain-based policy**.
6. For **Interface**, select **ETH1**.
7. Configure the source address:
 - a. Click to expand **Source address**.
 - b. For **Type**, select **Zone**.
 - c. For **Zone**, select **Any**.
8. Configure the destination address:
 - a. Click to expand **Destination address**.
 - b. For **Type**, select **Domain**.

- c. Click to expand **Domains**.
- d. Click the  to add a new domain.
- e. For **Domain**, type **youtube.com**.

You can add additional domains by repeating the last two steps.

9. Click **Apply** to save the configuration and apply the change.

Command line

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Create the route policy:

- a. Add a new routing policy:

```
(config)> add network route policy end
(config network route policy 0)>
```

- b. Set the label that will be used to identify this route policy:

```
(config network route policy 0)> label "Domain-based policy"
(config network route policy 0)>
```

- c. Set the interface:

```
(config network route policy 0)> interface /network/interface/eth1
(config network route policy 0)>
```

- d. Leave the source address type at the default of **zone**.
- e. Leave the source address zone at the default of **any**.
- f. Configure the destination address:

- i. Set the destination to use a domain:

```
(config network route policy 0)> dst type domain
(config network route policy 0)>
```

- ii. Add a domain and set it to **youtube.com**:

```
(config network route policy 0)> add dst domain end youtube.com
(config network route policy 0)>
```

You can add additional domains by repeating this step with a different domain name.

4. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

5. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Example: Route traffic to a specific WAN interface based on the client MAC address

This example routes all data from a certain client device through a cellular WAN based on the device's MAC address, while all other client devices are routed through the Ethernet WAN.

Web

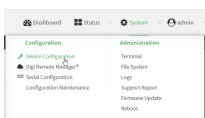
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

Remote Manager:

- a. Locate your device as described in [Use Digi Remote Manager to view and manage your device](#).
- b. Click the **Device ID**.
- c. Click **Settings**.
- d. Click to expand **Config**.

Local Web UI:

- a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

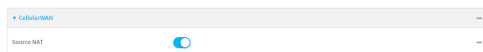


The **Configuration** window is displayed.

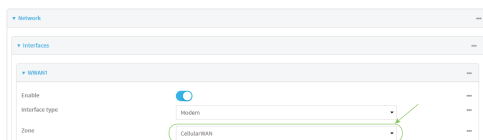
3. Create new firewall zones:
 - a. Create a firewall zone named CellularWAN with Source NAT enabled:
 - i. Click **Firewall > Zones**.
 - ii. For **Add Zone**, type **CellularWAN** and click **+**



- iii. Enable Source NAT.



- b. Create second firewall zone named EthernetWAN with Source NAT enabled:
 - i. For **Add Zone**, type **EthernetWAN** and click 
 - ii. Enable Source **NAT**.
 4. Configure the WAN interfaces to use the new zones:
 - a. Configure the cellular WAN interface:
 - i. Click **Network > Interfaces > .**
 - ii. For **Zone**, select **CellularWAN**.



- b. Configure the Ethernet WAN interface:
 - i. Click **Network > Interfaces > .**
 - ii. For **Zone**, select **EthernetWAN**.
 5. Configure the policy-based route for traffic from the client device that will be sent over the cellular WAN:
 - a. Click **Network > Routes > Policy-based routing**.
 - b. Click the  to add a new route policy.



- c. For **Label**, type **VoIP phone**.
 - d. For **Interface**, select .
 - e. Configure the source as the MAC address of the VoIP phone:
 - i. Click to expand **Source address**.
 - ii. For **Type**, select **MAC address**.
 - iii. For **MAC address**, type **26:88:0E:23:50:C2**.
 - f. Configure the destination zone:
 - i. Click to expand **Destination address**.
 - ii. For **Type**, select **Zone**.
 - iii. For **Zone**, select **CellularWAN**.

6. Create a packet filtering rule that rejects all other LAN packets on the cellular WAN interface.
 - a. Click **Firewall > Packet filtering**.
 - b. Click the  to add a new packet filtering rule.

- c. For **Label**, type **Reject LAN traffic to cellular WAN**.
- d. For **Action**, select **Drop**.
- e. For **Source zone**, select **Internal**.
- f. For **Destination zone**, select **CellularWAN**.

7. Click **Apply** to save the configuration and apply the change.

Command line

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Create new firewall zones:

- a. Create a firewall zone named CellularWAN with Source NAT enabled:

- i. Create the firewall zone:

```
(config)> add firewall zone CellularWAN
(config firewall zone CellularWAN)>
```

- i. Enable Source NAT on the new zone:

```
(config firewall zone CellularWAN)> src_nat true
(config firewall zone CellularWAN)>
```

- b. Create second firewall zone named EthernetWAN with Source NAT enabled:

- i. Type **..** to move back one node in the configuration:

```
(config firewall zone CellularWAN)> ..
(config firewall zone)>
```

- ii. Create the firewall zone:

```
(config firewall zone)> add EthernetWAN
(config firewall zone EthernetWAN)>
```

- i. Enable Source NAT on the new zone:

```
(config firewall zone EthernetWAN)> src_nat true
(config firewall zone EthernetWAN)>
```

4. Configure the WAN interfaces to use the new zones:

- a. Set the zone for the cellular WAN interface:

- i. Type **...** to move to the root of the configuration:

```
(config firewall zone EthernetWAN)> ...
(config)>
```

- ii. Set the zone:

```
(config)> network interface zone CellularWAN
(config)>
```

- b. Set the zone for the Ethernet WAN interface:

```
(config)> network interface zone EthernetWAN
(config)>
```

5. Configure the policy-based route for traffic from the client device that will be sent over the cellular WAN:

- a. Add a new routing policy:

```
(config)> add network route policy end
(config network route policy 0)>
```

- b. Set the label that will be used to identify this route policy:

```
(config network route policy 0)> label "VoIP phone"
(config network route policy 0)>
```

- c. Set the interface:

```
(config network route policy 0)> interface /network/interface/
(config network route policy 0)>
```

- d. Configure the source as the MAC address of the VoIP phone:

- i. Set the source type to **mac**:

```
(config network route policy 0)> src type mac
(config network route policy 0)>
```

- ii. Set the MAC address to the MAC address of the VoIP phone:

```
(config network route policy 0)> src mac 26:88:0E:23:50:C2
(config network route policy 0)>
```

- e. Configure the destination zone:

- i. Set the source destination to **zone**:

```
(config network route policy 0)> dst type zone
(config network route policy 0)>
```

- ii. Set the zone to **CellularWAN**:

```
(config network route policy 0)> dst zone CellularWAN
(config network route policy 0)>
```

6. Create a packet filtering rule that rejects all other LAN packets on the cellular WAN interface:

- a. Create a new packet filtering rule:

- i. Type ... to move to the root of the configuration:

```
(config network route policy 0)> ...
(config)>
```

- ii. Create the packet filtering rule:

```
(config)> add firewall filter end
(config firewall filter 2)>
```

- b. Set the label to **Reject LAN traffic to cellular WAN**:

```
(config firewall filter 2)> label "Reject LAN traffic to cellular WAN"
(config firewall filter 2)>
```

- c. Set the action to **drop**:

```
(config firewall filter 2)> action drop
(config firewall filter 2)>
```

- d. Set the source zone to **internal**:

```
(config firewall filter 2)> src_zone internal
(config firewall filter 2)>
```

- e. Set the destination zone to **CellularWAN**:

```
(config firewall filter 2)> dst_zone CellularWAN
(config firewall filter 2)>
```

7. Save the configuration and apply the change.

```
(config firewall filter 2)> save
Configuration saved.
>
```

8. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Configure routing services

Required configuration items

- Enable routing services.
- Enable and configure the types of routing services that will be used.



Web

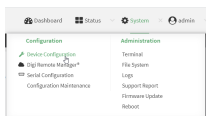
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

Remote Manager:

- a. Locate your device as described in [Use Digi Remote Manager to view and manage your device](#).
- b. Click the **Device ID**.
- c. Click **Settings**.
- d. Click to expand **Config**.

Local Web UI:

- a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



The **Configuration** window is displayed.

3. Click **Network** > **Routes** > **Routing services**.
4. Click **Enable**.



The default firewall zone setting, **Dynamic routes**, is specifically designed to work with routing services and should be left as the default.

5. Configure the routing services that will be used:
 - a. Click to expand a routing service.
 - b. **Enable** the routing service.
 - c. Complete the configuration of the routing service.
6. Click **Apply** to save the configuration and apply the change.

Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Enable routing services:

```
(config)> network route service enable true
(config)>
```

4. Configure routing services that will be used:
 - a. Use the ? to display available routing services:

```
(config)> network route service ?
```

Routing services: Settings for dynamic routing services and protocols.

Parameters	Current Value
enable	true Enable
zone	dynamic_routes Zone

Additional Configuration

bgp	BGP
isis	IS-IS
nhrp	NHRP
ospfv2	OSPFv2
ospfv3	OSPFv3
rip	RIP
ripng	RIPng

```
(config)>
```

- b. Enable a routing service that will be used. For example, to enable the RIP service:

```
(config)> network route service rip enable true
(config)>
```

- c. Complete the configuration of the routing service. For example, use the ? to view the available parameters for the RIP service:

```
(config)> network route service rip ?
```

Parameters	Current Value
ecmp	false Allow ECMP
enable	true Enable

Additional Configuration

interface	Interfaces
neighbour	Neighbours
redis	Route redistribution
timer	Timers

```
(config)>
```

5. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

6. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Show the routing table

To display the routing table:



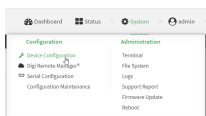
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

Remote Manager:

- a. Locate your device as described in [Use Digi Remote Manager to view and manage your device](#).
- b. Click the **Device ID**.
- c. Click **Settings**.
- d. Click to expand **Config**.

Local Web UI:

- a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



The **Configuration** window is displayed.

3. Click **Status > Routes**.

The **Network Routing** window is displayed.

4. Click **IPv4 Load Balance** to view IPv4 load balancing.
5. Click **IPv6 Load Balance** to view IPv6 load balancing.

Command line

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the Admin CLI prompt, type `show route`:
You can limit the display to only IPv4 entries by using `show route ipv4`, or to IPv6 entries by using `show route ipv6`. You can also display more information by adding the `verbose` option to the `show route` and `show route ip_type` commands.
3. Type `exit` to exit the Admin CLI.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type `quit` to disconnect from the device.

Dynamic DNS



WARNING! The Dynamic Domain Name System uses unencrypted HTTP communication. Please ensure you are utilizing a VPN to secure your communications.

The Domain Name System (DNS) uses name servers to provide a mapping between computer-readable IP addresses and human-readable hostnames. This allows users to access websites and personal networks with easy-to-remember URLs. Unfortunately, IP addresses change frequently, invalidating these mappings when they do. Dynamic DNS has become the standard method of addressing this problem, allowing devices to update name servers with their new IP addresses.

By providing the XBee Hive device with the domain name and credentials obtained from a dynamic DNS provider, the router can automatically update the remote nameserver whenever your WAN or public IP address changes.

Your XBee Hive device supports a number of Dynamic DNS providers as well as the ability to provide a custom provider that is not included on the list of providers.

Configure dynamic DNS

This section describes how to configure dynamic DNS on a XBee Hive device.

Required configuration items

- Add a new Dynamic DNS service.
- The interface that has its IP address registered with the Dynamic DNS provider.
- The name of a Dynamic DNS provider.
- The domain name that is linked to the interface's IP address.
- The username and password to authenticate with the Dynamic DNS provider.

Additional configuration items

- If the Dynamic DNS service provider is set to **custom**, identify the URL that should be used to update the IP address with the Dynamic DNS provider.
- The amount of time to wait to check if the interface's IP address needs to be updated.
- The amount of time to wait to force an update of the interface's IP address.
- The amount of time to wait for an IP address update to succeed before retrying the update.
- The number of times to retry a failed IP address update.



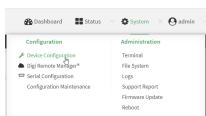
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

Remote Manager:

- a. Locate your device as described in [Use Digi Remote Manager to view and manage your device](#).
- b. Click the **Device ID**.
- c. Click **Settings**.
- d. Click to expand **Config**.

Local Web UI:

- a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

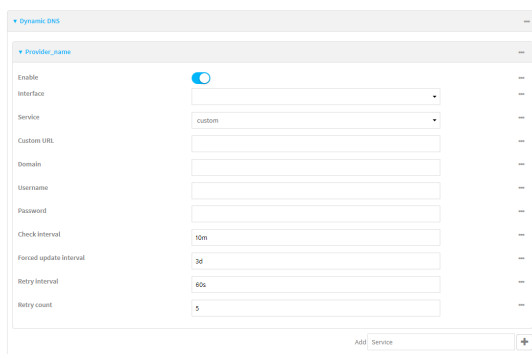


The **Configuration** window is displayed.

3. Click **Network > Dynamic DNS**.
4. Type a name for this Dynamic DNS instance in **Add Service** and click **+**



The Dynamic DNS configuration page displays.



New Dynamic DNS configurations are enabled by default. To disable, toggle off **Enable**.

5. For **Interface**, select the interface that has its IP address registered with the Dynamic DNS provider.
6. For **Service**, select the Dynamic DNS provider, or select **custom** to enter a custom URL for the Dynamic DNS provider.
7. If **custom** is selected for **Service**, type the **Custom URL** that should be used to update the IP address with the Dynamic DNS provider.
8. Type the **Domain** name that is linked to the interface's IP address.
9. Type the **Username** and **Password** used to authenticate with the Dynamic DNS provider.
10. (Optional) For **Check Interval**, type the amount of time to wait to check if the interface's IP address needs to be updated.
 Allowed values are any number of weeks, days, hours, minutes, or seconds, and take the format **number{w|d|h|m|s}**.
 For example, to set **Check interval** to ten minutes, enter **10m** or **600s**.
11. (Optional) For **Forced update interval**, type the amount of time to wait to force an update of the interface's IP address.
 Allowed values are any number of weeks, days, hours, minutes, or seconds, and take the format **number{w|d|h|m|s}**.
 For example, to set **Forced update interval** to ten minutes, enter **10m** or **600s**.
 The setting for **Forced update interval** must be larger than the setting for **Check Interval**.
12. (Optional) For **Retry interval**, type the amount of time to wait for an IP address update to succeed before retrying the update.
 Allowed values are any number of weeks, days, hours, minutes, or seconds, and take the format **number{w|d|h|m|s}**.
 For example, to set **Retry interval** to ten minutes, enter **10m** or **600s**.
13. (Optional) For **Retry count**, type the number of times to retry a failed IP address update.
14. Click **Apply** to save the configuration and apply the change.

Command line

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
 Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Add a new Dynamic DNS instance. For example, to add an instance named **new_ddns_instance**:

```
(config)> add network ddns new_ddns_instance
(config network ddns new_ddns_instance)>
```

New Dynamic DNS instances are enabled by default. To disable:

```
(config network ddns new_ddns_instance)> enable false
(config network ddns new_ddns_instance)>
```

4. Set the interface for the Dynamic DNS instance:

- a. Use the **?** to determine available interfaces:
- b. Set the interface. For example:

```
(config network ddns new_ddns_instance)> interface eth1
(config network ddns new_ddns_instance)>
```

5. Set the Dynamic DNS provider service:

- a. Use the **?** to determine available services:

```
(config network ddns new_ddns_instance)> service ?
```

Service: The provider of the dynamic DNS service.

Format:

```
custom
3322.org
changeip.com
ddns.com.br
dnsdynamic.org
...
```

Default value: custom

Current value: custom

```
(config network ddns new_ddns_instance)> service
```

- b. Set the service:

```
(config network ddns new_ddns_instance)> service service_name
(config network ddns new_ddns_instance)>
```

6. If **custom** is configured for **service**, set the custom URL that should be used to update the IP address with the Dynamic DNS provider:

```
(config network ddns new_ddns_instance)> custom url
(config network ddns new_ddns_instance)>
```

7. Set the domain name that is linked to the interface's IP address:

```
(config network ddns new_ddns_instance)> domain domain_name
(config network ddns new_ddns_instance)>
```

8. Set the username to authenticate with the Dynamic DNS provider:

```
(config network ddns new_ddns_instance)> username name
(config network ddns new_ddns_instance)>
```

9. Set the password to authenticate with the Dynamic DNS provider:

```
(config network ddns new_ddns_instance)> password pwd
(config network ddns new_ddns_instance)>
```

10. (Optional) Set the amount of time to wait to check if the interface's IP address needs to be updated:

```
(config network ddns new_ddns_instance)> check_interval value
(config network ddns new_ddns_instance)>
```

where *value* is any number of weeks, days, hours, minutes, or seconds, and takes the format ***number{w|d|h|m|s}***.

For example, to set **check_interval** to ten minutes, enter either **10m** or **600s**:

```
(config network ddns new_ddns_instance)> check_interval 600s
(config network ddns new_ddns_instance)>
```

The default is **10m**.

11. (Optional) Set the amount of time to wait to force an update of the interface's IP address:

```
(config network ddns new_ddns_instance)> force_interval value
(config network ddns new_ddns_instance)>
```

where *value* is any number of weeks, days, hours, minutes, or seconds, and takes the format ***number{w|d|h|m|s}***.

For example, to set **force_interval** to ten minutes, enter either **10m** or **600s**:

```
(config network ddns new_ddns_instance)> force_interval 600s
(config network ddns new_ddns_instance)>
```

The default is **3d**.

12. (Optional) Set the amount of time to wait for an IP address update to succeed before retrying the update:

```
(config network ddns new_ddns_instance)> retry_interval value
(config network ddns new_ddns_instance)>
```

where *value* is any number of weeks, days, hours, minutes, or seconds, and takes the format ***number{w|d|h|m|s}***.

For example, to set **retry_interval** to ten minutes, enter either **10m** or **600s**:

```
(config network ddns new_ddns_instance)> retry_interval 600s
(config network ddns new_ddns_instance)>
```

The default is **60s**.

13. (Optional) Set the number of times to retry a failed IP address update:

```
(config network ddns new_ddns_instance)> retry_count value
(config network ddns new_ddns_instance)>
```

where *value* is any integer. The default is **5**.

14. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

15. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Virtual Router Redundancy Protocol (VRRP)

Virtual Router Redundancy Protocol (VRRP) is a standard for gateway device redundancy and failover that creates a "virtual router" with a floating IP address. Devices connected to the LAN then use this virtual router as their default gateway. Responsibility for the virtual router is assigned to one of the VRRP-enabled devices on a LAN (the "master router"), and this responsibility transparently fails over to backup VRRP devices if the master router fails. This prevents the default gateway from being a single point of failure, without requiring configuration of dynamic routing or router discovery protocols on every host.

Multiple XBee Hive devices can be configured as VRRP devices and assigned a priority. The router with the highest priority will be used as the master router. If the master router fails, then the IP address of the virtual router is mapped to the backup device with the next highest priority. Each VRRP router is configured with a unique LAN IP address, and the same shared VRRP address.

VRRP+

VRRP+ is an extension to the VRRP standard that uses network probing to monitor connections through VRRP-enabled devices and can dynamically change the priority of the devices, including changing devices from master to backup, and from backup to master, even if the device has not failed. For example, if a host becomes unreachable on the far end of a network link, then the physical default gateway can be changed by adjusting the VRRP priority of the Digi XBee Hive Gateway device connected to the failing link. This provides failover capabilities based on the status of connections behind the router, in addition to the basic VRRP device failover. For XBee Hive devices, [SureLink](#) is used to probe network connections.

VRRP+ can be configured to probe a specified IP address by either sending an ICMP echo request (ping) or attempting to open a TCP socket to the IP address.

Configure VRRP

This section describes how to configure VRRP on a XBee Hive device.

Required configuration items

- Enable VRRP.
- The interface used by VRRP.
- The Router ID that identifies the virtual router instance. The Router ID must be the same on all VRRP devices that participate in the same VRRP device pool.
- The VRRP priority of this device.
- The shared virtual IP address for the VRRP virtual router. Devices connected to the LAN will use this virtual IP address as their default gateway.

See [Configure VRRP+](#) for information about configuring VRRP+, an extension to VRRP that uses network probing to monitor connections through VRRP-enabled devices and dynamically change the VRRP priority of devices based on the status of their network connectivity.

Web

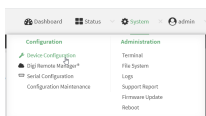
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

Remote Manager:

- a. Locate your device as described in [Use Digi Remote Manager to view and manage your device](#).
- b. Click the **Device ID**.
- c. Click **Settings**.
- d. Click to expand **Config**.

Local Web UI:

- a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

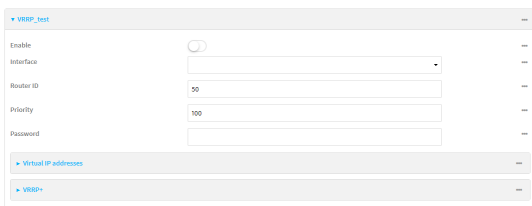


The **Configuration** window is displayed.

3. Click **Network > VRRP**.
4. For **Add VRRP instance**, type a name for the VRRP instance and click .

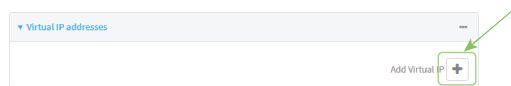


The new VRRP instance configuration is displayed.



5. Click **Enable**.

6. For **Interface**, select the interface on which this VRRP instance should run.
7. For **Router ID** field, type the ID of the virtual router instance. The Router ID must be the same on all VRRP devices that participate in the same VRRP device pool. Allowed values are from **1** and **255**, and it is configured to **50** by default.
8. For **Priority**, type the priority for this router in the group. The router with the highest priority will be used as the master router. If the master router fails, then the IP address of the virtual router is mapped to the backup device with the next highest priority. If this device's actual IP address is being used as the virtual IP address of the VRRP pool, then the priority of this device should be set to **255**. Allowed values are from **1** and **255**, and it is configured to **100** by default.
9. (Optional) For **Password**, type a password that will be used to authenticate this VRRP router with VRRP peers. If the password length exceeds 8 characters, it will be truncated to 8 characters.
10. Configure the virtual IP addresses associated with this VRRP instance:
 - a. Click to expand **Virtual IP addresses**.
 - b. Click  to add a virtual IP address.



- c. For **Virtual IP**, type the IPv4 or IPv6 address for a virtual IP of this VRRP instance.
 - d. (Optional) Repeat to add additional virtual IPs.
11. See [Configure VRRP+](#) for information about configuring VRRP+.
12. Click **Apply** to save the configuration and apply the change.

Command line

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Add a VRRP instance. For example:

```
(config)> add network vrrp VRRP_test
(config network vrrp VRRP_test)>
```

4. Enable the VRRP instance:

```
(config network vrrp VRRP_test)> enable true
(config network vrrp VRRP_test)>
```

5. Set the interface on which this VRRP instance should run:
 - a. Use the **?** to determine available interfaces:

- b. Set the interface, for example:

```
(config network vrrp VRRP_test)> interface /network/interface/eth
(config network vrrp VRRP_test)>
```

- c. Repeat for additional interfaces.

6. Set the router ID. The Router ID must be the same on all VRRP devices that participate in the same VRRP device pool. Allowed values are from **1** and **255**, and it is configured to **50** by default.

```
(config network vrrp VRRP_test)> router_id int
(config network vrrp VRRP_test)>
```

7. Set the priority for this router in the group. The router with the highest priority will be used as the master router. If the master router fails, then the IP address of the virtual router is mapped to the backup device with the next highest priority. If this device's actual IP address is being used as the virtual IP address of the VRRP pool, then the priority of this device should be set to **255**. Allowed values are from **1** and **255**, and it is configured to **100** by default.

```
(config network vrrp VRRP_test)> priority int
(config network vrrp VRRP_test)>
```

8. (Optional) Set a password that will be used to authenticate this VRRP router with VRRP peers. If the password length exceeds 8 characters, it will be truncated to 8 characters.

```
(config network vrrp VRRP_test)> password pwd
(config network vrrp VRRP_test)>
```

9. Add a virtual IP address associated with this VRRP instance. This can be an IPv4 or IPv6 address.

```
(config network vrrp VRRP_test)> add virtual_address end ip_address
(config network vrrp VRRP_test)>
```

Additional virtual IP addresses can be added by repeating this step with different values for *ip_address*.

10. Save the configuration and apply the change.

```
(config network vrrp new_vrrp_instance)> save
Configuration saved.
>
```

11. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Configure VRRP+

VRRP+ is an extension to the VRRP standard that uses SureLink network probing to monitor connections through VRRP-enabled devices and adjust devices' VRRP priority based on the status of the SureLink tests.

This section describes how to configure VRRP+ on a XBee Hive device.

Required configuration items

- Both master and backup devices:
 - A configured and enabled instance of VRRP. See [Configure VRRP](#) for information.
 - Enable VRRP+.
 - WAN interfaces to be monitored by using VRRP+.

Note SureLink is enabled by default on all WAN interfaces, and should not be disabled on the WAN interfaces that are being monitored by VRRP+.

If multiple WAN interfaces are being monitored on the same device, the VRRP priority will be adjusted only if all WAN interfaces fail SureLink tests.

- The amount that the VRRP priority will be modified when SureLink determines that the VRRP interface is not functioning correctly.
- Configure the VRRP interface's DHCP server to use a custom gateway that corresponds to one of the VRRP virtual IP addresses.
- Backup devices only:
 - Enable and configure SureLink on the VRRP interface.
 - Set the IP gateway to the IP address of the VRRP interface on the master device.

Additional configuration items

- For backup VRRP devices, enable the ability to monitor the VRRP master, so that a backup device can increase its priority when the master device fails SureLink tests.

Web

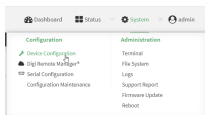
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

Remote Manager:

- a. Locate your device as described in [Use Digi Remote Manager to view and manage your device](#).
- b. Click the **Device ID**.
- c. Click **Settings**.
- d. Click to expand **Config**.

Local Web UI:

- a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



The **Configuration** window is displayed.

3. Click **Network > VRRP**.
4. Create a new VRRP instance, or click to expand an existing VRRP instance.
See [Configure VRRP](#) for information about creating a new VRRP instance.
5. Click to expand **VRRP+**.

6. Click **Enable**.
7. Add interfaces to monitor:
 - a. Click to expand **Monitor interfaces**.
 - b. Click to add an interface for monitoring.

- c. For **Interface**, select the local interface to monitor. Generally, this will be a cellular or WAN interface.
 - d. (Optional) Click again to add additional interfaces.
8. (Optional) For backup devices, click to enable **Monitor VRRP+ master**.
This parameter allows a backup VRRP device to monitor the master device, and increase its priority when the master device is failing SureLink tests. This can allow a device functioning as a backup device to promote itself to master.
9. For **Priority modifier**, type or select the amount that the device's priority should be decreased due to SureLink connectivity failure, and increased when SureLink succeeds again.
Along with the priority settings for devices in this VRRP pool, the amount entered here should be large enough to automatically demote a master device when SureLink connectivity fails. For example, if the VRRP master device has a priority of **100** and the backup device has a priority of **80**, then the **Priority modifier** should be set to an amount greater than **20** so that if SureLink fails on the master, it will lower its priority to below **80**, and the backup device will assume the master role.
10. Configure the VRRP interface. The VRRP interface is defined in the **Interface** parameter of the VRRP configuration, and generally should be a LAN interface:

The screenshot shows the configuration page for a VRRP instance. The 'VRRP+ test' section is expanded, showing the 'Interface' dropdown set to 'Interface LAN1'. Below this, the 'Virtual IP address' section has '10.0.0.1' entered in the 'Virtual IP' field. The 'Monitor interfaces' section is also visible, showing a list of interfaces to monitor.

To configure the VRRP interface:

- Click to expand **Network > Interfaces**.
- Click to expand the appropriate VRRP interface (for example, **LAN1**).
- For backup devices, for **Default Gateway**, type the IP address of the VRRP interface on the master device.

The screenshot shows the configuration page for an IPv4 address. The 'default gateway' field is highlighted with a green box, showing the IP address '102.168.3.1'. A callout box points to this field with the text 'IP address of the VRRP interface on the master device'.

- Configure the VRRP interface's DHCP server to use a custom gateway that corresponds to one of the VRRP virtual IP addresses:
 - Click to expand **DHCP Server > Advanced settings**.
 - For **Gateway**, select **Custom**.
 - For **Custom gateway**, enter the IP address of one of the virtual IPs used by this VRRP instance.

The screenshot shows the configuration page for a DHCP server. The 'Advanced settings' section is expanded, showing the 'Gateway' dropdown set to 'Custom' and the 'Custom gateway' field set to '102.168.3.1'.

- For backup devices, enable and configure SureLink on the VRRP interface. Generally, this should be a LAN interface; VRRP+ will then monitor the LAN using SureLink to determine if the interface has network connectivity and promote a backup to master if SureLink fails.
 - Click to expand **IPv4 > SureLink**.
 - Click **Enable**.

- iii. For **Interval**, type a the amount of time to wait between connectivity tests. To guarantee seamless internet access for VRRP+ purposes, SureLink tests should occur more often than the default of 15 minutes.

Allowed values are any number of weeks, days, hours, minutes, or seconds, and take the format **number{w|d|h|m|s}**. For example, to set **Interval** to five seconds, enter **5s**.

- iv. Click to expand **Test targets > Test target**.
- v. Configure the test target. For example, to configure SureLink to verify internet connectivity on the LAN by pinging <https://remotemanager.digi.com>:
 - i. For **Test Type**, select **Ping test**.
 - ii. For **Ping host**, type <https://remotemanager.digi.com>.

The screenshot shows a configuration page for VRRP. Under the 'Test targets' section, a 'Test target' is expanded. It shows a dropdown for 'Test type' set to 'Ping test', a text field for 'Ping host' containing 'mydevicecloud.com', and a text field for 'Ping packet size' containing '20'. Above this, in the 'Interval' field, the value '5s' is entered. Other fields like 'Enable', 'Restart interval', 'Backup device', 'Success condition', 'Attempts', and 'Response timeout' are also visible but not the focus of the configuration steps shown.

11. Click **Apply** to save the configuration and apply the change.

Command line

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Create a new VRRP instance, or edit an existing one. See [Configure VRRP](#) for information about creating a new VRRP instance.

4. Enable VRRP+:

```
(config)> network vrrp VRRP_test vrrp_plus enable true
(config)>
```

5. Add interfaces to monitor. Generally, this will be a cellular or WAN interface.
 - a. Use the **?** to determine available interfaces:

- b. Set the interface, for example:

```
(config)> add network vrrp VRRP_test vrrp_plus monitor_interface end
/network/interface/modem xbee_cellular
(config)>
```

- c. (Optional) Repeat for additional interfaces.

6. Set the amount that the device's priority should be decreased or increased due to SureLink connectivity failure or success:

```
(config)> network vrrp VRRP_test vrrp_plus weight value
(config)>
```

where *value* is an integer between **1** and **254**. The default is **10**.

Along with the priority settings for devices in this VRRP pool, the amount entered here should be large enough to automatically demote a master device when SureLink connectivity fails. For example, if the VRRP master device has a priority of **100** and the backup device has a priority of **80**, then **weight** should be set to an amount greater than **20** so that if SureLink fails on the master, it will lower its priority to below **80**, and the backup device will assume the master role.

7. (Optional) For backup devices, enable the ability for the device to monitor the master device. This allows a backup VRRP device to monitor the master device, and increase its priority when the master device is failing SureLink tests. This can allow a device functioning as a backup device to promote itself to master.

```
(config)> network vrrp VRRP_test vrrp_plus monitor_master true
(config)>
```

8. Configure the VRRP interface:

- a. Configure the VRRP interface's DHCP server to use a custom gateway that corresponds to one of the VRRP virtual IP addresses:

- i. Set the DHCP server gateway type to custom:

```
(config)> network interface eth ipv4 dhcp_server advanced gateway custom
(config)>
```

- ii. Determine the VRRP virtual IP addresses:

```
(config)> show network vrrp VRRP_test virtual_address
0 192.168.3.3
1 10.10.10.1

(config)>
```

- iii. Set the custom gateway to one of the VRRP virtual IP addresses. For example:

```
(config)> network interface eth ipv4 dhcp_server advanced gateway_custom 192.168.3.3
(config)>
```

- b. For backup devices, set the default gateway to the IP address of the VRRP interface on the master device. For example:

```
(config)> network interface eth ipv4 gateway 192.168.3.1
(config)>
```

- c. For backup devices, enable and configure SureLink on the VRRP interface.
- i. Determine the VRRP interface. Generally, this should be a LAN interface; VRRP+ will then monitor the LAN using SureLink to determine if the interface has network connectivity and promote a backup to master if SureLink fails.

```
(config)> show network vrrp VRRP_test interface
/network/interface/eth
(config)>
```

- ii. Enable SureLink on the interface:

```
(config)> network interface eth ipv4 surelink enable true
(config)>
```

- iii. Set the amount of time to wait between connectivity tests:

```
(config)> network interface eth ipv4 surelink interval value
(config)>
```

where *value* is any number of weeks, days, hours, minutes, or seconds, and takes the format ***number{w|d|h|m|s}***.

For example, to set **interval** to ten minutes, enter **5s**:

```
(config)> network interface eth ipv4 surelink interval 5s
(config)>
```

- iv. Create a SureLink test target:

```
(config)> add network interface eth ipv4 surelink target end
(config network interface eth ipv4 surelink target 0)>
```

- v. Configure the type of test for the test target:

```
(config network interface eth ipv4 surelink target 0)> test value
(config network interface eth ipv4 surelink target 0)>
```

where *value* is one of:

- **ping**: Tests connectivity by sending an ICMP echo request to a specified hostname or IP address.

- Specify the hostname or IP address:

```
(config network interface eth ipv4 surelink target 0)> ping_host host
(config network interface eth ipv4 surelink target 0)>
```

- (Optional) Set the size, in bytes, of the ping packet:

```
(config network interface eth ipv4 surelink target 0)> ping_size [num]
(config network interface eth ipv4 surelink target 0)>
```

- **dns:** Tests connectivity by sending a DNS query to the specified DNS server.
 - Specify the DNS server. Allowed value is the IP address of the DNS server.

```
(config network interface eth ipv4 surelinktarget 0)> dns_server ip_address
(config network interface eth ipv4 surelinktarget 0)>
```

- **dns_configured:** Tests connectivity by sending a DNS query to the DNS servers configured for this interface.
- **http:** Tests connectivity by sending an HTTP or HTTPS GET request to the specified URL.
 - Specify the url:

```
(config network interface eth ipv4 surelink target 0)> http_url value
(config network interface eth ipv4 surelink target 0)>
```

where *value* uses the format **http[s]://hostname/[path]**

- **interface_up:** The interface is considered to be down based on the interfaces down time, and the amount of time an initial connection to the interface takes before this test is considered to have failed.
 - (Optional) Set the amount of time that the interface can be down before this test is considered to have failed:

```
(config network interface eth ipv4 surelink target 0)> interface_down_time value
(config network interface eth ipv4 surelink target 0)>
```

where *value* is any number of weeks, days, hours, minutes, or seconds, and takes the format **number{w|d|h|m|s}**.

For example, to set **interface_down_time** to ten minutes, enter either **10m** or **600s**:

```
(config network interface eth ipv4 surelink target 0)> interface_down_time 600s
(config network interface eth ipv4 surelink target 0)>
```

The default is 60 seconds.

- (Optional) Set the amount of time to wait for an initial connection to the interface before this test is considered to have failed:

```
(config network interface eth ipv4 surelink target 0)> interface_timeout value
(config network interface eth ipv4 surelink target 0)>
```

where *value* is any number of weeks, days, hours, minutes, or seconds, and takes the format **number{w|d|h|m|s}**.

For example, to set **interface_timeout** to ten minutes, enter either **10m** or **600s**:

```
(config network interface eth ipv4 surelink target 0)> interface_timeout 600s
(config network interface eth ipv4 surelink target 0)>
```

The default is 60 seconds.

9. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

10. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Example: VRRP/VRRP+ configuration

This example configuration creates a VRRP pool containing two XBee Hive devices:



Configure device one (master device)



Task 1: Configure VRRP on device one

1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

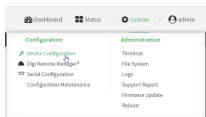
Remote Manager:

- a. Locate your device as described in [Use Digi Remote Manager to view and manage your device](#).
- b. Click the **Device ID**.
- c. Click **Settings**.

- d. Click to expand **Config**.

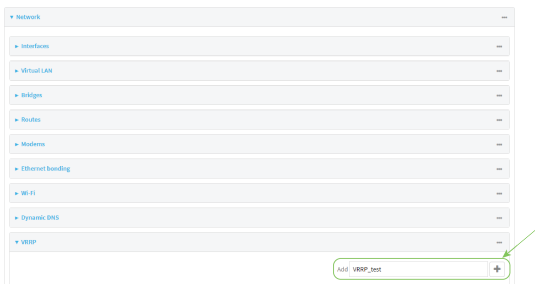
Local Web UI:

- a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

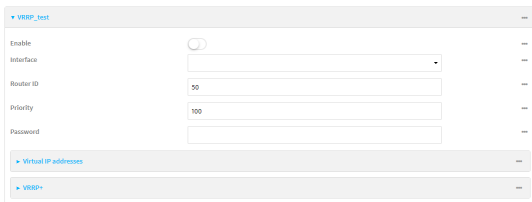


The **Configuration** window is displayed.

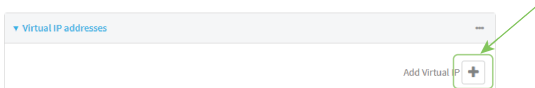
3. Click **Network > VRRP**.
4. For **Add VRRP instance**, type a name for the VRRP instance and click .



The new VRRP instance configuration is displayed.



5. Click **Enable**.
6. For **Interface**, select **Interface: ETH**.
7. For **Router ID**, leave at the default setting of **50**.
8. For **Priority**, leave at the default setting of **100**.
9. Click to expand **Virtual IP addresses**.
10. Click  to add a virtual IP address.

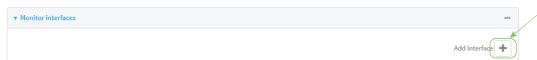


11. For **Virtual IP**, type **192.168.3.3**.

Task 2: Configure VRRP+ on device one

1. Click to expand **VRRP+**.
2. Click **Enable**.
3. Click to expand **Monitor interfaces**.

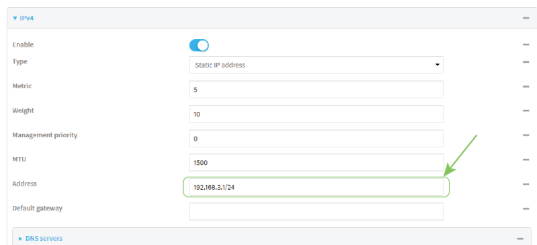
- Click  to add an interface for monitoring.



- Select **Interface: Modem**.
- For **Priority modifier**, type 30.

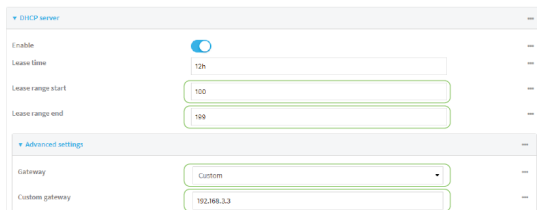
Task 3: Configure the IP address for the VRRP interface, ETH, on device one

- Click **Network > Interfaces > ETH > IPv4**
- For **Address**, type 192.168.3.1/24.



Task 4: Configure the DHCP server for ETH on device one

- Click to expand **Network > Interfaces > ETH > IPv4 > DHCP Server**
- For **Lease range start**, leave at the default of 100.
- For **Lease range end**, type 199.
- Click to expand **Advanced settings**.
- For **Gateway**, select **Custom**.
- For **Custom gateway**, enter 192.168.3.3.



- Click **Apply** to save the configuration and apply the change.

Command line

Task 1: Configure VRRP on device one

- Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Create the VRRP instance:

```
(config)> add network vrrp VRRP_test
(config network vrrp VRRP_test)>
```

4. Enable the VRRP instance:

```
(config network vrrp VRRP_test)> enable true
(config network vrrp VRRP_test)>
```

5. Set the VRRP interface to ETH:

```
(config network vrrp VRRP_test)> interface /network/interface/eth
(config network vrrp VRRP_test)>
```

6. Add the virtual IP address associated with this VRRP instance.

```
(config network vrrp VRRP_test)> add virtual_address end 192.168.3.3
(config network vrrp VRRP_test)>
```

Task 2: Configure VRRP+ on device one

1. Enable VRRP+:

```
(config network vrrp VRRP_test)> vrrp_plus enable true
(config network vrrp VRRP_test )>
```

2. Add the interface to monitor:

```
(config network vrrp VRRP_test)> add vrrp_plus monitor_interface end /network/interface/modem
xbee_cellular
(config network vrrp VRRP_test)>
```

3. Set the amount that the device's priority should be decreased or increased due to SureLink connectivity failure or success to **30**:

```
(config network vrrp VRRP_test )> network vrrp VRRP_test vrrp_plus weight 30
(config network vrrp VRRP_test )>
```

Task 3: Configure the IP address for the VRRP interface, ETH, on device one

1. Type ... to return to the root of the config prompt:

```
(config network vrrp VRRP_test )> ...
(config)>
```

2. Set the IP address for ETH:

```
(config)> network interface eth ipv4 address 192.168.3.1/24
(config)>
```

Task 4: Configure the DHCP server for ETH on device one

1. Set the start and end addresses of the DHCP pool to use to assign DHCP addresses to clients:

- a. Set the start address to **100**:

```
(config)> network interface eth ipv4 dhcp_server lease_start 100
(config)>
```

- b. Set the end address to **199**:

```
(config)> network interface eth ipv4 dhcp_server lease_end 199
(config)>
```

2. Set the DHCP server gateway type to custom:

```
(config)> network interface eth ipv4 dhcp_server advanced gateway custom
(config)>
```

3. Set the custom gateway to **192.168.3.3**:

```
(config)> network interface eth ipv4 dhcp_server advanced gateway_custom 192.168.3.3
(config)>
```

4. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

5. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Configure device two (backup device)



Web

Task 1: Configure VRRP on device two

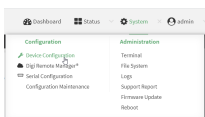
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

Remote Manager:

- a. Locate your device as described in [Use Digi Remote Manager to view and manage your device](#).
- b. Click the **Device ID**.
- c. Click **Settings**.
- d. Click to expand **Config**.

Local Web UI:

- a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

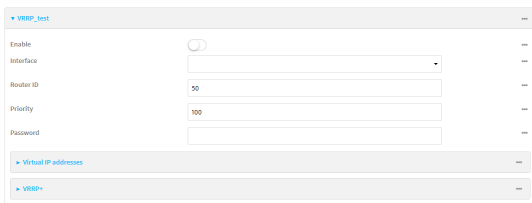


The **Configuration** window is displayed.

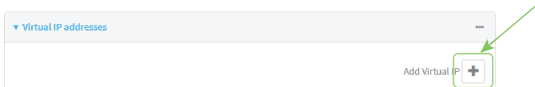
3. Click **Network > VRRP**.
4. For **Add VRRP instance**, type a name for the VRRP instance and click 



The new VRRP instance configuration is displayed.



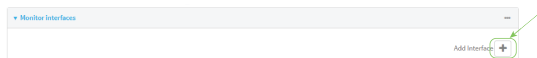
5. Click **Enable**.
6. For **Interface**, select **Interface: ETH**.
7. For **Router ID**, leave at the default setting of **50**.
8. For **Priority**, type **80**.
9. Click to expand **Virtual IP addresses**.
10. Click  to add a virtual IP address.



11. For **Virtual IP**, type **192.168.3.3**.

Task 2: Configure VRRP+ on device two

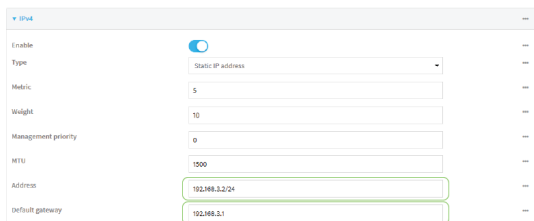
1. Click to expand **VRRP+**.
2. Click **Enable**.
3. Click to expand **Monitor interfaces**.
4. Click  to add an interface for monitoring.



5. Select **Interface: Modem**.
6. Click to enable **Monitor VRRP+ master**.
7. For **Priority modifier**, type 30.

Task 3: Configure the IP address for the VRRP interface, ETH, on device two

1. Click **Network > Interfaces > ETH > IPv4**
2. For **Address**, type 192.168.3.2/24.
3. For **Default gateway**, type the IP address of the VRRP interface on the master device, configured above in [Task 3, step 2](#) (192.168.3.1).

**Task 4: Configure SureLink for ETH on device two**

1. Click **Network > Interfaces > ETH > IPv4 > SureLink**.
2. Click **Enable**.
3. For **Interval**, type 15s.
4. Click to expand **Test targets > Test target**.
5. For **Test Type**, select **Ping test**.

- For **Ping host**, type <https://remotemanager.digi.com>.

Task 5: Configure the DHCP server for ETH on device two

- Click to expand **Network > Interfaces > ETH > IPv4 > DHCP Server**
- For **Lease range start**, type 200.
- For **Lease range end**, type 250.
- Click **Advanced settings**.
- For **Gateway**, select **Custom**.
- For **Custom gateway**, enter 192.168.3.3.

- Click **Apply** to save the configuration and apply the change.

Command line

Task 1: Configure VRRP on device two

- Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
- At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Create the VRRP instance:

```
(config)> add network vrrp VRRP_test  
(config network vrrp VRRP_test)>
```

4. Enable the VRRP instance:

```
(config network vrrp VRRP_test)> enable true  
(config network vrrp VRRP_test)>
```

5. Set the VRRP interface to ETH:

```
(config network vrrp VRRP_test)> interface /network/interface/eth  
(config network vrrp VRRP_test)>
```

6. Add the virtual IP address associated with this VRRP instance.

```
(config network vrrp VRRP_test)> add virtual_address end 192.168.3.3  
(config network vrrp VRRP_test)>
```

Task 2: Configure VRRP+ on device two

1. Enable VRRP+:

```
(config network vrrp VRRP_test)> vrrp_plus enable true  
(config network vrrp VRRP_test)>
```

2. Add the interface to monitor:

```
(config network vrrp VRRP_test)> add vrrp_plus monitor_interface end /network/interface/modem  
xbee_cellular  
(config network vrrp VRRP_test)>
```

3. Enable the ability to monitor the master device:

```
(config network vrrp VRRP_test)> vrrp_plus monitor_master true  
(config network vrrp VRRP_test)>
```

4. Set the amount that the device's priority should be decreased or increased due to SureLink connectivity failure or success to **30**:

```
(config network vrrp VRRP_test)> network vrrp VRRP_test vrrp_plus weight 30  
(config network vrrp VRRP_test)>
```

Task 3: Configure the IP address for the VRRP interface, ETH, on device two

1. Type ... to return to the root of the config prompt:

```
(config network vrrp VRRP_test)> ...  
(config)>
```

2. Set the IP address for ETH:

```
(config)> network interface eth ipv4 address 192.168.3.2
(config)>
```

3. Set the default gateway to the IP address of the VRRP interface on the master device, configured above in [Task 3, step 2](#) (192.168.3.1).

```
(config)> network interface eth ipv4 gateway 192.168.3.1
(config)>
```

Task 4: Configure SureLink for ETH on device two

1. Enable SureLink on the ETH interface:

```
(config)> network interface eth ipv4 surelink enable true
(config)>
```

2. Create a SureLink test target:

```
(config)> add network interface eth ipv4 surelink target end
(config network interface eth ipv4 surelink target 0)>
```

3. Set the type of test to ping:

```
(config network interface eth ipv4 surelink target 0)> test ping
(config network interface eth ipv4 surelink target 0)>
```

4. Set <https://remotemanager.digi.com> as the hostname to ping:

```
(config network interface eth ipv4 surelink target 0)> ping_host https://remotemanager.digi.com
(config network interface eth ipv4 surelink target 0)>
```

Task 5: Configure the DHCP server for ETH on device two

1. Type ... to return to the root of the configuration prompt:

```
(config network interface eth ipv4 surelink target 0)> ...
(config)>
```

2. Set the start and end addresses of the DHCP pool to use to assign DHCP addresses to clients:

- a. Set the start address to **200**:

```
(config)> network interface eth ipv4 dhcp_server lease_start 200
(config)>
```

- b. Set the end address to **250**:

```
(config)> network interface eth ipv4 dhcp_server lease_end 250
(config)>
```

3. Set the DHCP server gateway type to custom:

```
(config)> network interface eth ipv4 dhcp_server advanced gateway custom
(config)>
```

4. Set the custom gateway to **192.168.3.3**:

```
(config)> network interface eth ipv4 dhcp_server advanced gateway_custom 192.168.3.3
(config)>
```

5. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

6. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Show VRRP status and statistics

This section describes how to display VRRP status and statistics for a Digi XBee Hive Gateway device. VRRP status is available from the Web UI only.

Web

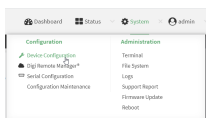
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

Remote Manager:

- a. Locate your device as described in [Use Digi Remote Manager to view and manage your device](#).
- b. Click the **Device ID**.
- c. Click **Settings**.
- d. Click to expand **Config**.

Local Web UI:

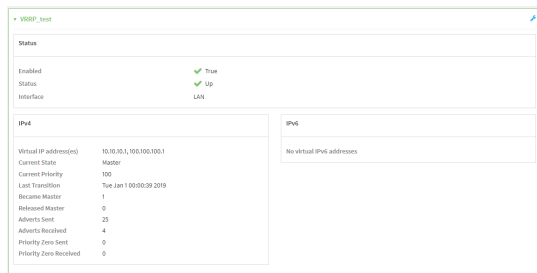
- a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



The **Configuration** window is displayed.

3. Click **Status > VRRP**.

The **Virtual Router Redundancy Protocol** window is displayed.



Command line

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the Admin CLI prompt, type **show vrrp**:

```
> show vrrp

VRRP    Status Proto State Virtual IP
-----
VRRP_test Up    IPv4 Backup 10.10.10.1
VRRP_test Up    IPv4 Backup 100.100.100.1
>
```

3. To display additional information about a specific VRRP instance, at the Admin CLI prompt, type **show vrrp name name**:

```
> show vrrp name VRRP_test

VRRP_test VRRP Status
-----
Enabled      : True
Status       : Up
Interface    : lan

IPv4
----
Virtual IP address(es) : 10.10.10.1, 100.100.100.1
Current State      : Master
Current Priority    : 100
Last Transition    : Tue Jan 1 00:00:39 2019
Became Master      : 1
Released Master    : 0
Adverts Sent       : 71
Adverts Received   : 4
Priority Zero Sent  : 0
Priority zero Received : 0
```

>

Virtual Private Networks (VPN)

Virtual Private Networks (VPNs) are used to securely connect two private networks together so that devices can connect from one network to the other using secure channels.

This chapter contains the following topics:

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L2TPv3 Ethernet	553
MACsec	558
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IPsec

IPsec is a suite of protocols for creating a secure communication link—an IPsec tunnel—between a host and a remote IP network or between two IP networks across a public network such as the Internet.

IPsec data protection

IPsec protects the data being sent across a public network by providing the following:

Data origin authentication

Authentication of data to validate the origin of data when it is received.

Data integrity

Authentication of data to ensure it has not been modified during transmission.

Data confidentiality

Encryption of data sent across the IPsec tunnel to ensure that an unauthorized device cannot read the data.

Anti-Replay

Authentication of data to ensure an unauthorized device has not injected it into the IPsec tunnel.

IPsec mode

The XBee Hive supports IPsec mode. You can set this mode to run using either the **Tunnel** or **Transport** options.

Tunnel

The entire IP packet is encrypted and/or authenticated and then encapsulated as the payload in a new IP packet.

Transport

Only the payload of the IP packet is encrypted and/or authenticated. The IP header is left untouched. This mode has limitations when using an authentication header, because the IP addresses in the IP header cannot be translated (for example, with Network Address Translation (NAT), as it would invalidate the authentication hash value.

Internet Key Exchange (IKE) settings

IKE is a key management protocol that allows IPsec to negotiate the security associations (SAs) that are used to create the secure IPsec tunnel. Both IKEv1 and IKEv2 are supported.

SA negotiations are performed in two phases, known as **phase 1** and **phase 2**.

Phase 1

In phase 1, IKE creates a secure authenticated communication channel between the device and the peer (the remote device which is at the other end of the IPsec tunnel) using the configured pre-shared key and the Diffie-Hellman key exchange. This creates the IKE SAs that are used to encrypt further IKE communications.

For IKEv1, there are two modes for the phase 1 negotiation: **Main mode** and **Aggressive mode**. IKEv2 does not use these modes.

Main mode

Main mode is the default mode. It is slower than aggressive mode, but more secure, in that all sensitive information sent between the device and its peer is encrypted.

Aggressive mode

Aggressive mode is faster than main mode, but is not as secure as main mode, because the device and its peer exchange their IDs and hash information in clear text instead of being encrypted. Aggressive mode is usually used when one or both of the devices have a dynamic external IP address.

Phase 2

In phase 2, IKE negotiates the SAs for IPsec. This creates two unidirectional SAs, one for each direction. Once the phase 2 negotiation is complete, the IPsec tunnel should be fully functional.

IPsec and IKE renegotiation

To reduce the chances of an IPsec tunnel being compromised, the IPsec SAs and IKE SA are renegotiated at a regular interval. This results in different encryption keys being used in the IPsec tunnel.

Authentication

Client authentication

XAUTH (extended authentication) pre-shared key authentication mode provides additional security by using client authentication credentials in addition to the standard pre-shared key. The XBee Hive device can be configured to authenticate with the remote peer as an XAUTH client.

RSA Signatures

With RSA signatures authentication, the XBee Hive device uses a private RSA key to authenticate with a remote peer that is using a corresponding public key.

Certificate-based Authentication

X.509 certificate-based authentication makes use of private keys on both the server and client which are secured and never shared. Both the server and client have a certificate which is generated with their respective private key and signed by a Certificate Authority (CA).

The XBee Hive implementation of IPsec can be configured to use X.509 certificate-based authentication using the private keys and certificates, along with a root CA certificate from the signing authority and, if available, a Certificate Revocation List (CRL).

Configure an IPsec tunnel

Configuring an IPsec tunnel with a remote device involves configuring the following items:

Required configuration items

■ IPsec tunnel configuration items:

- A name for the tunnel.

Note If the tunnel name is more than eight characters, the name will be truncated in the underlying network interface to the first six characters followed by three digits, incrementing from 000. This affects any custom scripts or firewall rules that may be trying to adjust the tunnel's interface or routing table entries.

- The mode: either tunnel or transport.

- Enable the IPsec tunnel.
The IPsec tunnel is enabled by default.
- The firewall zone of the IPsec tunnel.
- The routing metric for routes associated with this IPsec tunnel.
- The authentication type and pre-shared key or other applicable keys and certificates.
If SCEP certificates will be selected as the Authentication type, create the SCEP client prior to configuring the IPsec tunnel. See [Configure a Simple Certificate Enrollment Protocol client](#) for instructions.
- The local endpoint type and ID values, and the remote endpoint host and ID values.
- **IKE configuration items**
 - The IKE version, either IKEv1 or IKEv2.
 - Whether to initiate a key exchange or wait for an incoming request.
 - The IKE mode, either main aggressive.
 - The IKE authentication protocol to use for the IPsec tunnel negotiation during phase 1 and phase 2.
 - The IKE encryption protocol to use for the IPsec tunnel negotiation during phase 1 and phase 2.
 - The IKE Diffie-Hellman group to use for the IPsec tunnel negotiation during phase 1 and phase 2.
- Enable dead peer detection and configure the delay and timeout.
- Destination networks that require source NAT.
- Active recovery configuration. See [Configure SureLink active recovery for IPsec](#) for information about IPsec active recovery.

Additional configuration items

The following additional configuration settings are not typically configured to get an IPsec tunnel working, but can be configured as needed:

- Determine whether the device should use UDP encapsulation even when it does not detect that NAT is being used.
- If using IPsec failover, identify the primary tunnel during configuration of the backup tunnel.
- The Network Address Translation (NAT) keep alive time.
- The protocol, either Encapsulating Security Payload (ESP) or Authentication Header (AH).
- The management priority for the IPsec tunnel interface. The active interface with the highest management priority will have its address reported as the preferred contact address for central management and direct device access.
- Enable XAUTH client authentication, and the username and password to be used to authenticate with the remote peer.
- Enable Mode-configuration (MODECFG) to receive configuration information, such as the private IP address, from the remote peer.
- Disable the padding of IKE packets. This should normally not be done except for compatibility purposes.
- Destination networks that require source NAT.

- Depending on your network and firewall configuration, you may need to add a packet filtering rule to allow incoming IPsec traffic.
- **Tunnel and key renegotiating**
 - The lifetime of the IPsec tunnel before it is renegotiated.
 - The amount of time before the IKE phase 1 lifetime expires.
 - The amount of time before the IKE phase 2 lifetime expires
 - The lifetime margin, a randomizing amount of time before the IPsec tunnel is renegotiated.

Note If the remote networks for an IPsec tunnel overlap with the networks for a WAN internet connection (wired, cellular, or otherwise), you must configure a static route to direct the traffic either through the IPsec tunnel, or through the WAN (outside of the IPsec tunnel). See [Configure a static route](#) for information about configuring a static route.

Web

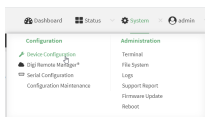
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

Remote Manager:

- a. Locate your device as described in [Use Digi Remote Manager to view and manage your device](#).
- b. Click the **Device ID**.
- c. Click **Settings**.
- d. Click to expand **Config**.

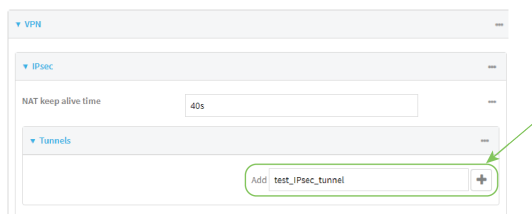
Local Web UI:

- a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



The **Configuration** window is displayed.

3. Click **VPN > IPsec**.
4. Click to expand **Tunnels**.
5. For **Add IPsec tunnel**, type a name for the tunnel and click .



The new IPsec tunnel configuration is displayed.

6. The IPsec tunnel is enabled by default. To disable, toggle off **Enable**.
7. (Optional) **Preferred tunnel** provides an optional mechanism for IPsec failover behavior. See [Configure IPsec failover](#) for more information.
8. (Optional) Enable **Force UDP encapsulation** to force the tunnel to use UDP encapsulation even when it does not detect that NAT is being used.
9. For **Zone**, select the firewall zone for the IPsec tunnel. Generally this should be left at the default of **IPsec**.

Note Depending on your network configuration, you may need to add a packet filtering rule to allow incoming traffic. For example, for the **IPsec** zone:

- a. Click to expand **Firewall > Packet filtering**.
- b. For **Add packet filter**, click .
- c. For **Label**, type **Allow incoming IPsec traffic**.
- d. For **Source zone**, select **IPsec**.

Leave all other fields at their default settings.

10. For **Metric**, enter or select the priority of routes associated with this IPsec tunnel. When more than one active route matches a destination, the route with the lowest metric is used. The metric can also be used in tandem with SureLink to configure IPsec failover behavior. See [Configure IPsec failover](#) for more information.
11. For **Mode**, select **Tunnel mode**. **Transport mode** is not currently supported.

12. Select the Mode, either:
 - **Tunnel mode**: The entire IP packet is encrypted and/or authenticated and then encapsulated as the payload in a new IP packet.
 - **Transport mode**: Only the payload of the IP packet is encrypted and/or authenticated. The IP header is unencrypted.
13. Select the **Protocol**, either:
 - **ESP** (Encapsulating Security Payload): Provides encryption as well as authentication and integrity.
 - **AH** (Authentication Header): Provides authentication and integrity only.
14. **Strict routing** is disabled by default. Toggle on to enable.
 Strict routing makes IPsec behave like a policy-based VPN, rather than a route-based VPN.
15. Click to expand **Authentication**.

- a. For **Authentication type**, select one of the following:
 - **Pre-shared key**: Uses a pre-shared key (PSK) to authenticate with the remote peer.
 - i. Type the **Pre-shared key**.
 - **Asymmetric pre-shared keys**: Uses asymmetric pre-shared keys to authenticate with the remote peer.
 - i. For **Local key**, type the local pre-shared key. This must be the same as the remote key on the remote host.
 - ii. For **Remote key**, type the remote pre-shared key. This must be the same as the local key on the remote host.
 - **RSA signature**: Uses a private RSA key to authenticate with the remote peer.
 - i. For **Private key**, paste the device's private RSA key in PEM format.
 - ii. Type the **Private key passphrase** that is used to decrypt the private key. Leave blank if the private key is not encrypted.
 - iii. For **Peer public key**, paste the peer's public RSA key in PEM format.
 - **SCEP certificates**: Uses Simple Certificate Enrollment Protocol (SCEP) to download a private key, certificates, and an optional Certificate Revocation List (CRL) to the XBee Hive device from a SCEP server.
 You must create the SCEP client prior to configuring the IPsec tunnel. See [Configure a Simple Certificate Enrollment Protocol client](#) for instructions.
 - i. For **SCEP Client**, select the SCEP client.
 - **X.509 certificate**: Uses private key and X.509 certificates to authenticate with the remote peer.

- i. For **Private key**, paste the device's private RSA key in PEM format.
 - ii. Type the **Private key passphrase** that is used to decrypt the private key. Leave blank if the private key is not encrypted.
 - iii. For **Certificate**, paste the local X.509 certificate in PEM format.
 - iv. For Peer verification, select either:
 - **Peer certificate**: For **Peer certificate**, paste the peer's X.509 certificate in PEM format.
 - **Certificate Authority**: For **Certificate Authority chain**, paste the Certificate Authority (CA) certificates. These must include all peer certificates in the chain up to the root CA certificate, in PEM format.
16. (Optional) For **Management Priority**, set the management priority for this IPsec tunnel. A tunnel that is up and has the highest priority will be used for central management and direct device access.
17. (Optional) To configure the device to connect to its remote peer as an XAUTH client:
 - a. Click to expand **XAUTH client**.

The screenshot shows a configuration panel for the 'XAUTH client'. At the top, there is a header 'XAUTH client' with a dropdown arrow. Below it, there is a row with the label 'Enable' and a toggle switch that is currently turned off. Underneath the toggle, there are two input fields: one labeled 'Username' and one labeled 'Password'.

- b. Click **Enable**.
 - c. Type the **Username** and **Password** that the device will use to authenticate as an XAUTH client with the peer.
18. (Optional) Click **Enable MODECFG client** to receive configuration information, such as the private IP address, from the remote peer.
19. Click to expand **Local endpoint**.
 - a. For **Type**, select either:
 - **Default route**: Uses the same network interface as the default route.
 - **Interface**: Select the **Interface** to be used as the local endpoint.
 - b. Click to expand **ID**.
 - i. Select the ID type:
 - **Auto**: The ID will be automatically determined from the value of the tunnels endpoints.
 - **Raw**: Enter an ID and have it passed unmodified to the underlying IPsec stack.
For **Raw ID value**, type the ID that will be passed.
 - **Any**: Any ID will be accepted.
 - **IPv4**: The ID will be interpreted as an IP address and sent as an ID_IPV4_ADDR IKE identity.
For **IPv4 ID value**, type an IPv4 formatted ID. This can be a fully-qualified domain name or an IPv4 address.

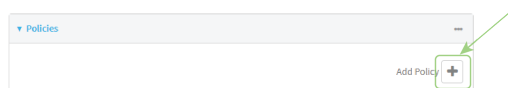
- **IPv6:** The ID will be interpreted as an IP address and sent as an ID_IPV6_ADDR IKE identity.
For **IPv6 ID value**, type an IPv6 formatted ID. This can be a fully-qualified domain name or an IPv6 address.
 - **RFC822/Email:** The ID will be interpreted as an RFC822 (email address).
For **RFC822 ID value**, type the ID in internet email address format.
 - **FQDN:** The ID will be interpreted as FQDN (Fully Qualified Domain Name) and sent as an ID_FQDN IKE identity.
For **FQDN ID value**, type the ID as an FQDN.
 - **KeyID:** The ID will be interpreted as a Key ID and sent as an ID_KEY_ID IKE identity.
For **KEYID ID value**, type the key ID.
 - **MAC address:** The device's primary MAC address will be used as the ID and sent as a ID_KEY_ID IKE identity.
 - **Serial number:** The device's serial number will be used as the ID and sent as a ID_KEY_ID IKE identity.
- 20. Click to expand **Remote endpoint**.
 - a. For **IP version**, select either **IPv4** or **IPv6**.
 - b. For **PeersHostname list selection**, select one of the following:
 - **Round robin:** Attempts to connect to hostnamespeers sequentially based on the list order.
 - **Random:** Randomly selects an IPsec peer to connect to from the hostnamespeers list.
 - **Priority ordered:** Selects the first hostnamespeers in the list that is resolvable.
 - c. Click to expand **PeersHostname**.
 - i. Click  to add a peernext to **Add Hostname**.
 - ii. For **Hostname**, type a hostname or IPv4 address. If your device is not configured to initiate the IPsec connection (see **IKE > [Initiate connection](#)**), you can also use the keyword **any**, which means that the hostname is dynamic or unknown.
 - iii. Click  again to add additional peershostnames.
 - d. Click to expand **ID**.
 - i. Select the ID type:
 - **Auto:** The ID will be automatically determined from the value of the tunnels endpoints.
 - **Raw:** Enter an ID and have it passed unmodified to the underlying IPsec stack.
For **Raw ID value**, type the ID that will be passed.
 - **Any:** Any ID will be accepted.
 - **IPv4:** The ID will be interpreted as an IPv4 address and sent as an ID_IPV4_ADDR IKE identity.
For **IPv4 ID value**, type an IPv4 formatted ID. This can be a fully-qualified domain name or an IPv4 address.

- **IPv6:** The ID will be interpreted as an IPv6 address and sent as an ID_IPV6_ADDR IKE identity.
For **IPv6 ID value**, type an IPv6 formatted ID. This can be a fully-qualified domain name or an IPv6 address.
- **RFC822/Email:** The ID will be interpreted as an RFC822 (email address).
For **RFC822 ID value**, type the ID in internet email address format.
- **FQDN:** The ID will be interpreted as FQDN (Fully Qualified Domain Name) and sent as an ID_FQDN IKE identity.
For **FQDN ID value**, type the ID as an FQDN.
- **KeyID:** The ID will be interpreted as a Key ID and sent as an ID_KEY_ID IKE identity.
For **KEYID ID value**, type the key ID.
- **MAC address:** The device's primary MAC address will be used as the ID and sent as a ID_KEY_ID IKE identity.
- **Serial number:** The device's serial number will be used as the ID and sent as a ID_KEY_ID IKE identity.

21. Click to expand **Policies**.

Policies define the network traffic that will be encapsulated by this tunnel.

- a. Click  to create a new policy.



The new policy configuration is displayed.

- b. Click to expand **Local traffic selector**.

- c. For **Type**, select one of the following:

- **Address:** The address of a local network interface.
For **Address**, select the appropriate interface.
- **Network:** The subnet of a local network interface.
For **Address**, select the appropriate interface.
- **Custom network:** A user-defined network.
For **Custom network**, enter the IPv4 address and optional netmask.
- **Request a network:** Requests a network from the remote peer.
- **Dynamic:** Uses the address of the local endpoint.

d. For **Protocol**, select one of the following:

- **Any**: Matches any protocol.
- **TCP**: Matches TCP protocol only.
- **UDP**: Matches UDP protocol only.
- **ICMP**: Matches ICMP requests only.
- **Other protocol**: Matches an unlisted protocol.

If **Other protocol** is selected, type the number of the protocol.

e. For **Port**, type the port matching criteria.

Allowed values are a port number, a range of port numbers, or **any**.

f. (Optional) Click to expand **Remote traffic selector**.

g. For **Remote network**, enter the IP address and optional netmask of the remote network.

h. For **Protocol**, select one of the following:

- **Any**: Matches any protocol.
- **TCP**: Matches TCP protocol only.
- **UDP**: Matches UDP protocol only.
- **ICMP**: Matches ICMP requests only.
- **Other protocol**: Matches an unlisted protocol.

If **Other protocol** is selected, type the number of the protocol.

i. For **Port**, type the port matching criteria.

Allowed values are a port number, a range of port numbers, or **any**.

22. Click to expand **IKE**.

a. For **IKE version**, select either IKEv1 or IKEv2. This setting must match the peer's IKE version.

b. **Initiate connection** instructs the device to initiate the key exchange, rather than waiting for an incoming request. This must be disabled if **Remote endpoint** > **Hostname** is set

to **any**. This must be disabled if the **ID Type** parameter for the **Peer ID** is set to **any**. (**Remote endpoint** > **Peers**. Click to expand a peer. Click to expand its **Peer ID**. Click to expand **ID**.)

- c. For **Mode**, select either **Main mode** or **Aggressive mode**.
- d. For **IKE fragmentation**, select one of the following:
 - **If supported by the peer**: Send oversized IKE messages in fragments, if the peer supports receiving them.
 - **Always**: Always send IKEv1 messages in fragments. For IKEv2, this option is equivalent to **If supported by the peer**.
 - **Never**: Do not send oversized IKE messages in fragments.
 - **Accept**: Do not send oversized IKE messages in fragments, but announce support for fragmentation to the peer.

The default is **Always**.

- e. For **Enable padding**, click to disable the padding of IKE packets. This should normally not be disabled except for compatibility purposes.
- f. For **Phase 1 lifetime**, enter the amount of time that the IKE security association expires after a successful negotiation and must be re-authenticated.
Allowed values are any number of weeks, days, hours, minutes, or seconds, and take the format **number{w|d|h|m|s}**.
For example, to set **Phase 1 lifetime** to ten minutes, enter **10m** or **600s**.
- g. For **Phase 2 lifetime**, enter the amount of time that the IKE security association expires after a successful negotiation and must be rekeyed.
Allowed values are any number of weeks, days, hours, minutes, or seconds, and take the format **number{w|d|h|m|s}**.
For example, to set **Phase 2 lifetime** to ten minutes, enter **10m** or **600s**.
- h. For **Lifetime margin**, enter a randomizing amount of time before the IPsec tunnel is renegotiated.
Allowed values are any number of weeks, days, hours, minutes, or seconds, and take the format **number{w|d|h|m|s}**.
For example, to set **Lifetime margin** to ten minutes, enter **10m** or **600s**.
- i. Click to expand **Phase 1 Proposals**.
 - i. Click  to create a new phase 1 proposal.
 - ii. For **Cipher**, select the type of encryption.
 - iii. For **Hash**, select the type of hash to use to verify communication integrity.
 - iv. For **Diffie-Hellman group**, select the type of Diffie-Hellman group to use for key exchange.
 - v. You can add additional Phase 1 proposals by clicking  next to **Add Phase 1 Proposal**.
- j. Click to expand **Phase 2 Proposals**.
 - i. Click  to create a new phase 2 proposal.
 - ii. For **Cipher**, select the type of encryption.
 - iii. For **Hash**, select the type of hash to use to verify communication integrity.

- iv. For **Diffie-Hellman group**, select the type of Diffie-Hellman group to use for key exchange.
 - v. You can add additional Phase 2 proposals by clicking  next to **Add Phase 2 Proposal**.
- 23. (Optional) Click to expand **Dead peer detection**. Dead peer detection is enabled by default. Dead peer detection uses periodic IKE transmissions to the remote endpoint to detect whether tunnel communications have failed, allowing the tunnel to be automatically restarted when failure occurs.
 - a. To enable or disable dead peer detection, click **Enable**.
 - b. For **Delay**, type the number of seconds between transmissions of dead peer packets. Dead peer packets are only sent when the tunnel is idle.
 - c. For **Timeout**, type the number of seconds to wait for a response from a dead peer packet before assuming the tunnel has failed.
- 24. (Optional) Click to expand **NAT** to create a list of destination networks that require source NAT.
 - a. Click  next to **Add NAT destination**.
 - b. For **Destination network**, type the IPv4 address and optional netmask of a destination network that requires source NAT. You can also use **any**, meaning that any destination network connected to the tunnel will use source NAT.
- 25. See [Configure SureLink active recovery for IPsec](#) for information about IPsec **Active recovery**.
- 26. (Optional) Click **Advanced** to set various IPsec-related time out, keep alive, and related values.
- 27. Click **Apply** to save the configuration and apply the change.

Command line

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the Xbee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Add an IPsec tunnel. For example, to add an IPsec tunnel named **ipsec_example**:

```
(config)> add vpn ipsec tunnel ipsec_example
(config vpn ipsec tunnel ipsec_example)>
```

The IPsec tunnel is enabled by default. To disable:

```
(config vpn ipsec tunnel ipsec_example)> enable false
(config vpn ipsec tunnel ipsec_example)>
```

4. (Optional) Set the tunnel to use UDP encapsulation even when it does not detect that NAT is being used:

```
(config vpn ipsec tunnel ipsec_example)> force_udp_encap true
(config vpn ipsec tunnel ipsec_example)>
```

5. Set the firewall zone for the IPsec tunnel. Generally this should be left at the default of **ipsec**.

```
(config vpn ipsec tunnel ipsec_example)> zone zone
(config vpn ipsec tunnel ipsec_example)>
```

To view a list of available zones:

```
(config vpn ipsec tunnel ipsec_example)> zone ?
```

Zone: The firewall zone assigned to this IPsec tunnel. This can be used by packet filtering rules and access control lists to restrict network traffic on this tunnel.

Format:

```
any
dynamic_routes
edge
external
internal
ipsec
loopback
setup
```

Default value: ipsec

Current value: ipsec

```
(config vpn ipsec tunnel ipsec_example)>
```

Note Depending on your network configuration, you may need to add a packet filtering rule to allow incoming traffic. For example, for the **IPsec** zone:

- a. Type ... to move to the root of the configuration:

```
(config vpn ipsec tunnel ipsec_example)> ...
(config)>
```

- b. Add a packet filter:

```
(config)> add firewall filter end
(config firewall filter 2)>
```

- c. Set the label to **Allow incoming IPsec traffic**:

```
(config config firewall filter 2)> label "Allow incoming IPsec traffic"
(config firewall filter 2)>
```

- d. Set the source zone to **ipsec**:

```
(config config firewall filter 2)> src_zone ipsec
(config firewall filter 2)>
```

6. Set the metric for the IPsec tunnel. When more than one active route matches a destination, the route with the lowest metric is used. The metric can also be used in tandem with SureLink to configure IPsec failover behavior. See [Configure IPsec failover](#) for more information.

```
(config vpn ipsec tunnel ipsec_example)> metric value
(config vpn ipsec tunnel ipsec_example)>
```

where *value* is any integer between **0** and **65535**.

7. Set the mode:

```
(config vpn ipsec tunnel ipsec_example)> mode mode
(config vpn ipsec tunnel ipsec_example)>
```

where *mode* is either:

- **tunnel**: The entire IP packet is encrypted and/or authenticated and then encapsulated as the payload in a new IP packet.
- **transport**: Only the payload of the IP packet is encrypted and/or authenticated. The IP header is unencrypted.

The default is **tunnel**.

8. Set the protocol:

```
(config vpn ipsec tunnel ipsec_example)> type protocol
(config vpn ipsec tunnel ipsec_example)>
```

where *protocol* is either:

- **esp** (Encapsulating Security Payload): Provides encryption as well as authentication and integrity.
- **ah** (Authentication Header): Provides authentication and integrity only.

The default is **esp**.

9. (Optional) Set the management priority for this IPsec tunnel:

```
(config vpn ipsec tunnel ipsec_example)> mgmt value
(config vpn ipsec tunnel ipsec_example)>
```

where *value* is any interger between **0** and **1000**.

10. Set the authentication type:

```
(config vpn ipsec tunnel ipsec_example)> auth type value
(config vpn ipsec tunnel ipsec_example)>
```

where *value* is one of:

- **secret**: Uses a pre-shared key (PSK) to authenticate with the remote peer.
 - a. Set the pre-shared key:

```
(config vpn ipsec tunnel ipsec_example)> auth secret key
(config vpn ipsec tunnel ipsec_example)>
```

- **asymmetric-secrets**: Uses asymmetric pre-shared keys to authenticate with the remote peer.
 - a. Set the local pre-shared key. This must be the same as the remote key on the remote host.:

```
(config vpn ipsec tunnel ipsec_example)> auth local_secret key
(config vpn ipsec tunnel ipsec_example)>
```

- b. Set the remote pre-shared key. This must be the same as the local key on the remote host.:

```
(config vpn ipsec tunnel ipsec_example)> auth remote_secret key
(config vpn ipsec tunnel ipsec_example)>
```

- **rsasig**: Uses a private RSA key to authenticate with the remote peer.
 - a. For the **private_key** parameter, paste the device's private RSA key in PEM format:

```
(config vpn ipsec tunnel ipsec_example)> auth private_key key
(config vpn ipsec tunnel ipsec_example)>
```

- b. Set the private key passphrase that is used to decrypt the private key. Leave blank if the private key is not encrypted.

```
(config vpn ipsec tunnel ipsec_example)> auth private_key_passphrase passphrase
(config vpn ipsec tunnel ipsec_example)>
```

- c. For the **peer_public_key** parameter, paste the peer's public RSA key in PEM format:

```
(config vpn ipsec tunnel ipsec_example)> auth peer_public_key key
(config vpn ipsec tunnel ipsec_example)>
```

- **x509**: Uses private key and X.509 certificates to authenticate with the remote peer.

- a. For the **private_key** parameter, paste the device's private RSA key in PEM format:

```
(config vpn ipsec tunnel ipsec_example)> auth private_key key
(config vpn ipsec tunnel ipsec_example)>
```

- b. Set the private key passphrase that is used to decrypt the private key. Leave blank if the private key is not encrypted.

```
(config vpn ipsec tunnel ipsec_example)> auth private_key_passphrase passphrase
(config vpn ipsec tunnel ipsec_example)>
```

- c. For the **cert** parameter, paste the local X.509 certificate in PEM format:

```
(config vpn ipsec tunnel ipsec_example)> auth cert certificate
(config vpn ipsec tunnel ipsec_example)>
```

- d. Set the method for verifying the peer's X.509 certificate:

```
(config vpn ipsec tunnel ipsec_example)> auth peer_verify value
(config vpn ipsec tunnel ipsec_example)>
```

where *value* is either:

- **cert**: Uses the peer's X.509 certificate in PEM format for verification.
 - For the **peer_cert** parameter, paste the peer's X.509 certificate in PEM format:
- **ca**: Uses the Certificate Authority chain for verification.
 - For the **ca_cert** parameter, paste the Certificate Authority (CA) certificates. These must include all peer certificates in the chain up to the root CA certificate, in PEM format.

```
(config vpn ipsec tunnel ipsec_example)> auth ca_cert cert_chain
(config vpn ipsec tunnel ipsec_example)>
```

11. (Optional) Configure the device to connect to its remote peer as an XAUTH client:

- a. Enable XAUTH client functionality:

```
(config vpn ipsec tunnel ipsec_example)> xauth_client enable true
(config vpn ipsec tunnel ipsec_example)>
```

- b. Set the XAUTH client username:

```
(config vpn ipsec tunnel ipsec_example)> xauth_client username name
(config vpn ipsec tunnel ipsec_example)>
```

- c. Set the XAUTH client password:

```
(config vpn ipsec tunnel ipsec_example)> xauth_client password pwd
(config vpn ipsec tunnel ipsec_example)>
```

12. (Optional) Enable MODECFG client functionality:

MODECFG client functionality configures the device to receive configuration information, such as the private IP address, from the remote peer.

- a. Enable MODECFG client functionality:

```
(config vpn ipsec tunnel ipsec_example)> modecfg_client enable true
(config vpn ipsec tunnel ipsec_example)>
```

13. Configure the local endpoint:

- a. Set the method for determining the local network interface:

```
(config vpn ipsec tunnel ipsec_example)> local type value
(config vpn ipsec tunnel ipsec_example)>
```

where *value* is either:

- **defaultroute**: Uses the same network interface as the default route.
- **interface**: Select the **Interface** to be used as the local endpoint.

- b. Set the ID type:

```
(config vpn ipsec tunnel ipsec_example)> local id type value
(config vpn ipsec tunnel ipsec_example)>
```

where *value* is one of:

- **auto**: The ID will be automatically determined from the value of the tunnels endpoints.
- **raw**: Enter an ID and have it passed unmodified to the underlying IPsec stack.
Set the unmodified ID that will be passed:

```
(config vpn ipsec tunnel ipsec_example)> local id type raw_id id
(config vpn ipsec tunnel ipsec_example)>
```

- **any**: Any ID will be accepted.
- **ipv4**: The ID will be interpreted as an IPv4 address and sent as an ID_IPV4_ADDR IKE identity.
Set an IPv4 formatted ID. This can be a fully-qualified domain name or an IPv4 address.

```
(config vpn ipsec tunnel ipsec_example)> local id type ipv4_id id
(config vpn ipsec tunnel ipsec_example)>
```

- **ipv6:** The ID will be interpreted as an IPv6 address and sent as an ID_IPV6_ADDR IKE identity.

Set an IPv6 formatted ID. This can be a fully-qualified domain name or an IPv6 address.

```
(config vpn ipsec tunnel ipsec_example)> local id type ipv6_id id
(config vpn ipsec tunnel ipsec_example)>
```

- **rfc822:** The ID will be interpreted as an RFC822 (email address).

Set the ID in internet email address format:

```
(config vpn ipsec tunnel ipsec_example)> local id type rfc822_id id
(config vpn ipsec tunnel ipsec_example)>
```

- **fqdn:** The ID will be interpreted as FQDN (Fully Qualified Domain Name) and sent as an ID_FQDN IKE identity.

- **keyid:** The ID will be interpreted as a Key ID and sent as an ID_KEY_ID IKE identity.

Set the key ID:

```
(config vpn ipsec tunnel ipsec_example)> local id type keyid_id id
(config vpn ipsec tunnel ipsec_example)>
```

- **mac_address:** The device's MAC address will be used for the Key ID and sent as an ID_KEY_ID IKE identity.

- **serial_number:** The ID device's serial number will be used for the Key ID and sent as an ID_KEY_ID IKE identity.

14. Configure the remote endpoint:

- Add a remote hostnamespeer:

```
(config vpn ipsec tunnel ipsec_example)> add remote peers end
(config vpn ipsec tunnel ipsec_example remote peers 1)> hostname [value]

(config vpn ipsec tunnel ipsec_example)>
```

where *[value]* is the FQDN hostnamespeer or IPv4 address of the IPsec peer. If your device is not configured to initiate the IPsec connection (see Ike Initiate), you can also use the keyword any, which means that the hostnamespeer is dynamic or unknown.

Repeat for additional hostnamespeer.

- Set the hostnamespeer selection type:

```
(config vpn ipsec tunnel ipsec_example)> remote peer_selection value
(config vpn ipsec tunnel ipsec_example)>
```

where *value* is one of:

- **round_robin:** Attempts to connect to hostnamespeer sequentially based on the list order.
- **random:** Randomly selects an IPsec peer to connect to from the hostnamespeer

list.

- **priority:** Selects the first hostnamespeer in the list that is resolvable.

c. Set the ID type:

```
(config vpn ipsec tunnel ipsec_example)> remote id type value
(config vpn ipsec tunnel ipsec_example)>
```

where *value* is one of:

- **auto:** The ID will be automatically determined from the value of the tunnels endpoints.
- **raw:** Enter an ID and have it passed unmodified to the underlying IPsec stack.
Set the unmodified ID that will be passed:

```
(config vpn ipsec tunnel ipsec_example)> remote id type raw_id id
(config vpn ipsec tunnel ipsec_example)>
```

- **any:** Any ID will be accepted.
- **ipv4:** The ID will be interpreted as an IPv4 address and sent as an ID_IPV4_ADDR IKE identity.
Set an IPv4 formatted ID. This can be a fully-qualified domain name or an IPv4 address.

```
(config vpn ipsec tunnel ipsec_example)> remote id type ipv4_id id
(config vpn ipsec tunnel ipsec_example)>
```

- **ipv6:** The ID will be interpreted as an IPv6 address and sent as an ID_IPV6_ADDR IKE identity.
Set an IPv6 formatted ID. This can be a fully-qualified domain name or an IPv6 address.

```
(config vpn ipsec tunnel ipsec_example)> remote id type ipv6_id id
(config vpn ipsec tunnel ipsec_example)>
```

- **rfc822:** The ID will be interpreted as an RFC822 (email address).
Set the ID in internet email address format:

```
(config vpn ipsec tunnel ipsec_example)> remote id type rfc822_id id
(config vpn ipsec tunnel ipsec_example)>
```

- **fqdn:** The ID will be interpreted as FQDN (Fully Qualified Domain Name) and sent as an ID_FQDN IKE identity.
- **keyid:** The ID will be interpreted as a Key ID and sent as an ID_KEY_ID IKE identity.

Set the key ID:

```
(config vpn ipsec tunnel ipsec_example)> remote id type keyid_id id
(config vpn ipsec tunnel ipsec_example)>
```

- **mac_address:** The device's MAC address will be used for the Key ID and sent as an ID_KEY_ID IKE identity.
- **serial_number:** The ID device's serial number will be used for the Key ID and sent as an ID_KEY_ID IKE identity.

15. Configure IKE settings:

a. Set the IKE version:

```
(config vpn ipsec tunnel ipsec_example)> ike version value
(config vpn ipsec tunnel ipsec_example)>
```

where *value* is either **ikev1** or **ikev2**. This setting must match the peer's IKE version.

b. Determine whether the device should initiate the key exchange, rather than waiting for an incoming request. By default, the device will initiate the key exchange. This must be disabled if hostnamespeer is set to **any**. To disable:

```
(config vpn ipsec tunnel ipsec_example)> ike initiate false
(config vpn ipsec tunnel ipsec_example)>
```

c. Set the IKE phase 1 mode:

```
(config vpn ipsec tunnel ipsec_example)> ike mode value
(config vpn ipsec tunnel ipsec_example)>
```

where *value* is either **aggressive** or **main**.

d. Set the IKE fragmentation:

```
(config vpn ipsec tunnel ipsec_example)> ike fragmentation value
(config vpn ipsec tunnel ipsec_example)>
```

where *value* is one of:

- **if_supported:** Send oversized IKE messages in fragments, if the peer supports receiving them.
- **always:** Always send IKEv1 messages in fragments. For IKEv2, this option is equivalent to **if supported**.
- **never:** Do not send oversized IKE messages in fragments.
- **accept:** Do not send oversized IKE messages in fragments, but announce support for fragmentation to the peer.

The default is **always**.

e. Padding of IKE packets is enabled by default and should normally not be disabled except for compatibility purposes. To disable:

```
(config vpn ipsec tunnel ipsec_example)> ike pad false
(config vpn ipsec tunnel ipsec_example)>
```

f. Set the amount of time that the IKE security association expires after a successful negotiation and must be re-authenticated:

```
(config vpn ipsec tunnel ipsec_example)> ike phase1_lifetime value
(config vpn ipsec tunnel ipsec_example)>
```

where *value* is any number of weeks, days, hours, minutes, or seconds, and takes the format ***number{w|d|h|m|s}***.

For example, to set **phase1_lifetime** to ten minutes, enter either **10m** or **600s**:

```
(config vpn ipsec tunnel ipsec_example)> ike phase1_lifetime 600s
(config vpn ipsec tunnel ipsec_example)>
```

The default is three hours.

- g. Set the amount of time that the IKE security association expires after a successful negotiation and must be rekeyed.

```
(config vpn ipsec tunnel ipsec_example)> ike phase2_lifetime value
(config vpn ipsec tunnel ipsec_example)>
```

where *value* is any number of weeks, days, hours, minutes, or seconds, and takes the format ***number{w|d|h|m|s}***.

For example, to set **phase2_lifetime** to ten minutes, enter either **10m** or **600s**:

```
(config vpn ipsec tunnel ipsec_example)> ike phase2_lifetime 600s
(config vpn ipsec tunnel ipsec_example)>
```

The default is one hour.

- h. Set a randomizing amount of time before the IPsec tunnel is renegotiated:

```
(config vpn ipsec tunnel ipsec_example)> ike lifetime_margin value
(config vpn ipsec tunnel ipsec_example)>
```

where *value* is any number of weeks, days, hours, minutes, or seconds, and takes the format ***number{w|d|h|m|s}***.

For example, to set **lifetime_margin** to ten minutes, enter either **10m** or **600s**:

```
(config vpn ipsec tunnel ipsec_example)> ike lifetime_margin 600s
(config vpn ipsec tunnel ipsec_example)>
```

The default is nine minutes.

- i. Configure the types of encryption, hash, and Diffie-Hellman group to use during phase 1:

- i. Add a phase 1 proposal:

```
(config vpn ipsec tunnel ipsec_example)> add ike phase1_proposal end
(config vpn ipsec tunnel ipsec_example ike phase1_proposal 0)>
```

- ii. Set the type of encryption to use during phase 1:

```
(config vpn ipsec tunnel ipsec_example ike phase1_proposal 0)> cipher value
(config vpn ipsec tunnel ipsec_example ike phase1_proposal 0)>
```

where *value* is one of:

- **3des**
- **aes128**
- **aes128gcm128**
- **aes128gcm64**
- **aes128gcm96**
- **aes192**
- **aes192gcm128**
- **aes192gcm64**
- **aes192gcm96**
- **aes256**
- **aes256gcm128**
- **aes256gcm64**
- **aes256gcm96**
- **null**

The default is **3des**.

- iii. Set the type of hash to use during phase 1 to verify communication integrity:

```
(config vpn ipsec tunnel ipsec_example ike phase1_proposal 0)> hash value
(config vpn ipsec tunnel ipsec_example ike phase1_proposal 0)>
```

where *value* is one of:

- **md5**
- **sha1**
- **sha256**
- **sha384**
- **sha512**

The default is **sha1**.

- iv. Set the type of Diffie-Hellman group to use for key exchange during phase 1:
- i. Use the **?** to determine available Diffie-Hellman group types:

```
(config vpn ipsec tunnel ipsec_example ike phase1_proposal 0)> dh_group ?
curve25519
curve448
ecp192
ecp224
...
(config vpn ipsec tunnel ipsec_example ike phase1_proposal 0)>
```

- ii. Set the Diffie-Hellman group type:

```
(config vpn ipsec tunnel ipsec_example ike phase1_proposal 0)> dh_group value
(config vpn ipsec tunnel ipsec_example ike phase1_proposal 0)>
```

The default is **modp2048**.

v. (Optional) Add additional phase 1 proposals:

i. Move back one level in the schema:

```
(config vpn ipsec tunnel ipsec_example ike phase1_proposal 0)> ..
(config vpn ipsec tunnel ipsec_example ike phase1_proposal)>
```

ii. Add an additional proposal:

```
(config vpn ipsec tunnel ipsec_example ike phase1_proposal)> add end
(config vpn ipsec tunnel ipsec_example ike phase1_proposal 1)>
```

Repeat the above steps to set the type of encryption, hash, and Diffie-Hellman group for the additional proposal.

iii. Repeat to add more phase 1 proposals.

j. Configure the types of encryption, hash, and Diffie-Hellman group to use during phase 2:

i. Move back two levels in the schema:

```
(config vpn ipsec tunnel ipsec_example ike phase1_proposal 0)> .. ..
(config vpn ipsec tunnel ipsec_example ike)>
```

ii. Add a phase 2 proposal:

```
(config vpn ipsec tunnel ipsec_example ike)> add ike phase2_proposal end
(config vpn ipsec tunnel ipsec_example ike phase2_proposal 0)>
```

iii. Set the type of encryption to use during phase 2:

```
(config vpn ipsec tunnel ipsec_example ike phase2_proposal 0)> cipher value
(config vpn ipsec tunnel ipsec_example ike phase2_proposal 0)>
```

where *value* is one of:

- **3des**
- **aes128**
- **aes128gcm128**
- **aes128gcm64**
- **aes128gcm96**
- **aes192**
- **aes192gcm128**
- **aes192gcm64**
- **aes192gcm96**
- **aes256**
- **aes256gcm128**
- **aes256gcm64**
- **aes256gcm96**
- **null**

The default is **3des**.

- iv. Set the type of hash to use during phase 2 to verify communication integrity:

```
(config vpn ipsec tunnel ipsec_example ike phase2_proposal 0)> hash value
(config vpn ipsec tunnel ipsec_example ike phase2_proposal 0)>
```

where *value* is one of:

- md5
- sha1
- sha256
- sha384
- sha512

The default is **sha1**.

- v. Set the type of Diffie-Hellman group to use for key exchange during phase 2:
- i. Use the **?** to determine available Diffie-Hellman group types:

```
(config vpn ipsec tunnel ipsec_example ike phase2_proposal 0)> dh_group ?
curve25519
curve448
ecp192
ecp224
...
(config vpn ipsec tunnel ipsec_example ike phase2_proposal 0)>
```

- ii. Set the Diffie-Hellman group type:

```
(config vpn ipsec tunnel ipsec_example ike phase2_proposal 0)> dh_group value
(config vpn ipsec tunnel ipsec_example ike phase2_proposal 0)>
```

The default is **modp2048**.

- vi. (Optional) Add additional phase 2 proposals:
- i. Move back one level in the schema:

```
(config vpn ipsec tunnel ipsec_example ike phase2_proposal 0)> ..
(config vpn ipsec tunnel ipsec_example ike phase2_proposal)>
```

- ii. Add an additional proposal:

```
(config vpn ipsec tunnel ipsec_example ike phase2_proposal)> add end
(config vpn ipsec tunnel ipsec_example ike phase2_proposal 1)>
```

Repeat the above steps to set the type of encryption, hash, and Diffie-Hellman group for the additional proposal.

- iii. Repeat to add more phase 2 proposals.

16. (Optional) Configure dead peer detection:

Dead peer detection is enabled by default. Dead peer detection uses periodic IKE transmissions to the remote endpoint to detect whether tunnel communications have failed, allowing the tunnel to be automatically restarted when failure occurs.

- a. Change to the root of the configuration schema:

```
(config vpn ipsec tunnel ipsec_example ike phase2_proposal 0)> ...
(config)>
```

- b. To disable dead peer detection:

```
(config)> vpn ipsec tunnel ipsec_example dpd enable false
(config)>
```

- c. Set the number of seconds between transmissions of dead peer packets. Dead peer packets are only sent when the tunnel is idle. The default is **60**.

```
(config)> vpn ipsec tunnel ipsec_example dpd delay value
(config)>
```

- d. Set the number of seconds to wait for a response from a dead peer packet before assuming the tunnel has failed. The default is **90**.

```
(config)> vpn ipsec tunnel ipsec_example dpd timeout value
(config)>
```

17. (Optional) Create a list of destination networks that require source NAT:

- a. Add a destination network:

```
(config)> add vpn ipsec tunnel ipsec_example nat end
(config vpn ipsec tunnel ipsec_example nat 0)>
```

- b. Set the IPv4 address and optional netmask of a destination network that requires source NAT. You can also use **any**, meaning that any destination network connected to the tunnel will use source NAT.

```
(config vpn ipsec tunnel ipsec_example nat 0)> dst value
(config vpn ipsec tunnel ipsec_example nat 0)>
```

18. Configure policies that define the network traffic that will be encapsulated by this tunnel:

- a. Change to the root of the configuration schema:

```
(config vpn ipsec tunnel ipsec_example nat 0)> ...
(config)>
```

- b. Add a policy:

```
(config)> add vpn ipsec tunnel ipsec_example policy end
(config vpn ipsec tunnel ipsec_example policy 0)>
```

- c. Set the type of local traffic selector:

```
(config vpn ipsec tunnel ipsec_example policy 0)> local type value
(config vpn ipsec tunnel ipsec_example policy 0)>
```

where *value* is one of:

- **address:** The address of a local network interface.

Set the address:

- i. Use the **?** to determine available interfaces:
- ii. Set the interface. For example:

```
(config vpn ipsec tunnel ipsec_example policy 0)> local address eth1
(config vpn ipsec tunnel ipsec_example policy 0)>
```

- **network:** The subnet of a local network interface.

Set the network:

- i. Use the **?** to determine available interfaces:
- ii. Set the interface. For example:

```
(config vpn ipsec tunnel ipsec_example policy 0)> local network eth1
(config vpn ipsec tunnel ipsec_example policy 0)>
```

- **custom:** A user-defined network.

Set the custom network:

```
(config vpn ipsec tunnel ipsec_example policy 0)> local custom value
(config vpn ipsec tunnel ipsec_example policy 0)>
```

where *value* is the IPv4 address and optional netmask. The keyword **any** can also be used.

- **request:** Requests a network from the remote peer.
- **dynamic:** Uses the address of the local endpoint.

- d. Set the port matching criteria for the local traffic selector:

```
(config vpn ipsec tunnel ipsec_example policy 0)> local port value
(config vpn ipsec tunnel ipsec_example policy 0)>
```

where *value* is the port number, a range of port numbers, or the keyword **any**.

- e. Set the protocol matching criteria for the local traffic selector:

```
(config vpn ipsec tunnel ipsec_example policy 0)> local protocol value
(config vpn ipsec tunnel ipsec_example policy 0)>
```

where *value* is one of:

- **any:** Matches any protocol.
- **tcp:** Matches TCP protocol only.
- **udp:** Matches UDP protocol only.
- **icmp:** Matches ICMP requests only.

- **other**: Matches an unlisted protocol.

If **other** is used, set the number of the protocol:

```
(config vpn ipsec tunnel ipsec_example policy 0)> local protocol_other int
(config vpn ipsec tunnel ipsec_example policy 0)>
```

Allowed values are an integer between **1** and **255**.

- f. Set the IP address and optional netmask of the remote traffic selector:

```
(config vpn ipsec tunnel ipsec_example policy 0)> remote network value
(config vpn ipsec tunnel ipsec_example policy 0)>
```

- g. Set the port matching criteria for the remote traffic selector:

```
(config vpn ipsec tunnel ipsec_example policy 0)> remote port value
(config vpn ipsec tunnel ipsec_example policy 0)>
```

where *value* is the port number, a range of port numbers, or the keyword **any**.

- h. Set the protocol matching criteria for the remote traffic selector:

```
(config vpn ipsec tunnel ipsec_example policy 0)> remote protocol value
(config vpn ipsec tunnel ipsec_example policy 0)>
```

where *value* is one of:

- **any**: Matches any protocol.
- **tcp**: Matches TCP protocol only.
- **udp**: Matches UDP protocol only.
- **icmp**: Matches ICMP requests only.
- **other**: Matches an unlisted protocol.

If **other** is used, set the number of the protocol:

```
(config vpn ipsec tunnel ipsec_example policy 0)> remote protocol_other int
(config vpn ipsec tunnel ipsec_example policy 0)>
```

Allowed values are an integer between **1** and **255**.

19. (Optional) You can also configure various IPsec related time out, keep alive, and related values:

- a. Change to the root of the configuration schema:

```
(config vpn ipsec tunnel ipsec_example policy 0)> ...
(config)>
```

- b. Use the **?** to determine available options:

```
(config)> vpn ipsec advanced ?
```

Advanced: Advanced configuration that applies to all IPsec tunnels.

Parameters	Current Value

```

debug          none      Debug level
ike_fragment_size 1280    Maximum IKE fragment size
ike_retransmit_tries 5      IKE retransmit tries
keep_alive     40s       NAT keep alive time

```

Additional Configuration

```

connection_retry_timeout Connection retry timeout
connection_try_interval  Connection try interval
ike_timeout             IKE timeout

```

```
(config)>
```

Generally, the default settings for these should be sufficient.

- c. You can also enable debugging for IPsec:

```

(config)> vpn ipsec advanced debug value
(config)>

```

where *value* is one of:

- **none**
- **basic_auditing**
- **detailed_control**
- **generic_control**
- **raw_data**
- **sensitive_data**

20. Save the configuration and apply the change.

```

(config)> save
Configuration saved.
>

```

21. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Configure IPsec failover

You can configure the XBee Hive device to fail over from a primary IPsec tunnel to a backup tunnel:

- **SureLink** active recovery—You can use SureLink along with the IPsec tunnel's metric to configure two or more tunnels so that when the primary tunnel is determined to be inactive by SureLink, a secondary tunnel can begin serving traffic that the primary tunnel was serving.
- **Preferred tunnel**—When multiple IPsec tunnels are configured, one tunnel can be configured as a backup to another tunnel by defining a preferred tunnel for the backup device.

Required configuration items

- Two or more configured IPsec tunnels: The primary tunnel, and one or more backup tunnels.
- Either:
 - SureLink configured on the primary tunnel with **Restart Interface** enabled, and the metric for all tunnels set appropriately to determine which IPsec tunnel has priority. With this failover configuration, both tunnels are active simultaneously, and there is minimal downtime due to failover.
 - Identify the preferred tunnel during configuration of the backup tunnel. In this scenario, the backup tunnel is not active until the preferred tunnel fails.

IPsec failover using SureLink

With this configuration, when two IPsec tunnels are configured with the same local and remote endpoints but different metrics, traffic addressed to the remote endpoint will be routed through the IPsec tunnel with the lower metric.

If **SureLink > Restart Interface** is enabled for the tunnel with the lower metric, and SureLink determines that the tunnel is not functioning properly (for example, pings to a host at the other end of the tunnel are failing), then:

1. SureLink will shut down the tunnel and renegotiate its IPsec connection.
2. While the tunnel with the lower metric is down, traffic addressed to the remote endpoint will be routed through the tunnel with the higher metric.

For example:

- Tunnel_1:
 - **Metric:** 10
 - **Local endpoint > Interface:** ETH
 - **Remote endpoint > Hostname:** 192.168.10.1
 - **SureLink** configuration:
 - **Restart Interface** enabled
 - **Test target:**
 - **Test type:** Ping test
 - **Ping host:** 192.168.10.2

- Tunnel_2:
 - **Metric:** 20
 - **Local endpoint > Interface:** ETH
 - **Remote endpoint > Hostname:** 192.168.10.1

In this configuration:

1. Tunnel_1 will normally be used for traffic destined for the 192.168.10.1 endpoint.
2. If pings to 192.168.10.2 fail, SureLink will shut down the tunnel and renegotiate its IPsec connection.
3. While Tunnel_1 is down, Tunnel_2 will be used for traffic destined for the 192.168.10.1 endpoint.

Web

1. Configure the primary IPsec tunnel. See [Configure an IPsec tunnel](#) for instructions.
 - During configuration of the IPsec tunnel, set the metric to a low value (for example, **10**).

The screenshot shows the configuration page for an IPsec tunnel named 'IPsec/AlwaysPrimaryTunnel'. The 'Enable' toggle is turned on. The 'Preferred tunnel' dropdown is empty. 'Force UDP encapsulation' is turned off. The 'Zone' dropdown is set to 'IPsec'. The 'Metric' input field contains the value '10'. The 'Mode' dropdown is set to 'Tunnel mode'. The 'Protocol' dropdown is set to 'ESP'.

- Configure SureLink for the primary IPsec tunnel and enable **Restart interface**. See [Configure SureLink active recovery for IPsec](#) for instructions.

The screenshot shows the configuration page for SureLink. The 'Enable' toggle is turned on. The 'Restart interface' toggle is also turned on. The 'Restart device' dropdown is empty. The 'Interval' is set to '15m'. The 'Success condition' dropdown is set to 'One test target passes'. The 'Attempts' field is set to '3'. The 'Response timeout' is set to '15s'. There is a 'Test targets' section at the bottom.

2. Create a backup IPsec tunnel. Configure this tunnel to use the same local and remote endpoints as the primary tunnel. See [Configure an IPsec tunnel](#) for instructions.
 - During configuration of the IPsec tunnel, set the metric to a value that is higher than the metric of the primary tunnel (for example, **20**).

The screenshot shows the configuration page for a backup IPsec tunnel named 'IPsec/AlwaysBackupTunnel'. The 'Enable' toggle is turned on. The 'Preferred tunnel' dropdown is empty. 'Force UDP encapsulation' is turned off. The 'Zone' dropdown is set to 'IPsec'. The 'Metric' input field contains the value '20'. The 'Mode' dropdown is set to 'Tunnel mode'. The 'Protocol' dropdown is set to 'ESP'.

Command line

1. Configure the primary IPsec tunnel. See [Configure an IPsec tunnel](#) for instructions.
 - During configuration of the IPsec tunnel, set the metric to a low value (for example, **10**):

```
(config vpn ipsec tunnel IPsecFailoverPrimaryTunnel)> metric 10
(config vpn ipsec tunnel IPsecFailoverPrimaryTunnel)>
```

- Configure SureLink for the primary IPsec tunnel and enable **Restart interface**. See [Configure SureLink active recovery for IPsec](#) for instructions.

```
(config vpn ipsec tunnel IPsecFailoverPrimaryTunnel)> surelink restart true
(config vpn ipsec tunnel IPsecFailoverPrimaryTunnel)>
```

2. Create a backup IPsec tunnel. Configure this tunnel to use the same local and remote endpoints as the primary tunnel. See [Configure an IPsec tunnel](#) for instructions.
 - During configuration of the IPsec tunnel, set the metric to a value that is higher than the metric of the primary tunnel (for example, **20**):

```
(config vpn ipsec tunnel IPsecFailoverBackupTunnel)> metric 20
(config vpn ipsec tunnel IPsecFailoverBackupTunnel)>
```

IPsec failover using Preferred tunnel



1. Configure the primary IPsec tunnel. See [Configure an IPsec tunnel](#) for instructions.
2. Create a backup IPsec tunnel. See [Configure an IPsec tunnel](#) for instructions.
3. During configuration of the backup IPsec tunnel, identify the primary IPsec tunnel in the **Preferred tunnel** parameter:

The screenshot shows the configuration page for the IPsecFailoverBackupTunnel. The 'Preferred tunnel' dropdown menu is highlighted with a red box and contains the text 'IPsecFailoverPrimaryTunnel'. Other visible fields include 'Enable' (checked), 'Force UDP encapsulation' (unchecked), 'Zone' (set to 'IPsec'), 'Metric' (set to '0'), 'Tunnel mode' (set to 'Tunnel mode'), and 'Protocol' (set to 'ESP').

Command line

1. Configure the primary IPsec tunnel. See [Configure an IPsec tunnel](#) for instructions.
2. Create a backup IPsec tunnel. See [Configure an IPsec tunnel](#) for instructions.
3. During configuration of the backup IPsec tunnel, identify the primary IPsec tunnel:
 - a. Use the **?** to view a list of available tunnels:

```
(config vpn ipsec tunnel backup_ipsec_tunnel)> ipsec_failover ?
```

Preferred tunnel: This tunnel will not start until the preferred tunnel has failed. It will continue to operate until the preferred tunnel returns to full operation status.

Format:

```
primary_ipsec_tunnel
backup_ipsec_tunnel
Optional: yes
Current value:
```

```
(config vpn ipsec tunnel backup_ipsec_tunnel)> ipsec_failover
```

- b. Set the primary IPsec tunnel:

```
(config vpn ipsec tunnel backup_ipsec_tunnel)> ipsec_failover primary_ipsec_tunnel
(config vpn ipsec tunnel backup_ipsec_tunnel)>
```

Configure SureLink active recovery for IPsec

You can configure the XBee Hive device to regularly probe IPsec tunnels to determine if the connection has failed and take remedial action.

You can also configure the IPsec tunnel to fail over to a backup tunnel. See [Configure IPsec failover](#) for further information.

Required configuration items

- A valid IPsec configuration. See [Configure an IPsec tunnel](#) for configuration instructions.
- Enable IPsec SureLink.
- The behavior of the XBee Hive device upon IPsec failure: either
 - Restart the IPsec interface
 - Reboot the device.

Additional configuration items

- The interval between connectivity tests.
- Whether the interface should be considered to have failed if one of the test targets fails, or all of the test targets fail.
- The number of probe failures before the IPsec connection is considered to have failed.
- The amount of time that the device should wait for a response to a probe failures before considering it to have failed.

To configure the XBee Hive device to regularly probe the IPsec connection:

Web

1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

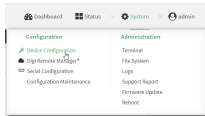
Remote Manager:

- a. Locate your device as described in [Use Digi Remote Manager to view and manage your device](#).
- b. Click the **Device ID**.

- c. Click **Settings**.
- d. Click to expand **Config**.

Local Web UI:

- a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



The **Configuration** window is displayed.

3. Click **VPN > IPsec**.
4. Create a new IPsec tunnel or select an existing one:
 - To create a new IPsec tunnel, see [Configure an IPsec tunnel](#).
 - To edit an existing IPsec tunnel, click to expand the appropriate tunnel.
5. After creating or selecting the IPsec tunnel, click **SureLink**.

 A screenshot of the 'SureLink' configuration window. The window has a title bar with a dropdown arrow and the text 'SureLink'. Below the title bar, there are several settings:

- Enable:** A toggle switch that is currently turned off.
- Test interval:** A text input field containing '15m'.
- Success condition:** A dropdown menu showing 'One test passes'.
- Pass threshold:** A text input field containing '1'.
- Response timeout:** A text input field containing '15s'.

 At the bottom of the window, there are three expandable sections: 'Tests', 'Recovery actions', and 'Advanced settings', each with a right-pointing arrow and a three-dot menu icon.

6. **Enable** SureLink.
7. (Optional) Change the **Test interval** between connectivity tests.
 Allowed values are any number of weeks, days, hours, minutes, or seconds, and take the format **number{w|d|h|m|s}**.
 For example, to set **Interval** to ten minutes, enter **10m** or **600s**.
 The default is 15 minutes.
8. (Optional) If more than one test target is configured, for **Success condition**, select either:
 - **One test passes:** Only one test needs to pass for Surelink to consider an interface to be up.
 - **All test pass:** All tests need to pass for SureLink to consider the interface to be up.

9. (Optional) For **Pass threshold**, type or select the number of times that the test must pass after failure, before the interface is determined to be working and is reinstated.
10. (Optional) For **Response timeout**, type the amount of time that the device should wait for a response to a test failure before considering it to have failed.

Allowed values are any number of weeks, days, hours, minutes, or seconds, and take the format **number{w|d|h|m|s}**.

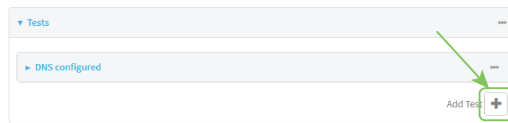
For example, to set **Response timeout** to ten minutes, enter **10m** or **600s**.

The default is 15 seconds.

11. Click to expand **Tests**.

By default, **Test DNS servers configured for this interface** is automatically configured and enabled. This test communication with DNS servers that are either provided by DHCP, or statically configured for this interface.

- a. Click 



New tests are enabled by default. To disable, click to toggle off **Enable**.

- b. Type a **Label** for the test.
- c. Click to toggle on **IPv6** if the test should apply to both IPv6 rather than IPv4.
- d. Select the **Test type**.

Available test types:

- **Ping test:** Uses ICMP to determine connectivity.

If **Ping test** is selected, complete the following:

- **Ping target:** The type of target for the ping, one of:
 - **Hostname or IP address** of an external server.
 - **Ping host:** hostname or IP address of the server.
 - The **Interface gateway**. If **Interface gateway** is selected, an initial traceroute is sent to the hostname or IP address configured in the SureLink advanced settings, and then the first hop in that route is used for the ping test.
 - The **Interface address**.
 - The **Interface DNS server**.
- **Ping payload size:** The number of bytes to send as part of the ping payload.

- **DNS test:** Performs a DNS query to the named DNS server.

If **DNS test** is selected, complete the following:

- **DNS server:** The IP address of the DNS server.

- **HTTP test:** Uses HTTP(s) GET requests to determine connectivity to the configured web server.

If **HTTP test** is selected, complete the following:

- **Web server:** The URL of the web server.

- **Test DNS servers configured for this interface:** Tests communication with DNS servers that are either provided by DHCP, or statically configured for this interface.
- **Test the interface status:** Tests the current status of the interface. The test fails if the interface is down. Failing this test infers that all other tests fail.

If **Test the interface status** is selected, complete the following:

- **Down time:** The amount of time that the interface is down before the test can be considered to have failed.

Allowed values are any number of weeks, days, hours, minutes, or seconds, and take the format *number{w|d|h|m|s}*.

For example, to set **Down time** to ten minutes, enter **10m** or **600s**.

- **Initial connection time:** The amount of time to wait for the interface to connect for the first time before the test is considered to have failed.

Allowed values are any number of weeks, days, hours, minutes, or seconds, and take the format *number{w|d|h|m|s}*.

For example, to set **Initial connection time** to ten minutes, enter **10m** or **600s**.

- **Custom test:** Tests the interface with custom commands.

If **Custom test** is selected, complete the following:

- The **Commands to run to test**.

- **TCP connection test:** Tests that the interface can reach a destination port on the configured host.

If **TCP connection test** is selected, complete the following:

- **TCP connect host:** The hostname or IP address of the host to create a TCP connection to.
- **TCP connect port:** The TCP port to create a TCP connection to.

- **Test another interface's status:** Tests the status of another interface.

If **Test another interface's status** is selected, complete the following:

- **Test interface:** The interface to test.
- **IP version:** The type of IP connection, one of:
 - **Any:** Either the IPv4 or IPv6 connection must be up.
 - **Both:** Both the IPv4 or IPv6 connection must be up.
 - **IPv4:** The IPv4 connection must be up.
 - **IPv6:** The IPv6 connection must be up.
- **Expected status:** The status required for the test to pass.
 - **Up:** The test will pass only if the referenced interface is up and passing its own SureLink tests (if applicable).
 - **Down:** The test will pass only if the referenced interface is down or failing its own SureLink tests (if applicable).

e. Repeat for each additional test.

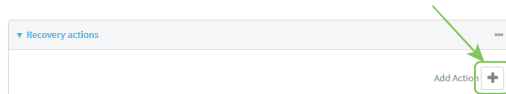
12. Add recovery actions:

- a. Click to expand **Recovery actions**.

By default, there are two preconfigured recovery actions:

- **Update routing**: Uses the **Change default gateway** action, which increases the interface's metric by 100 to change the default gateway.
- **Restart interface**.

- b. Click 



New recovery actions are enabled by default. To disable, click to toggle off **Enable**.

- c. Type a **Label** for the recovery action.
- d. For **Recovery type**, select **Reboot device**.
- e. For **Recovery type**, select the type of recovery action. If multiple recovery actions are configured, they are performed in the order that they are listed.
 - **Change default gateway**: Increases the interface's metric to change the default gateway.
If **Change default gateway** is selected, complete the following:
 - **SureLink test failures**: The number of failures for this recovery action to perform, before moving to the next recovery action.
 - **Increase metric to change active default gateway**: Increase the interface's metric by this amount. This should be set to a number large enough to change the routing table to use another default gateway. The default is **100**.
 - **Override wait interval before performing the next recovery action**: The time to wait before the next test is run. If set to the default value of **0s**, the **Test interval** is used.
 - **Restart interface**.
If **Restart interface** is selected, complete the following:
 - **SureLink test failures**: The number of failures for this recovery action to perform, before moving to the next recovery action.
 - **Override wait interval before performing the next recovery action**: The time to wait before the next test is run. If set to the default value of **0s**, the **Test interval** is used.
 - **Reset modem**: This recovery action is available for WWAN interfaces only.
If **Reset modem** is selected, complete the following:
 - **SureLink test failures**: The number of failures for this recovery action to perform, before moving to the next recovery action.
 - **Override wait interval before performing the next recovery action**: The time to wait before the next test is run. If set to the default value of **0s**, the **Test interval** is used.

- **Switch to alternate SIM:** Switches to an alternate SIM. This recovery action is available for WWAN interfaces only.

If **Switch to alternate SIM** is selected, complete the following:

- **SureLink test failures:** The number of failures for this recovery action to perform, before moving to the next recovery action.
- **Override wait interval before performing the next recovery action:** The time to wait before the next test is run. If set to the default value of **0s**, the **Test interval** is used.

- **Reboot device.**

If **Reboot device** is selected, complete the following:

- **SureLink test failures:** The number of failures for this recovery action to perform, before moving to the next recovery action.
- **Override wait interval before performing the next recovery action:** The time to wait before the next test is run. If set to the default value of **0s**, the **Test interval** is used.

- **Execute custom Recovery commands.**

If **Recovery commands** is selected, complete the following:

- **SureLink test failures:** The number of failures for this recovery action to perform, before moving to the next recovery action.
- The **Commands to run to recovery connectivity**.
- **Override wait interval before performing the next recovery action:** The time to wait before the next test is run. If set to the default value of **0s**, the **Test interval** is used.

- **Switch eSIM profile** for carrier profile connectivity issue detection and alternate carrier profile selection to help maintain cellular service. For more information, [see Configure SureLink to switch eSIM profiles](#) in the Cellular documentation portal.

If **Switch eSIM profile** is selected, complete the following:

- **Label**, type a word or phrase to identify the action. For example, *Repower modem - eSIM*.
- **Recovery type**, select **Switch eSIM profile**.

- **Powercycle the modem.** This recovery action is available for WWAN interfaces only.

If **Powercycle the modem** is selected, complete the following:

- **SureLink test failures:** The number of failures for this recovery action to perform, before moving to the next recovery action.
- **Override wait interval before performing the next recovery action:** The time to wait before the next test is run. If set to the default value of **0s**, the **Test interval** is used.

f. Repeat for each additional recovery action.

13. (Optional) Configure advanced SureLink parameters:

- a. Click to expand **Advanced settings**.
 - b. For **Delayed Start**, type the amount of time to wait while the device is starting before SureLink testing begins. This setting is bypassed when the interface is determined to be up.
 Allowed values are any number of weeks, days, hours, minutes, or seconds, and take the format **number{w|d|h|m|s}**.
 For example, to set **Delayed start** to ten minutes, enter **10m** or **600s**.
 The default is 300 seconds.
 - c. For **Backoff interval**, type the time to add to the test interval when restarting the list of actions. This option is capped at 15 minutes.
 Allowed values are any number of weeks, days, hours, minutes, or seconds, and take the format **number{w|d|h|m|s}**.
 For example, to set **Backoff interval** to ten minutes, enter **10m** or **600s**.
 The default is 300 seconds.
 - d. **Test interface gateway by pinging** is used by the **Interface gateway Ping test** as the endpoint for traceroute to use to determine the interface gateway. The default is 8.8.8.8, and should only be changed if this IP address is not accessible due to networking issues.
14. Click **Apply** to save the configuration and apply the change.

Command line

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
 Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Create a new IPsec tunnel, or edit an existing one:
 - To create a new IPsec tunnel, see [Configure an IPsec tunnel](#).
 - To edit an existing IPsec tunnel, change to the IPsec tunnel's node in the configuration schema. For example, for an IPsec tunnel named **ipsec_example**, change to the **ipsec_example** node in the configuration schema:

```
(config)> vpn ipsec tunnel ipsec_example
(config vpn ipsec tunnel ipsec_example)>
```

4. Enable SureLink:

```
(config vpn ipsec tunnel ipsec_example)> surelink enable true
(config vpn ipsec tunnel ipsec_example)>
```

5. By default, the **Test DNS servers configured for this interface** test is automatically configured and enabled. This tests communication with DNS servers that are either

provided by DHCP, or statically configured for this interface.

To add additional tests:

- a. Add a test:

```
(config vpn ipsec tunnel ipsec_example)> add surelink tests end
(config vpn ipsec tunnel ipsec_example surelink tests 1)>
```

- b. New tests are enabled by default. To disable:

```
(config vpn ipsec tunnel ipsec_example surelink tests 1)> enable false
(config vpn ipsec tunnel ipsec_example surelink tests 1)>
```

- c. Create a label for the test:

```
(config vpn ipsec tunnel ipsec_example surelink tests 1)> label string
(config vpn ipsec tunnel ipsec_example surelink tests 1)>
```

- d. if the test should apply to both IPv6 rather than IPv4, enable IPv6:

```
(config vpn ipsec tunnel ipsec_example surelink tests 1)> ipv6 true
(config vpn ipsec tunnel ipsec_example surelink tests 1)>
```

- e. Set the test type:

```
(config vpn ipsec tunnel ipsec_example surelink tests 1)> test value
(config vpn ipsec tunnel ipsec_example surelink tests 1)>
```

where *value* is one of:

- **ping**: Uses ICMP to determine connectivity.

If **ping** is selected, complete the following:

- Set the **ping_method**:

```
(config vpn ipsec tunnel ipsec_example surelink tests 1)> ping_method value
(config vpn ipsec tunnel ipsec_example surelink tests 1)>
```

where *value* is one of:

- **hostname**: The hostname or IP address of an external server.
- Set **ping_host** to the hostname or IP address of the server:

```
(config vpn ipsec tunnel ipsec_example surelink tests 1)> ping_host
hostname/IP_address
(config vpn ipsec tunnel ipsec_example surelink tests 1)>
```

- **interface_gateway**. If set, an initial traceroute is sent to the hostname or IP address configured in the SureLink advanced settings, and then the first hop in that route is used for the ping test.
- **interface_address**.
- **interface_dns**: The interface's DNS server.

- Set the number of bytes to send as part of the ping payload:

```
(config vpn ipsec tunnel ipsec_example ipsec tunnel ipsec_example surelink tests
1)> ping_size int
(config vpn ipsec tunnel ipsec_example surelink tests 1)>
```

- **dns**: Performs a DNS query to the named DNS server.

If **dns** is set, set the IPv4 or IPv6 address of the DNS server:

```
(config vpn ipsec tunnel ipsec_example surelink tests 1)> dns_server IP_address
(config vpn ipsec tunnel ipsec_example surelink tests 1)>
```

- **http**: Uses HTTP(s) GET requests to determine connectivity to the configured web server.

If **http** is set, set the URL of the web server.

```
(config vpn ipsec tunnel ipsec_example surelink tests 1)> http url
(config vpn ipsec tunnel ipsec_example surelink tests 1)>
```

- **dns_configured**: Tests communication with DNS servers that are either provided by DHCP, or statically configured for this interface.
- **interface_up**: Tests the current status of the interface. The test fails if the interface is down. Failing this test infers that all other tests fail.

If **interface_up** is set, complete the following:

- Set the amount of time that the interface is down before the test can be considered to have failed.

```
(config vpn ipsec tunnel ipsec_example surelink tests 1)> interface_down_time
value
(config vpn ipsec tunnel ipsec_example surelink tests 1)>
```

where *value* is any number of weeks, days, hours, minutes, or seconds, and takes the format **number{w|d|h|m|s}**.

For example, to set **interface_down_time** to ten minutes, enter either **10m** or **600s**:

```
(config vpn ipsec tunnel ipsec_example surelink tests 1)> interface_down_time 600s
(config)>
```

- Set the amount of time to wait for the interface to connect for the first time before the test is considered to have failed.

```
(config vpn ipsec tunnel ipsec_example surelink tests 1)> interface_timeout value
(config vpn ipsec tunnel ipsec_example surelink tests 1)>
```

where *value* is any number of weeks, days, hours, minutes, or seconds, and takes the format **number{w|d|h|m|s}**.

For example, to set **interface_timeout** to ten minutes, enter either **10m** or **600s**:

```
(config vpn ipsec tunnel ipsec_example surelink tests 1)> interface_timeout 600s
(config)>
```

- **custom_test:** Tests the interface with custom commands.

If **custom_test** is set, set the commands to run to perform the test:

```
(config vpn ipsec tunnel ipsec_example surelink tests 1)> custom_test_commands
"string"
(config vpn ipsec tunnel ipsec_example surelink tests 1)>
```

- **tcp_connection:** Tests that the interface can reach a destination port on the configured host.

If **tcp_connection** is selected, complete the following:

- Set the hostname or IP address of the host to create a TCP connection to:

```
(config vpn ipsec tunnel ipsec_example surelink tests 1)> tcp_host hostname/IP_
address
(config vpn ipsec tunnel ipsec_example surelink tests 1)>
```

- Set the TCP port to create a TCP connection to.

```
(config vpn ipsec tunnel ipsec_example surelink tests 1)> tcp_port port
(config vpn ipsec tunnel ipsec_example surelink tests 1)>
```

- **other:** Tests the status of another interface.

If **other** is selected, complete the following:

- Set the interface to test.
 - i. Use the **?** to determine available interfaces:
 - ii. Set the interface. For example:

```
(config vpn ipsec tunnel ipsec_example surelink tests 1)> other_interface
/network/interface/eth1
(config vpn ipsec tunnel ipsec_example surelink tests 1)>
```

- Set the type of IP connection:

```
(config vpn ipsec tunnel ipsec_example surelink tests 1)> other_ip_version value
(config vpn ipsec tunnel ipsec_example surelink tests 1)>
```

where *value* is one of:

- **any:** Either the IPv4 or IPv6 connection must be up.
- **both:** Both the IPv4 or IPv6 connection must be up.
- **ipv4:** The IPv4 connection must be up.
- **ipv6:** The IPv6 connection must be up.

- The status required for the test to pass.

```
(config vpn ipsec tunnel ipsec_example surelink tests 1)> other_status value
(config vpn ipsec tunnel ipsec_example surelink tests 1)>
```

where *value* is one of:

- **up**: The test will pass only if the referenced interface is up and passing its own SureLink tests (if applicable).
- **down**: The test will pass only if the referenced interface is down or failing its own SureLink tests (if applicable).

- f. Repeat for each additional test.

6. Add recovery actions:

- a. Type ... to return to the root of the configuration:

```
(config vpn ipsec tunnel ipsec_example surelink tests 1)> ...
(config)>
```

- b. Add a recovery action:

```
(config)> add vpn ipsec tunnel ipsec_example surelink actions end
(config vpn ipsec tunnel ipsec_example surelink actions 0)>
```

- c. New actions are enabled by default. To disable:

```
(config vpn ipsec tunnel ipsec_example surelink actions 0)> enable false
(config vpn ipsec tunnel ipsec_example surelink actions 0)>
```

- d. Create a label for the action:

```
(config vpn ipsec tunnel ipsec_example surelink actions 0)> label string
(config vpn ipsec tunnel ipsec_example surelink actions 0)>
```

- e. Set the type of recovery action to **reboot_device**:

```
(config vpn ipsec tunnel ipsec_example surelink actions 0)> action reboot_device
(config vpn ipsec tunnel ipsec_example surelink actions 0)>
```

- Set the number of failures for this recovery action to perform, before moving to the next recovery action:

```
(config vpn ipsec tunnel ipsec_example surelink actions 0)> test_failures int
(config vpn ipsec tunnel ipsec_example surelink actions 0)>
```

The default is **3**.

- Set the time to wait before the next test is run. If set to the default value of **0s**, the test interval is used.

```
(config vpn ipsec tunnel ipsec_example surelink actions 0)> override_interval int
(config vpn ipsec tunnel ipsec_example surelink actions 0)>
```

- f. Set the type of recovery action. If multiple recovery actions are configured, they are performed in the order that they are listed. The command varies depending on whether

the interface is a WAN or WWAN:

```
(config vpn ipsec tunnel ipsec_example surelink actions 0)> modem_action value
(config vpn ipsec tunnel ipsec_example surelink actions 0)>
```

■ **WAN interfaces:**

```
(config vpn ipsec tunnel ipsec_example surelink actions 0)> action value
(config vpn ipsec tunnel ipsec_example surelink actions 0)>
```

■ **WWAN interfaces:**

```
(config vpn ipsec tunnel ipsec_example surelink actions 0)> modem_action value
(config vpn ipsec tunnel ipsec_example surelink actions 0)>
```

where *value* is one of:

- **update_routing_table:** Increases the interface's metric to change the default gateway.

If **update_routing_table** is selected, complete the following:

- Set the number of failures for this recovery action to perform, before moving to the next recovery action:

```
(config vpn ipsec tunnel ipsec_example surelink actions 0)> test_failures int
(config vpn ipsec tunnel ipsec_example surelink actions 0)>
```

The default is **3**.

- Set the amount that the interface's metric should be increased. This should be set to a number large enough to change the routing table to use another default gateway.

```
(config vpn ipsec tunnel ipsec_example surelink actions 0)> metric_adjustment_
modem int
(config vpn ipsec tunnel ipsec_example surelink actions 0)>
```

The default is **100**.

- Set the time to wait before the next test is run. If set to the default value of **0s**, the test interval is used.

```
(config vpn ipsec tunnel ipsec_example surelink actions 0)> override_interval int
(config vpn ipsec tunnel ipsec_example surelink actions 0)>
```

■ **restart_interface.**

If **restart_interface** is selected, complete the following:

- Set the number of failures for this recovery action to perform, before moving to the next recovery action:

```
(config vpn ipsec tunnel ipsec_example surelink actions 0)> test_failures int
(config vpn ipsec tunnel ipsec_example surelink actions 0)>
```

The default is **3**.

- Set the time to wait before the next test is run. If set to the default value of **0s**, the test interval is used.

```
(config vpn ipsec tunnel ipsec_example surelink actions 0)> override_interval int
(config vpn ipsec tunnel ipsec_example surelink actions 0)>
```

- **reset_modem**: This recovery action is available for WWAN interfaces only.

If **reset_modem** is selected, complete the following:

- Set the number of failures for this recovery action to perform, before moving to the next recovery action:

```
(config vpn ipsec tunnel ipsec_example surelink actions 0)> test_failures int
(config vpn ipsec tunnel ipsec_example surelink actions 0)>
```

The default is **3**.

- Set the time to wait before the next test is run. If set to the default value of **0s**, the test interval is used.

```
(config vpn ipsec tunnel ipsec_example surelink actions 0)> override_interval int
(config vpn ipsec tunnel ipsec_example surelink actions 0)>
```

- **switch_sim**: Switches to an alternate SIM. This recovery action is available for WWAN interfaces only.

If **switch_sim** is selected, complete the following:

- Set the number of failures for this recovery action to perform, before moving to the next recovery action:

```
(config vpn ipsec tunnel ipsec_example surelink actions 0)> test_failures int
(config vpn ipsec tunnel ipsec_example surelink actions 0)>
```

The default is **3**.

- Set the time to wait before the next test is run. If set to the default value of **0s**, the test interval is used.

```
(config vpn ipsec tunnel ipsec_example surelink actions 0)> override_interval int
(config vpn ipsec tunnel ipsec_example surelink actions 0)>
```

- **modem_power_cycle**: This recovery action is available for WWAN interfaces only.

If **modem_power_cycle** is selected, complete the following:

- Set the number of failures for this recovery action to perform, before moving to the next recovery action:

```
(config vpn ipsec tunnel ipsec_example surelink actions 0)> test_failures int
(config vpn ipsec tunnel ipsec_example surelink actions 0)>
```

The default is **3**.

- Set the time to wait before the next test is run. If set to the default value of **0s**, the test interval is used.

```
(config vpn ipsec tunnel ipsec_example surelink actions 0)> override_interval int
(config vpn ipsec tunnel ipsec_example surelink actions 0)>
```

■ **reboot_device.**

If **reboot_device** is selected, complete the following:

- Set the number of failures for this recovery action to perform, before moving to the next recovery action:

```
(config vpn ipsec tunnel ipsec_example surelink actions 0)> test_failures int
(config vpn ipsec tunnel ipsec_example surelink actions 0)>
```

The default is **3**.

- Set the time to wait before the next test is run. If set to the default value of **0s**, the test interval is used.

```
(config vpn ipsec tunnel ipsec_example surelink actions 0)> override_interval int
(config vpn ipsec tunnel ipsec_example surelink actions 0)>
```

■ **custom_action:** Execute custom recovery commands.

If **custom_action** is selected, complete the following:

- Set the number of failures for this recovery action to perform, before moving to the next recovery action:

```
(config vpn ipsec tunnel ipsec_example surelink actions 0)> test_failures int
(config vpn ipsec tunnel ipsec_example surelink actions 0)>
```

The default is **3**.

- Set the commands to run to attempt to recovery connectivity.

```
(config network interface my_wan surelink actions 0)> custom_action_commands_
modem "string"
(config network interface my_wan surelink actions 0)>
```

- Set the time to wait before the next test is run. If set to the default value of **0s**, the test interval is used.

```
(config vpn ipsec tunnel ipsec_example surelink actions 0)> override_interval int
(config vpn ipsec tunnel ipsec_example surelink actions 0)>
```

g. Repeat for each additional recovery action.

7. Optional SureLink configuration parameters:

a. Type ... to return to the root of the configuration:

```
(config vpn ipsec tunnel ipsec_example surelink actions 0)> ...
(config)>
```

b. Set the test interval between connectivity tests:

```
(config)> vpn ipsec tunnel ipsec_example surelink interval value
(config)>
```

where *value* is any number of weeks, days, hours, minutes, or seconds, and takes the format ***number{w|d|h|m|s}***.

For example, to set **interval** to ten minutes, enter either **10m** or **600s**:

```
(config)> vpn ipsec tunnel ipsec_example surelink interval 600s
(config)>
```

The default is **15m**.

- c. If more than one test target is configured, set the success condition:

```
(config)> vpn ipsec tunnel ipsec_example surelink success_condition value
(config)>
```

where *value* is either:

- **one**: Only one test needs to pass for Surelink to consider an interface to be up.
 - **all**: All tests need to pass for SureLink to consider the interface to be up.
- d. Set the number of times that the test must pass after failure, before the interface is determined to be working and is reinstated.

```
(config)> vpn ipsec tunnel ipsec_example surelink pass_threshold int
(config)>
```

The default is **1**.

- e. Set the amount of time that the device should wait for a response to a test attempt before considering it to have failed:

```
(config)> vpn ipsec tunnel ipsec_example surelink timeout value
(config)>
```

where *value* is any number of weeks, days, hours, minutes, or seconds, and takes the format ***number{w|d|h|m|s}***.

For example, to set **timeout** to ten minutes, enter either **10m** or **600s**:

```
(config)> vpn ipsec tunnel ipsec_example surelink timeout 600s
(config)>
```

The default is **15s**.

- f. Set the amount of time to wait while the device is starting before SureLink testing begins. This setting is bypassed when the interface is determined to be up.

```
(config)> vpn ipsec tunnel ipsec_example surelink advanced delayed_start value
(config)>
```

where *value* is any number of weeks, days, hours, minutes, or seconds, and takes the format ***number{w|d|h|m|s}***.

For example, to set **delayed_start** to ten minutes, enter either **10m** or **600s**:

```
(config)> vpn ipsec tunnel ipsec_example surelink advanced delayed_start 600s
(config)>
```

The default is **300s**.

- g. Set the time to add to the test interval when restarting the list of actions. This option is capped at 15 minutes.

```
(config)> vpn ipsec tunnel ipsec_example surelink advanced backoff_interval value
(config)>
```

where *value* is any number of weeks, days, hours, minutes, or seconds, and takes the format **number{w|d|h|m|s}**.

For example, to set **backoff_interval** to ten minutes, enter either **10m** or **600s**:

```
(config)> vpn ipsec tunnel ipsec_example surelink advanced backoff_interval 600s
(config)>
```

The default is 300 seconds.

- h. The **interface_gateway** parameter is used by the Interface gateway Ping test as the endpoint for traceroute to use to determine the interface gateway. The default is **8.8.8.8**, and should only be changed if this IP address is not accessible due to networking issues. To set to an alternate host:

```
(config)> vpn ipsec tunnel ipsec_example surelink advanced interface_gateway hostname/IP_address
(config)>
```

8. Save the configuration and apply the change.

```
(config vpn ipsec tunnel ipsec_example connection_monitor target 0)> save
Configuration saved.
>
```

9. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Show IPsec status and statistics

Web

1. Log into the XBee Hive WebUI as a user with full Admin access rights.
2. On the menu, select **Status > IPsec**.
The **IPsec** page appears.
3. To view configuration details about an IPsec tunnel, click the **✱** (configuration) icon in the upper right of the tunnel's status pane.

Command line

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. To display details about all configured IPsec tunnels, type the following at the prompt:

```
> show ipsec all
```

```
Name  Enable Status  Hostname
-----
ipsec1 true   up    192.168.2.1
vpn1   false  pending 192.168.3.1
```

```
>
```

3. To display details about a specific tunnel:

```
> show ipsec tunnel ipsec1
```

```
Tunnel      : ipsec1
Enable      : true
Status      : pending
Hostname    : 192.168.2.1
Zone        : ipsec
Mode        : tunnel
Type        : esp
```

```
>
```

4. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Debug an IPsec configuration

If you experience issues with an IPsec tunnel not being successfully negotiated with the remote end of the tunnel, you can enable IPsec debug messages to be written to the system log. See [View system and event logs](#) for more information about viewing the system log.

Web

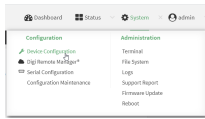
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

Remote Manager:

- a. Locate your device as described in [Use Digi Remote Manager to view and manage your device](#).
- b. Click the **Device ID**.
- c. Click **Settings**.
- d. Click to expand **Config**.

Local Web UI:

- a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



The **Configuration** window is displayed.

3. Click **VPN > IPsec**.
4. Click to expand **Advanced**.
5. For **Debug level**, select one of the following:
 - **Disable debug messages**.
 - **Basic auditing debug**: Logs basic auditing information, (for example, SA up/SA down).
 - **Generic control flow**: Select this for basic debugging information.
 - **Detailed control flow**: More detailed debugging control flow.
 - **Raw data**: Includes raw data dumps in hexadecimal format.
 - **Sensitive material**: Also includes sensitive material in dumps (for example, encryption keys).
6. Click **Apply** to save the configuration and apply the change.

Command line

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Set the IPsec debug value:

```
config> vpn ipsec advanced debug value
config>
```

where *value* is one of:

- **none**. (Default) No debug messages are written.
- **basic_auditing**: Logs basic auditing information, (for example, SA up/SA down).
- **generic_control**: Select this for basic debugging information.
- **detailed_control**: More detailed debugging control flow.
- **raw_data**: Includes raw data dumps in hexadecimal format.
- **sensitive_data**: Also includes sensitive material in dumps (for example, encryption keys).

4. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

5. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Configure a Simple Certificate Enrollment Protocol client



WARNING! The Simple Certificate Enrollment Protocol (SCEP) uses unencrypted HTTP communication. Please ensure you are utilizing a VPN to secure your communications.

Simple Certificate Enrollment Protocol (SCEP) is a mechanism that allows for large-scale X.509 certificate deployment. You can configure XBee Hive device to function as a SCEP client that will connect to a SCEP server that is used to sign Certificate Signing Requests (CSRs), provide Certificate Revocation Lists (CRLs), and distribute valid certificates from a Certificate Authority (CA).

Required configuration

- Enable the SCEP client.
- The fully-qualified domain name of the SCEP server to be used for certificate requests.
- The challenge password provided by the SCEP server that the SCEP client will use when making SCEP requests.
- The distinguished name to be used for the CSR.

Additional configuration

- The number of days that the certificate enrollment can be renewed, prior to the request expiring.

Web

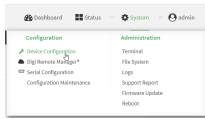
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

Remote Manager:

- a. Locate your device as described in [Use Digi Remote Manager to view and manage your device](#).
- b. Click the **Device ID**.
- c. Click **Settings**.
- d. Click to expand **Config**.

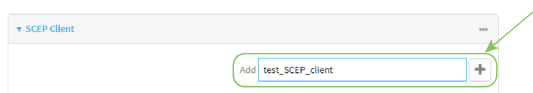
Local Web UI:

- a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

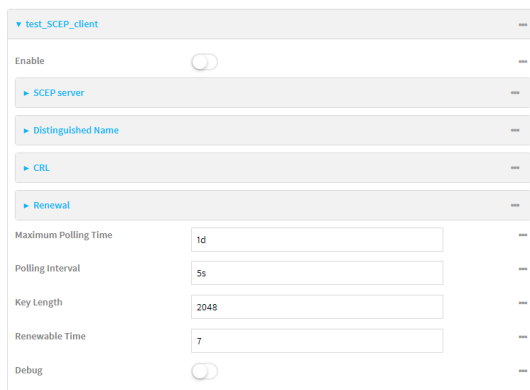


The **Configuration** window is displayed.

3. Click **Network > SCEP Client**.
4. For **Add clients**, enter a name for the SCEP client and click **+**.



The new SCEP client configuration is displayed.



5. Click **Enable** to enable the SCEP client.
6. For **Maximum Polling Time**, type the maximum time that the device will poll the SCEP server, when operating in manual mode.
 Allowed values are any number of weeks, days, hours, minutes, or seconds, and take the format **number{w|d|h|m|s}**.
 For example, to set **Maximum Polling Time** to ten minutes, enter **10m** or **600s**.
 The default is **1d**.
7. For **Polling Interval**, type the amount of time that the device should wait between polling attempts, when operating in manual mode.
 Allowed values are any number of weeks, days, hours, minutes, or seconds, and take the format **number{w|d|h|m|s}**.
 For example, to set **Polling Interval** to ten minutes, enter **10m** or **600s**.
 The default is **5s**.
8. For **Key Length**, type the bit size of the private key. The default is **2048**.
9. For **Renewable Time**, type the number of days that the certificate enrollment can be renewed, prior to the request expiring. This value is configured on the SCEP server, and is

used by the XBee Hive device to determine when to start attempting to auto-renew an existing certificate. The default is 7.

10. (Optional) Click **Debug** to enable verbose logging in /var/log/scep_client.
11. Click to expand **SCEP server**.

The screenshot shows a configuration form for the SCEP server. It has a title bar with a dropdown arrow and the text 'SCEP server'. Below the title bar are several input fields: 'FQDN' (empty), 'CA Identity' (empty), 'Path' (containing '/cgi-bin/pkiclient.exe'), 'Password' (empty), 'Encryption Algorithm' (a dropdown menu with 'Auto' selected), and 'Signature Algorithm' (a dropdown menu with 'Auto' selected). Each input field has a small 'x' icon to its right.

12. For **FQDN**, type the fully qualified domain name or IP address of the SCEP server.
13. (Optional) For **CA identity**, type a string that will be understood by the certificate authority. For example, it could be a domain name or a user name. If the certificate authority has multiple CA certificates, this field can be used to distinguish which is required.
14. For **Path**, Type the HTTP URL path required for accessing the certificate authority. You should leave this option at the default of **/cgi-bin/pkiclient.exe** unless directed by the CA to use another path.
15. For **Password**, type the challenge password as configured on the SCEP server.
16. For **Encryption Algorithm**, select the PKCS#7 encryption algorithm. The default is **Auto**, which automatically selects the best algorithm.
17. For **Signature Algorithm**, select the PKCS#7 signature algorithm. The default is **Auto**, which automatically selects the best algorithm.
18. Click to expand **Distinguished Name**.

The screenshot shows a configuration form for the Distinguished Name. It has a title bar with a dropdown arrow and the text 'Distinguished Name'. Below the title bar are several input fields: 'Domain Component' (empty), 'Country Code' (empty), 'State or Province' (empty), 'Locality' (empty), 'Organization' (empty), 'Organizational Unit' (empty), and 'Common Name' (empty). Each input field has a small 'x' icon to its right.

19. Type the value for each appropriate Distinguished Name attribute.
20. (Optional) Configure the certificate revocation list (CRL):
 - a. Click to expand **CRL**.
 - b. Click **Enable** to enable the CRL.

- c. For **Type**, select the type of CRL:
 - **URL**: The URL to the file name used to access the certificate revocation list from the CA.
 - **CRLDP**: The CRL distribution point.
 - **getCRL**: A CRL query using the issuer name and serial number from the certificate whose revocation status is being queried.

The default is **URL**.
- d. If **Type** is set to **URL**, for **URL**, type the URL to be used.
21. Configure certificate renewal:
 - a. Click to expand **Renewal**.
 - b. Click **Use New Private Key** to enable the creation of a new private key for renewal requests.
 - c. **Use Client Certificate** is enabled by default. Click to disable the use of a client certificate for renewal requests.
22. Click **Apply** to save the configuration and apply the change.

Command line

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Add a new SCEP client:

```
(config)> add network scep_client scep_client_name
(config network scep_client scep_client_name
)>
```

4. Enable the SCEP client:

```
(config network scep_client scep_client_name)> enable true
(config network scep_client scep_client_name)>
```

5. Set the url parameter to the fully qualified domain name or IP address of the SCEP server:

```
(config network scep_client scep_client_name)> server url https://scep.example.com
(config network scep_client scep_client_name)>
```

6. (Optional) Set a CA identity string that will be understood by the certificate authority. For example, it could be a domain name or a user name. If the certificate authority has multiple CA certificates, this field can be used to distinguish which is required.

```
(config network scep_client scep_client_name)> server ca_ident string
(config network scep_client scep_client_name)>
```

7. Set the HTTP URL path required for accessing the certificate authority. You should leave this option at the default of **/cgi-bin/pkiclient.exe** unless directed by the CA to use another path.

```
(config network scep_client scep_client_name)> server path path
(config network scep_client scep_client_name)>
```

8. Set the challenge password as configured on the SCEP server:

```
(config network scep_client scep_client_name)> server password challenge_password
(config network scep_client scep_client_name)>
```

9. Set Distinguished Name attributes:

- a. Set the Domain Component:

```
(config network scep_client scep_client_name)> distinguished_name dc value
(config network scep_client scep_client_name)>
```

- b. Set the two letter Country Code:

```
(config network scep_client scep_client_name)> distinguished_name c value
(config network scep_client scep_client_name)>
```

- c. Set the State or Province:

```
(config network scep_client scep_client_name)> distinguished_name st value
(config network scep_client scep_client_name)>
```

- d. Set the Locality:

```
(config network scep_client scep_client_name)> distinguished_name l value
(config network scep_client scep_client_name)>
```

- e. Set the Organization:

```
(config network scep_client scep_client_name)> distinguished_name o value
(config network scep_client scep_client_name)>
```

- f. Set the Organizational Unit:

```
(config network scep_client scep_client_name)> distinguished_name ou value
(config network scep_client scep_client_name)>
```

- g. Set the Common Name:

```
(config network scep_client scep_client_name)> distinguished_name cn value
(config network scep_client scep_client_name)>
```

10. (Optional) Configure the certificate revocation list (CRL):

- a. Enable the CRL:

```
(config network scep_client scep_client_name)> crl enable true
(config network scep_client scep_client_name)>
```

- b. Set the type of CRL:

```
(config network scep_client scep_client_name)> crl type value
(config network scep_client scep_client_name)>
```

where *value* is one of:

- **url**: The URL to the file name used to access the certificate revocation list from the CA.
- **crl dp**: The CRL distribution point.
- **getCRL**: A CRL query using the issuer name and serial number from the certificate whose revocation status is being queried.

The default is **url**.

- c. If **type** is set to **url**, set the URL that should be used:

```
(config network scep_client scep_client_name)> crl url value
(config network scep_client scep_client_name)>
```

11. Configure certificate renewal:

- a. To enable the creation of a new private key for renewal requests:

```
(config network scep_client scep_client_name)> renewal new_key true
(config network scep_client scep_client_name)>
```

- b. The use of a client certificate for renewal requests is enabled by default. To disable:

```
(config network scep_client scep_client_name)> renewal use_client_cert false
(config network scep_client scep_client_name)>
```

12. Set the maximum time that the device will poll the SCEP server, when operating in manual mode:

```
(config network scep_client scep_client_name)> max_poll_time value
(config network scep_client scep_client_name)>
```

where *value* is any number of weeks, days, hours, minutes, or seconds, and takes the format ***number*{w|d|h|m|s}**.

For example, to set **max_poll_time** to ten minutes, enter either **10m** or **600s**:

```
(config network scep_client scep_client_name)> max_poll_time 600s
(config network scep_client scep_client_name)>
```

The default is **1d**.

13. Set the amount of time that the device should wait between polling attempts, when operating in manual mode:

```
(config network scep_client scep_client_name)> polling_interval value
(config network scep_client scep_client_name)>
```

where *value* is any number of weeks, days, hours, minutes, or seconds, and takes the format ***number*{w|d|h|m|s}**.

For example, to set **polling_interval** to ten minutes, enter either **10m** or **600s**:

```
(config network scep_client scep_client_name)> polling_interval 600s
(config network scep_client scep_client_name)>
```

The default is **5s**.

14. Set the bit size of the private key:

```
(config network scep_client scep_client_name)> key_length int
(config network scep_client scep_client_name)>
```

The default is **2048**.

15. Set the number of days that the certificate enrollment can be renewed, prior to the request expiring. This value is configured on the SCEP server, and is used by the XBee Hive device to determine when to start attempting to auto-renew an existing certificate. The default is **7**.

```
(config network scep_client scep_client_name)> renewable_time integer
(config network scep_client scep_client_name)>
```

16. (Optional) Enable verbose logging in /var/log/scep_client:

```
(config network scep_client scep_client_name)> debug true
(config network scep_client scep_client_name)>
```

17. Save the configuration and apply the change.

```
(config network scep_client scep_client_name)> save
Configuration saved.
>
```

18. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Example: SCEP client configuration with Fortinet SCEP server

In this example configuration, we will configure the XBee Hive device as a SCEP client that will connect to a Fortinet SCEP server.

Fortinet configuration

On the Fortinet server:

1. Enable ports for SCEP services:
 - a. From the menu, select **Network > Interfaces**.
 - b. Select the appropriate port and click **Edit**.
 - c. For **Access Rights > Services**, enable the following services:
 - **HTTPS > SCEP**
 - **HTTPS > CRL Downloads**
 - **HTTP > SCEP**
 - **HTTP > CRL Downloads**

- d. The remaining fields can be left at their defaults or changed as appropriate.
- e. Click **OK**.
2. Create a Certificate Authority (CA):
 - a. From the menu, click **Certificate Authorities > Local CAs**.
 - b. Click **Create New**.
 - c. Type a **Certificate ID** for the CA, for example, **fortinet_example_ca**.
 - d. Complete the **Subject Information** fields.
 - e. The remaining fields can be left at their defaults or changed as appropriate.
 - f. Click **OK**.
3. Edit SCEP settings:
 - a. From the menu, click **SCEP > General**.
 - b. Click **Enable SCEP** if it is not enabled.
 - c. For **Default enrollment password**, enter a password. The password entered here must correspond to the challenge password configured for the SCEP client on the XBee Hive device.
 - d. The remaining fields can be left at their defaults or changed as appropriate.
 - e. Click **OK**.
4. Create an **Enrollment Request**:
 - a. From the menu, click **SCEP > Enrollment Requests**.
 - b. Click **Create New**.
 - c. For **Automatic request type**, select **Wildcard**.
 - d. For **Certificate authority**, select the CA created in step 1, above.
 - e. Complete the **Subject Information** fields. The Distinguished Name (DN) attributes entered here must correspond to the Distinguished Name attributes configured for the SCEP client on the XBee Hive device.
 - f. For **Renewal > Allow renewal x days before the certified is expired**, type the number of days that the certificate enrollment can be renewed, prior to the request expiring. The **Renewable Time** setting on the XBee Hive device must match the setting of this parameter.
 - g. The remaining fields can be left at their defaults or changed as appropriate.
 - h. Click **OK**.

XBee Hive configuration

On the XBee Hive device:

Web

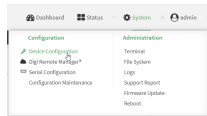
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

Remote Manager:

- a. Locate your device as described in [Use Digi Remote Manager to view and manage your device](#).
- b. Click the **Device ID**.
- c. Click **Settings**.
- d. Click to expand **Config**.

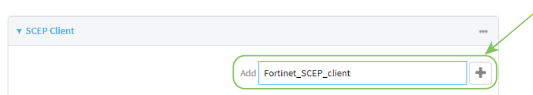
Local Web UI:

- a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

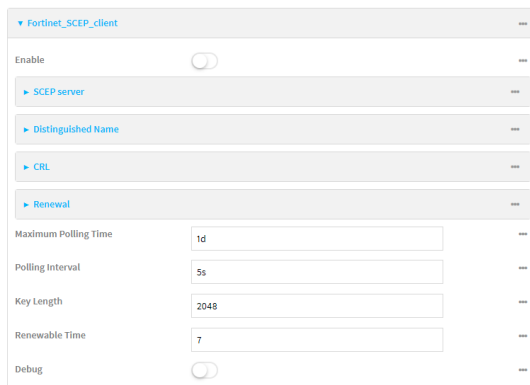


The **Configuration** window is displayed.

3. Click **Network > SCEP Client**.
4. For **Add clients**, enter a name for the SCEP client and click .

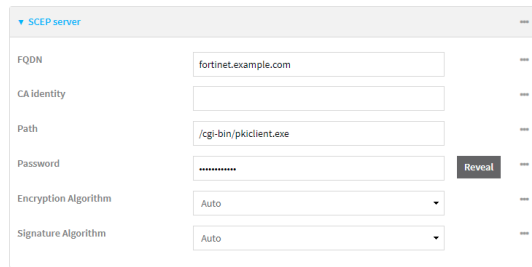


The new SCEP client configuration is displayed.



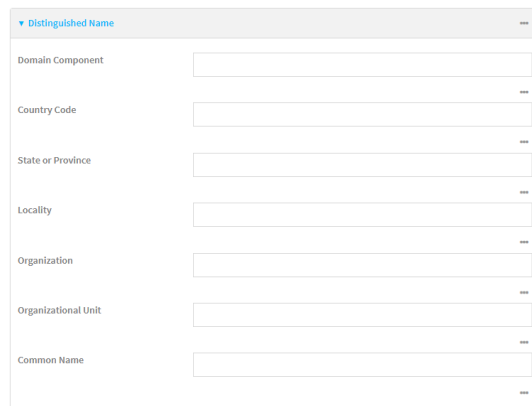
5. Click **Enable** to enable the SCEP client.
6. For **Renewable Time**, type the number of days that the certificate enrollment can be renewed, prior to the request expiring. This value must match the setting of the **Allow renewal x days before the certified is expired** option on the Fortinet server.
7. (Optional) Click **Debug** to enable verbose logging in /var/log/scep_client.

8. Click to expand **SCEP server**.



The screenshot shows the 'SCEP server' configuration form. It includes fields for FQDN (fortinet.example.com), CA identity, Path (/cgi-bin/pkiclient.exe), Password (masked with asterisks), Encryption Algorithm (Auto), and Signature Algorithm (Auto). A 'Reveal' button is next to the password field.

9. For **FQDN**, type the fully qualified domain name or IP address of the Fortinet server.
10. For **Password**, type the challenge password. This corresponds to the **Default enrollment password** on the Fortinet server.
11. Click to expand **Distinguished Name**.



The screenshot shows the 'Distinguished Name' configuration form. It includes fields for Domain Component, Country Code, State or Province, Locality, Organization, Organizational Unit, and Common Name.

12. Type the value for each appropriate Distinguished Name attribute. The values entered here must correspond to the DN attributes in the **Enrollment Request** on the Fortinet server.
13. Click **Apply** to save the configuration and apply the change.

Command line

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBees local command line as a user with full Admin access rights.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Add a new SCEP client, for example, **Fortinet_SCEP_client**:

```
(config)> add network scep_client Fortinet_SCEP_client
(config network scep_client Fortinet_SCEP_client
)>
```

4. Enable the SCEP client:

```
(config network scep_client Fortinet_SCEP_client)> enable true
(config network scep_client Fortinet_SCEP_client)>
```

5. Set the url parameter to the fully qualified domain name or IP address of the SCEP server:

```
(config network scep_client Fortinet_SCEP_client)> server url https://fortinet.example.com
(config network scep_client Fortinet_SCEP_client)>
```

6. Set the challenge password as configured on the SCEP server. This corresponds to the **Default enrollment password** on the Fortinet server.

```
(config network scep_client Fortinet_SCEP_client)> server password challenge_password
(config network scep_client Fortinet_SCEP_client)>
```

7. Set Distinguished Name attributes. The values entered here must correspond to the DN attributes in the **Enrollment Request** on the Fortinet server.

- a. Set the Domain Component:

```
(config network scep_client Fortinet_SCEP_client)> distinguished_name dc value
(config network scep_client Fortinet_SCEP_client)>
```

- b. Set the two letter Country Code:

```
(config network scep_client Fortinet_SCEP_client)> distinguished_name c value
(config network scep_client Fortinet_SCEP_client)>
```

- c. Set the State or Province:

```
(config network scep_client Fortinet_SCEP_client)> distinguished_name st value
(config network scep_client Fortinet_SCEP_client)>
```

- d. Set the Locality:

```
(config network scep_client Fortinet_SCEP_client)> distinguished_name l value
(config network scep_client Fortinet_SCEP_client)>
```

- e. Set the Organization:

```
(config network scep_client Fortinet_SCEP_client)> distinguished_name o value
(config network scep_client Fortinet_SCEP_client)>
```

- f. Set the Organizational Unit:

```
(config network scep_client Fortinet_SCEP_client)> distinguished_name ou value
(config network scep_client Fortinet_SCEP_client)>
```

- g. Set the Common Name:

```
(config network scep_client Fortinet_SCEP_client)> distinguished_name cn value
(config network scep_client Fortinet_SCEP_client)>
```

8. Set the number of days that the certificate enrollment can be renewed, prior to the request expiring. This value must match the setting of the **Allow renewal x days before the certified is expired** option on the Fortinet server.

```
(config network scep_client Fortinet_SCEP_client)> renewable_time integer
(config network scep_client Fortinet_SCEP_client)>
```

9. (Optional) Enable verbose logging in /var/log/scep_client:

```
(config network scep_client Fortinet_SCEP_client)> debug true
(config network scep_client Fortinet_SCEP_client)>
```

10. Save the configuration and apply the change.

```
(config network scep_client Fortinet_SCEP_client)> save
Configuration saved.
>
```

11. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Show SCEP client status and information

You can show general SCEP client information for all SCEP clients, and specific information for an individual SCEP client.

This procedure is only available from the Admin CLI.

Command line

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. To display details about all configured SCEP clients, type the following at the prompt:

```
> show scep-client

SCEP Enabled Expiry
-----
test true Jun 4 19:05:25 2022 GMT
test1 false

>
```

3. To display details about a specific SCEP client:

```
> show scep-client name name
```

For example:

```
> show scep-client name test

test SCEP Status
-----
Enabled : true

Client Certificate
-----
Subject : C=US,ST=MA,L=BOS,O=Digi,OU=IT1,CN=dummy
Issuer : CN=TA-SCEP-1-CA
Serial : 1100000017A30C8EDD3805EB52000000000017
Expiry : Jun 4 19:05:25 2022 GMT

Certificate Authority Certificate {1}
-----
Subject : C=US,CN=TA-SCEP-1-MSCEP-RA
Issuer : CN=TA-SCEP-1-CA
Serial : 1100000002A1E755981C0C3F340000000000002
Expiry : Apr 25 13:42:47 2023 GMT

Certificate Authority Certificate {2}
-----
Subject : C=US,CN=TA-SCEP-1-MSCEP-RA
Issuer : CN=TA-SCEP-1-CA
Serial : 1100000003268AFB5E98BFCA730000000000003
Expiry : Apr 25 13:42:48 2023 GMT

Certificate Authority Certificate {3}
-----
Subject : CN=TA-SCEP-1-CA
Issuer : CN=TA-SCEP-1-CA
Serial : 681670E9EFB7FCB74E79C33DD9D54847
Expiry : Apr 25 13:36:42 2027 GMT
```

Certificate Revocation List

Issuer : CN=TA-SCEP-1-CA

Last Update : May 23 13:27:21 2022 GMT

>

4. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

OpenVPN

OpenVPN is an open-source Virtual Private Network (VPN) technology that creates secure point-to-point or site-to-site connections in routed or bridged configurations. OpenVPN uses a custom security protocol that is Secure Socket Layer (SSL) / Transport Layer Security (TLS) for key exchange. It uses standard encryption and authentication algorithms for data privacy and authentication over TCP or UDP.

The OpenVPN server can push the network configuration, such as the topology and IP routes, to OpenVPN clients. This makes OpenVPN simpler to configure as it reduces the chances of a configuration mismatch between the client and server. OpenVPN also supports cipher negotiation between the client and server. This means you can configure the OpenVPN server and clients with a range of different cipher options and the server will negotiate with the client on the cipher to use for the connection.

For more information on OpenVPN, see www.openvpn.net.

OpenVPN modes:

There are two modes for running OpenVPN:

- Routing mode, also known as TUN.
- Bridging mode, also known as TAP.

Note TAP should not be used as the XBee Hive does not allow bridging.

Routing (TUN) mode

In routing mode, each OpenVPN client is assigned a different IP subnet from the OpenVPN server and other OpenVPN clients. OpenVPN clients use Network Address Translation (NAT) to route traffic from devices connected on its LAN interfaces to the OpenVPN server.

The manner in which the IP subnets are defined depends on the OpenVPN topology in use. The XBee Hive device supports two types of OpenVPN topology:

OpenVPN Topology	Subnet definition method
net30	Each OpenVPN client is assigned a /30 subnet within the IP subnet specified in the OpenVPN server configuration. With net30 topology, pushed routes are used, with the exception of the default route. Automatic route pushing (exec) is not allowed, because this would not inform the firewall and would be blocked.
subnet	Each OpenVPN client connected to the OpenVPN server is assigned an IP address within the IP subnet specified in the OpenVPN server configuration. For the XBee Hive device, pushed routes are not allowed; you will need to manually configure routes on the device.

For more information on OpenVPN topologies, see [OpenVPN topology](#).

Bridging (TAP) mode

In bridging mode, a LAN interface on the OpenVPN server is assigned to OpenVPN. The LAN interfaces of the OpenVPN clients are on the same IP subnet as the OpenVPN server's LAN interface. This means that devices connected to the OpenVPN client's LAN interface are on the

same IP subnet as devices. The XBee Hive device supports two mechanisms for configuring an OpenVPN server in TAP mode:

- OpenVPN managed—The XBee Hive device creates the interface and then uses its standard configuration to set up the connection (for example, its standard DHCP server configuration).
- Device only—IP addressing is controlled by the system, not by OpenVPN.

Additional OpenVPN information

For more information on OpenVPN, see these resources:

[Bridging vs. routing](#)

[OpenVPN/Routing](#)

Configure an OpenVPN server

Required configuration items

- Enable the OpenVPN server.
The OpenVPN server is enabled by default.
- The mode used by the OpenVPN server, one of:
 - **TUN (OpenVPN managed)**—Also known as routing mode. Each OpenVPN client is assigned a different IP subnet from the OpenVPN server and other OpenVPN clients. OpenVPN clients use Network Address Translation (NAT) to route traffic from devices connected on its LAN interfaces to the OpenVPN server.
 - **TAP - OpenVPN managed**—Also known as bridging mode. A more advanced implementation of OpenVPN. The XBee Hive device creates an OpenVPN interface and uses standard interface configuration (for example, a standard DHCP server configuration).

Note This option should not be selected as the XBee Hive hardware does not support bridging

- **TAP - Device only**—An alternate form of OpenVPN bridging mode, in which the device, rather than OpenVPN, controls the interface configuration. If this method is used, the OpenVPN server must be included as a device in either an interface or a bridge.

Note This option should not be selected as the XBee Hive hardware does not support bridging

- The firewall zone to be used by the OpenVPN server.
- The IP network and subnet mask of the OpenVPN server.
- The server's Certificate authority (CA) certificate, and public, private and Diffie-Hellman (DH) keys.
- An OpenVPN authentication group and an OpenVPN user.
- Determine the method of certificate management:
 - Certificates managed by the server.
 - Certificates created externally and added to the server.

- If certificates are created and added to the server, determine the level of authentication:
 - Certificate authentication only.
 - Username and password authentication only.
 - Certificate and username and password authentication.

If username and password authentication is used, you must create an OpenVPN authentication group and user. See [Configure an OpenVPN Authentication Group and User](#) for instructions.

- Certificates and keys:
 - The **CA certificate** (usually in a ca.crt file).
 - The **Public key** (for example, server.crt)
 - The **Private key** (for example, server.key).
 - The **Diffie Hellman key** (usually in dh2048.pem).
- Active recovery configuration. See [Configure SureLink active recovery for OpenVPN](#) for information about OpenVPN active recovery.

Additional configuration items

- The route metric for the OpenVPN server.
- The range of IP addresses that the OpenVPN server will provide to clients.
- The TCP/UDP port to use. By default, the XBee Hive device uses port **1194**.
- Access control list configuration to restrict access to the OpenVPN server through the firewall.
- Additional OpenVPN parameters.

Web

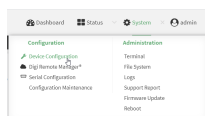
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

Remote Manager:

- a. Locate your device as described in [Use Digi Remote Manager to view and manage your device](#).
- b. Click the **Device ID**.
- c. Click **Settings**.
- d. Click to expand **Config**.

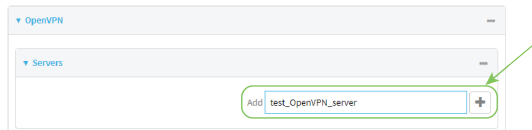
Local Web UI:

- a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

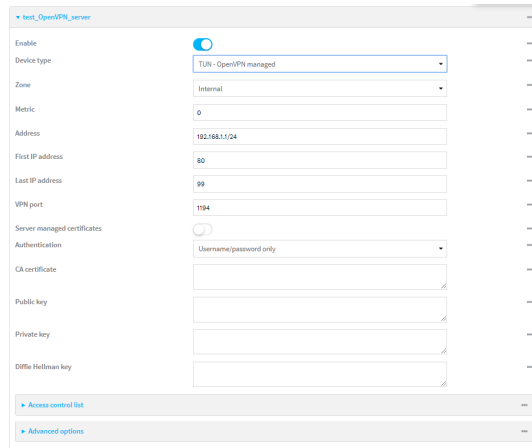


The **Configuration** window is displayed.

3. Click **VPN > OpenVPN > Servers**.
4. For **Add**, type a name for the OpenVPN server and click 



The new OpenVPN server configuration is displayed.



The OpenVPN server is enabled by default. To disable, toggle off **Enable**.

5. For **Device type**, select the mode used by the OpenVPN server, either:
 - **TUN (OpenVPN managed)**
 - **TAP - OpenVPN managed**
 - **TAP - Device only**

See [OpenVPN](#) for information about OpenVPN server modes.

6. If **TUN (OpenVPN managed)** or **TAP - OpenVPN managed** is selected for **Device type**:
 - a. For **Zone**, select the firewall zone for the OpenVPN server. For TUN device types, this should be set to **Internal** to treat clients as LAN devices.
 - b. (Optional) Select the **Metric** for the OpenVPN server. If multiple active routes match a destination, the route with the lowest metric will be used. The default setting is **0**.
 - c. For **Address**, type the IP address and subnet mask of the OpenVPN server.
 - d. (Optional) For **First IP address** and **Last IP address**, set the range of IP addresses that the OpenVPN server will use when providing IP addresses to clients. The default is from **80** to **99**.
7. (Optional) Set the **VPN port** that the OpenVPN server will use. The default is **1194**.
8. For **Server managed certificates**, determine the method of certificate management. If enabled, the server will manage certificates. If not enabled, certificates must be created externally and added to the server.

9. If **Server managed certificates** is not enabled:
 - a. Select the **Authentication** type:
 - **Certificate only**: Uses only certificates for client authentication. Each client requires a public and private key.
 - **Username/password only**: Uses a username and password for client authentication. You must create an OpenVPN authentication group and user. See [Configure an OpenVPN Authentication Group and User](#) for instructions.
 - **Certificate and username/password**: Uses both certificates and a username and password for client authentication. Each client requires a public and private key, and you must create an OpenVPN authentication group and user. See [Configure an OpenVPN Authentication Group and User](#) for instructions.
 - b. Paste the contents of the **CA certificate** (usually in a ca.crt file), the **Public key** (for example, server.crt), the **Private key** (for example, server.key), and the **Diffie Hellman key** (usually in dh2048.pem) into their respective fields. The contents will be hidden when the configuration is saved.
10. (Optional) Click to expand **Access control list** to restrict access to the OpenVPN server:
 - To limit access to specified IPv4 addresses and networks:
 - a. Click **IPv4 Addresses**.
 - b. For **Add Address**, click 
 - c. For **Address**, enter the IPv4 address or network that can access the device's service-type. Allowed values are:
 - A single IP address or host name.
 - A network designation in CIDR notation, for example, 192.168.1.0/24.
 - **any**: No limit to IPv4 addresses that can access the service-type.
 - d. Click  again to list additional IP addresses or networks.
 - To limit access to specified IPv6 addresses and networks:
 - a. Click **IPv6 Addresses**.
 - b. For **Add Address**, click 
 - c. For **Address**, enter the IPv6 address or network that can access the device's service-type. Allowed values are:
 - A single IP address or host name.
 - A network designation in CIDR notation, for example, 2001:db8::/48.
 - **any**: No limit to IPv6 addresses that can access the service-type.
 - d. Click  again to list additional IP addresses or networks.
 - To limit access to hosts connected through a specified interface on the device:
 - a. Click **Interfaces**.
 - b. For **Add Interface**, click 
 - c. For **Interface**, select the appropriate interface from the dropdown.
 - d. Click  again to allow access through additional interfaces.
 - To limit access based on firewall zones:
 - a. Click **Zones**. By default, there are three firewall zones already configured: Internal, Edge, and IPsec.

- b. For **Add Zone**, click 
 - c. For **Zone**, select the appropriate firewall zone from the dropdown.
See [Firewall configuration](#) for information about firewall zones.
 - d. Click  again to allow access through additional firewall zones.
11. (Optional) Click to expand **Advanced Options** to manually set additional OpenVPN parameters.
 - a. Click **Enable** to enable the use of additional OpenVPN parameters.
 - b. Click **Override** if the additional OpenVPN parameters should override default options.
 - c. For **OpenVPN parameters**, type the additional OpenVPN parameters.
12. Click **Apply** to save the configuration and apply the change.

Command line

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. At the config prompt, type:

```
(config)> add vpn openvpn server name
(config vpn openvpn server name)>
```

where *name* is the name of the OpenVPN server.

The OpenVPN server is enabled by default. To disable the server, type:

```
(config vpn openvpn server name)> enable false
(config vpn openvpn server name)>
```

4. Set the mode used by the OpenVPN server:

```
(config vpn openvpn server name)> device_type value
(config vpn openvpn server name)>
```

where *value* is one of:

- **TUN (OpenVPN managed)**—Also known as routing mode. Each OpenVPN client is assigned a different IP subnet from the OpenVPN server and other OpenVPN clients. OpenVPN clients use Network Address Translation (NAT) to route traffic from devices connected on its LAN interfaces to the OpenVPN server.
- **TAP - OpenVPN managed**—Also known as bridging mode. A more advanced implementation of OpenVPN. The XBee Hive device creates an OpenVPN interface and uses standard interface configuration (for example, a standard DHCP server configuration).

Note This option should not be selected as the XBee Hive hardware does not support bridging

- **TAP - Device only**—An alternate form of OpenVPN bridging mode, in which the device, rather than OpenVPN, controls the interface configuration. If this method is used, the OpenVPN server must be included as a device in either an interface or a bridge.
-

Note This option should not be selected as the XBee Hive hardware does not support bridging

See [OpenVPN](#) for information about OpenVPN modes. The default is **tun**.

5. If **tap** or **tun** are set for **device_type**:

- a. Set the IP address and subnet mask of the OpenVPN server.

```
(config vpn openvpn server name)> address ip_address/netmask
(config vpn openvpn server name)>
```

- b. Set the firewall zone for the OpenVPN server. For TUN device types, this should be set to **internal** to treat clients as LAN devices.

```
(config vpn openvpn server name)> zone value
(config vpn openvpn server name)>
```

To view a list of available zones:

```
(config vpn openvpn server name)> firewall zone ?
```

Zone: The zone for the local TUN interface. To treat clients as LAN devices this would usually be set to internal.

Format:

```
any
dynamic_routes
edge
external
internal
ipsec
loopback
setup
```

Current value:

```
(config vpn openvpn server name)>
```

- c. (Optional) Set the route metric for the OpenVPN server. If multiple active routes match a destination, the route with the lowest metric will be used.

```
(config vpn openvpn server name)> metric value
(config vpn openvpn server name)>
```

where *value* is an integer between **0** and **65535**. The default is **0**.

- d. (Optional) Set the range of IP addresses that the OpenVPN server will use when providing IP addresses to clients:

- i. Set the first address in the range limit:

```
(config vpn openvpn server name)> server_first_ip value
(config vpn openvpn server name)>
```

where *value* is a number between **1** and **255**. The number entered here will represent the first client IP address. For example, if **address** is set to **192.168.1.1/24** and **server_first_ip** is set to **80**, the first client IP address will be 192.168.1.80.

The default is from **80**.

- ii. Set the last address in the range limit:

```
(config vpn openvpn server name)> server_last_ip value
(config vpn openvpn server name)>
```

where *value* is a number between **1** and **255**. The number entered here will represent the last client IP address. For example, if **address** is set to **192.168.1.1/24** and **server_last_ip** is set to **99**, the last client IP address will be 192.168.1.80.

The default is from **80**.

6. (Optional) Set the port that the OpenVPN server will use:

```
(config vpn openvpn server name)> port port
(config vpn openvpn server name)>
```

The default is **1194**.

7. Determine the method of certificate management:

- a. To allow the server to manage certificates:

```
(config vpn openvpn server name)> autogenerate true
(config vpn openvpn server name)>
```

- b. To create certificates externally and add them to the server

```
(config vpn openvpn server name)> autogenerate false
(config vpn openvpn server name)>
```

The default setting is **false**.

- c. If **autogenerate** is set to false:

- i. Set the authentication type:

```
(config vpn openvpn server name)> authentication value
(config vpn openvpn server name)>
```

where *value* is one of:

- **cert**: Uses only certificates for client authentication. Each client requires a public and private key.
- **passwd**: Uses a username and password for client authentication. You must create an OpenVPN authentication group and user. See [Configure an OpenVPN Authentication Group and User](#) for instructions.

- **cert_passwd**: Uses both certificates and a username and password for client authentication. Each client requires a public and private key, and you must create an OpenVPN authentication group and user. See [Configure an OpenVPN Authentication Group and User](#) for instructions.

- ii. Paste the contents of the CA certificate (usually in a ca.crt file) into the value of the **cacert** parameter:

```
(config vpn openvpn server name)> cacert value
(config vpn openvpn server name)>
```

- iii. Paste the contents of the public key (for example, server.crt) into the value of the **server_cert** parameter:

```
(config vpn openvpn server name)> server_cert value
(config vpn openvpn server name)>
```

- iv. Paste the contents of the private key (for example, server.key) into the value of the **server_key** parameter:

```
(config vpn openvpn server name)> server_key value
(config vpn openvpn server name)>
```

- v. Paste the contents of the Diffie Hellman key (usually in dh2048.pem) into the value of the **diffie** parameter:

```
(config vpn openvpn server name)> diffie value
(config vpn openvpn server name)>
```

8. (Optional) Set the access control list to restrict access to the OpenVPN server:

- To limit access to specified IPv4 addresses and networks:

```
(config vpn openvpn server name)> add acl address end value
(config vpn openvpn server name)>
```

Where *value* can be:

- A single IP address or host name.
- A network designation in CIDR notation, for example, 192.168.1.0/24.
- **any**: No limit to IPv4 addresses that can access the service-type.

Repeat this step to list additional IP addresses or networks.

- To limit access to specified IPv6 addresses and networks:

```
(config vpn openvpn server name)> add acl address6 end value
(config vpn openvpn server name)>
```

Where *value* can be:

- A single IP address or host name.
- A network designation in CIDR notation, for example, 2001:db8::/48.
- **any**: No limit to IPv6 addresses that can access the service-type.

Repeat this step to list additional IP addresses or networks.

- To limit access to hosts connected through a specified interface on the XBee Hive device:

```
(config vpn openvpn server name)> add acl interface end value
(config vpn openvpn server name)>
```

Where *value* is an interface defined on your device.

Display a list of available interfaces:

Use ... **network interface ?** to display interface information:

Repeat this step to list additional interfaces.

- To limit access based on firewall zones:

```
(config vpn openvpn server name)> add acl zone end value
(config vpn openvpn server name)>
```

Where *value* is a firewall zone defined on your device, or the **any** keyword.

Display a list of available firewall zones:

Type ... **firewall zone ?** at the config prompt:

```
(config vpn openvpn server name)> ... firewall zone ?
```

Zones: A list of groups of network interfaces that can be referred to by packet filtering rules and access control lists.

Additional Configuration

```
any
dynamic_routes
edge
external
internal
ipsec
loopback
setup
```

```
(config vpn openvpn server name)>
```

Repeat this step to include additional firewall zones.

9. (Optional) Set additional OpenVPN parameters.

- Enable the use of additional OpenVPN parameters:

```
(config vpn openvpn server name)> advanced_options enable true
(config vpn openvpn server name)>
```

- Configure whether the additional OpenVPN parameters should override default options:

```
(config vpn openvpn server name)> advanced_options override true
(config vpn openvpn server name)>
```

- c. Set the additional OpenVPN parameters:

```
(config vpn openvpn server name)> extra parameters
(config vpn openvpn server name)>
```

10. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

11. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Configure an OpenVPN Authentication Group and User

If username and password authentication is used for the OpenVPN server, you must create an OpenVPN authentication group and user.

See [Configure an OpenVPN server](#) for information about configuring an OpenVPN server to use username and password authentication. See [XBee Hive user authentication](#) for more information about creating authentication groups and users.

Web

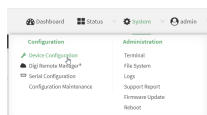
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

Remote Manager:

- a. Locate your device as described in [Use Digi Remote Manager to view and manage your device](#).
- b. Click the **Device ID**.
- c. Click **Settings**.
- d. Click to expand **Config**.

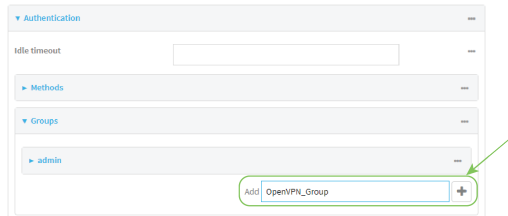
Local Web UI:

- a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

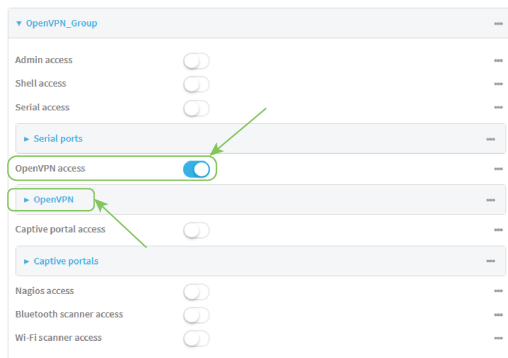


The **Configuration** window is displayed.

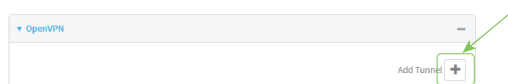
3. Add an OpenVPN authentication group:
 - a. Click **Authentication > Groups**.
 - b. For **Add Group**, type a name for the group (for example, **OpenVPN_Group**) and click .



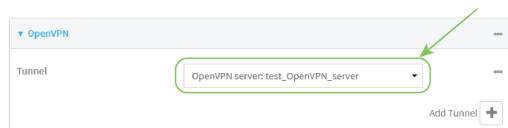
The new authentication group configuration is displayed.



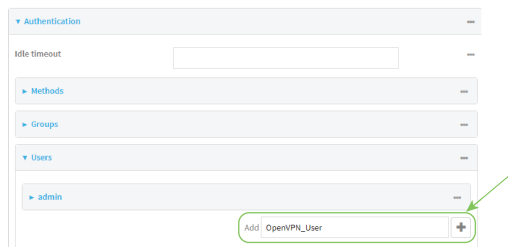
- c. Click **OpenVPN access** to enable OpenVPN access rights for users of this group.
- d. Click to expand the **OpenVPN** node.
- e. Click  to add a tunnel.



- f. For **Tunnel**, select an OpenVPN tunnel to which users of this group will have access.



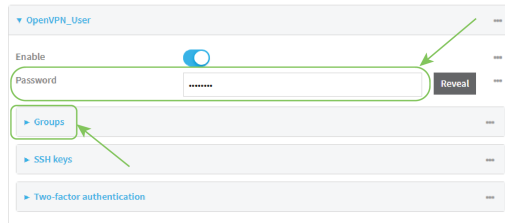
- g. Repeat to add additional OpenVPN tunnels.
4. Add an OpenVPN authentication user:
 - a. Click **Authentication > Users**.
 - b. For **Add**, type a name for the user (for example, **OpenVPN_User**) and click .



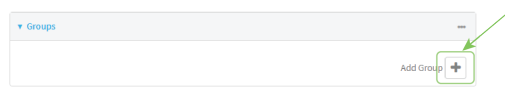
- c. Type a password for the user.

This password is used for local authentication of the user. You can also configure the user to use RADIUS or TACACS+ authentication by configuring authentication methods. See [User authentication methods](#) for information.

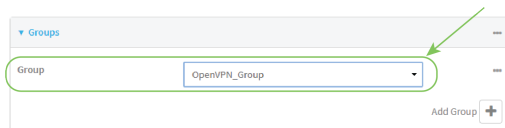
- d. Click to expand the **Groups** node.



- e. Click  to add a group to the user.



- f. Select a **Group** with **OpenVPN access** enabled.



5. Click **Apply** to save the configuration and apply the change.

Command line

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the Xbee Hive local command line as a user with full Admin access rights.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Use the **add auth group** command to add a new authentication. For example, to add a group named **OpenVPN_Group**:

```
(config)> add auth group OpenVPN_Group
(config auth group OpenVPN_Group)>
```

4. Enable OpenVPN access rights for users of this group:

```
(config auth group OpenVPN_Group)> acl openvpn enable true
```

5. Add an OpenVPN tunnel to which users of this group will have access:

- a. Determine available tunnels:

```
(config auth group OpenVPN_Group)> ... .. vpn openvpn server ?
```

Servers: A list of openvpn servers

Additional Configuration

OpenVPN_server1 OpenVPN server

```
(config auth group OpenVPN_Group)>
```

- b. Add a tunnel:

```
(config auth group OpenVPN_Group)> add auth group test acl openvpn tunnels end
/vpn/openvpn/server/OpenVPN_server1
(config auth group OpenVPN_Group)>
```

6. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

7. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Configure an OpenVPN client by using an .ovpn file

Required configuration items

- Enable the OpenVPN client.
The OpenVPN client is enabled by default.
- The firewall zone to be used by the OpenVPN client.

Additional configuration items

- The route metric for the OpenVPN client.
- The login credentials for the OpenVPN client, if configured on the OpenVPN server.

See [Configure SureLink active recovery for OpenVPN](#) for information about OpenVPN active recovery.

Web

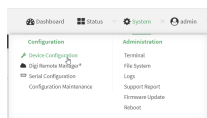
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

Remote Manager:

- a. Locate your device as described in [Use Digi Remote Manager to view and manage your device](#).
- b. Click the **Device ID**.
- c. Click **Settings**.
- d. Click to expand **Config**.

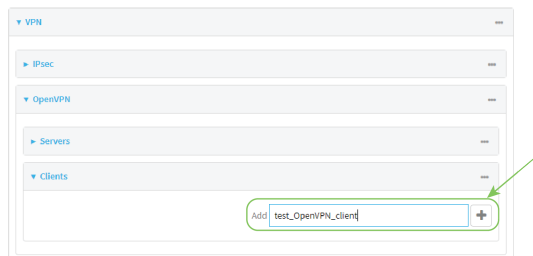
Local Web UI:

- a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



The **Configuration** window is displayed.

3. Click **VPN > OpenVPN > Clients**.
4. For **Add**, type a name for the OpenVPN client and click **+**.



The new OpenVPN client configuration is displayed.

5. The OpenVPN client is enabled by default. To disable, toggle off **Enable**.
6. The default behavior is to use an OVPN file for client configuration. To disable this behavior and configure the client manually, click **Use .ovpn file** to disable. If **Use .ovpn file** is disabled, see [Configure an OpenVPN client without using an .ovpn file](#) for configuration information.
7. For **Zone**, select the firewall zone for the OpenVPN client.
8. (Optional) Select the **Metric** for the OpenVPN client. If multiple active routes match a destination, the route with the lowest metric will be used.
9. (Optional) For **Username** and **Password**, type the login credentials as configured on the OpenVPN server.
10. For **OVPN file**, paste the content of the client.ovpn file.
11. Click **Apply** to save the configuration and apply the change.

Command line

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. At the config prompt, type:

```
(config)> add vpn openvpn client name
(config vpn openvpn client name)>
```

where *name* is the name of the OpenVPN server.

The OpenVPN client is enabled by default. To disable the client, type:

```
(config vpn openvpn client name)> enable false
(config vpn openvpn client name)>
```

4. Set the firewall zone for the OpenVPN client:

```
(config vpn openvpn client name)> zone value
(config vpn openvpn client name)>
```

To view a list of available zones:

```
(config vpn openvpn client name)> zone ?
```

Zone: The zone for the openvpn client interface.

Format:

```
any
dynamic_routes
edge
external
internal
ipsec
loopback
setup
```

Current value:

```
(config vpn openvpn client name)>
```

5. (Optional) Set the route metric for the OpenVPN server. If multiple active routes match a destination, the route with the lowest metric will be used.

```
(config vpn openvpn client name)> metric value
(config vpn openvpn client name)>
```

where *value* is an interger between **0** and **65535**. The default is **0**.

6. (Optional) Set the login credentials as configured on the OpenVPN server:

```
(config vpn openvpn client name)> username value
(config vpn openvpn client name)> password value
(config vpn openvpn client name)>
```

7. Paste the content of the client.ovpn file into the value of the **config_file** parameter:

```
(config vpn openvpn client name)> config_file value
(config vpn openvpn client name)>
```

8. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

9. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Configure an OpenVPN client without using an .ovpn file

Required configuration items

- Enable the OpenVPN client.
The OpenVPN client is enabled by default.
- The mode used by the OpenVPN server: routing (TUN), or bridging (TAP).
- The firewall zone to be used by the OpenVPN client.
- The IP address of the OpenVPN server.
- Certificates and keys:
 - The **CA certificate** (usually in a ca.crt file).
 - The **Public key** (for example, client.crt)
 - The **Private key** (for example, client.key).

Additional configuration items

- The route metric for the OpenVPN client.
- The login credentials for the OpenVPN client, if configured on the OpenVPN server.
- Additional OpenVPN parameters.

See [Configure SureLink active recovery for OpenVPN](#) for information about OpenVPN active recovery.

Web

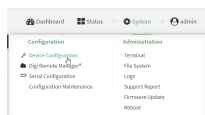
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

Remote Manager:

- a. Locate your device as described in [Use Digi Remote Manager to view and manage your device](#).
- b. Click the **Device ID**.
- c. Click **Settings**.
- d. Click to expand **Config**.

Local Web UI:

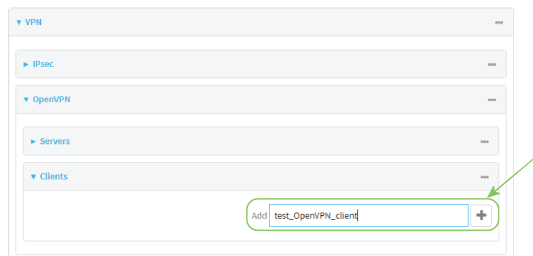
- a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



The **Configuration** window is displayed.

3. Click **VPN > OpenVPN > Clients**.

4. For **Add**, type a name for the OpenVPN client and click .



The new OpenVPN client configuration is displayed.

5. The OpenVPN client is enabled by default. To disable, toggle off **Enable**.
6. The default behavior is to use an OVPN file for client configuration. To disable this behavior and configure the client manually, click **Use .ovpn file** to disable.
7. For **Device type**, select the mode used by the OpenVPN server: **TUN** or **TAP**.
8. For **Zone**, select the firewall zone for the OpenVPN client.
9. (Optional) Select the **Metric** for the OpenVPN client. If multiple active routes match a destination, the route with the lowest metric will be used.
10. (Optional) For **Username** and **Password**, type the login credentials as configured on the OpenVPN server.
11. For **VPN server IP**, type the IP address of the OpenVPN server.
12. (Optional) Set the **VPN port** used by the OpenVPN server. The default is **1194**.
13. Paste the contents of the **CA certificate** (usually in a ca.crt file), the **Public key** (for example, client.crt), and the **Private key** (for example, client.key) into their respective fields. The contents will be hidden when the configuration is saved.
14. (Optional) Click to expand **Advanced Options** to manually set additional OpenVPN parameters.

- a. Click **Enable** to enable the use of additional OpenVPN parameters.
 - b. Click **Override** if the additional OpenVPN parameters should override default options.
 - c. For **OpenVPN parameters**, type the additional OpenVPN parameters. For example, to override the configuration by using a configuration file, enter **--config filename**, for example, **--config /etc/config/openvpn_config**.
15. Click **Apply** to save the configuration and apply the change.

Command line

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. At the config prompt, type:

```
(config)> add vpn openvpn client name
(config vpn openvpn client name)>
```

where *name* is the name of the OpenVPN server.

The OpenVPN client is enabled by default. To disable the client, type:

```
(config vpn openvpn client name)> enable false
(config vpn openvpn client name)>
```

4. The default behavior is to use an OVPN file for client configuration. To disable this behavior and configure the client manually:

```
(config vpn openvpn client name)> use_file false
(config vpn openvpn client name)>
```

5. Set the mode used by the OpenVPN server:

```
(config vpn openvpn client name)> device_type value
(config vpn openvpn client name)>
```

where *value* is either **tun** or **tap**. The default is **tun**.

6. Set the firewall zone for the OpenVPN client:

```
(config vpn openvpn client name)> zone value
(config vpn openvpn client name)>
```

To view a list of available zones:

```
(config vpn openvpn client name)> zone ?
```

Zone: The zone for the openvpn client interface.

Format:
 any
 dynamic_routes
 edge
 external
 internal
 ipsec
 loopback
 setup
 Current value:

(config vpn openvpn client *name*)>

7. (Optional) Set the route metric for the OpenVPN server. If multiple active routes match a destination, the route with the lowest metric will be used.

(config vpn openvpn client *name*)> metric *value*
 (config vpn openvpn client *name*)>

where *value* is an interger between **0** and **65535**. The default is **0**.

8. (Optional) Set the login credentials as configured on the OpenVPN server:

(config vpn openvpn client *name*)> username *value*
 (config vpn openvpn client *name*)> password *value*
 (config vpn openvpn client *name*)>

9. Set the IP address of the OpenVPN server:

(config vpn openvpn client *name*)> server *ip_address*
 (config vpn openvpn client *name*)>

10. (Optional) Set the port used by the OpenVPN server:

(config vpn openvpn client *name*)> port *port*
 (config vpn openvpn client *name*)>

The default is **1194**.

11. Paste the contents of the CA certificate (usually in a ca.crt file) into the value of the **cacert** parameter:

(config vpn openvpn client *name*)> cacert *value*
 (config vpn openvpn client *name*)>

12. Paste the contents of the public key (for example, client.crt) into the value of the **public_cert** parameter:

(config vpn openvpn client *name*)> public_cert *value*
 (config vpn openvpn client *name*)>

13. Paste the contents of the private key (for example, client.key) into the value of the **private_key** parameter:

```
(config vpn openvpn client name)> private_key value
(config vpn openvpn client name)>
```

14. (Optional) Set additional OpenVPN parameters.

- a. Enable the use of additional OpenVPN parameters:

```
(config vpn openvpn client name)> advanced_options enable true
(config vpn openvpn client name)>
```

- b. Configure whether the additional OpenVPN parameters should override default options:

```
(config vpn openvpn client name)> advanced_options override true
(config vpn openvpn client name)>
```

- c. Set the additional OpenVPN parameters:

```
(config vpn openvpn client name)> advanced_options extra parameters
(config vpn openvpn client name)>
```

15. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

16. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Configure SureLink active recovery for OpenVPN

You can configure the XBee Hive device to regularly probe OpenVPN client connections to determine if the connection has failed and take remedial action.

Required configuration items

- A valid OpenVPN client configuration. See [Configure an OpenVPN client by using an .ovpn file](#) or [Configure an OpenVPN client without using an .ovpn file](#) for configuration instructions.
- Enable OpenVPN SureLink.
- The behavior of the XBee Hive device upon OpenVPN failure: either
 - Restart the OpenVPN interface
 - Reboot the device.

Additional configuration items

- The interval between connectivity tests.
- Whether the interface should be considered to have failed if one of the test targets fails, or all of the test targets fail.
- The number of probe failures before the OpenVPN connection is considered to have failed.
- The amount of time that the device should wait for a response to a probe failures before considering it to have failed.

To configure the XBee Hive device to regularly probe the OpenVPN connection:

Web

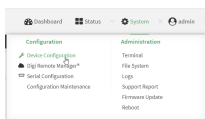
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

Remote Manager:

- a. Locate your device as described in [Use Digi Remote Manager to view and manage your device](#).
- b. Click the **Device ID**.
- c. Click **Settings**.
- d. Click to expand **Config**.

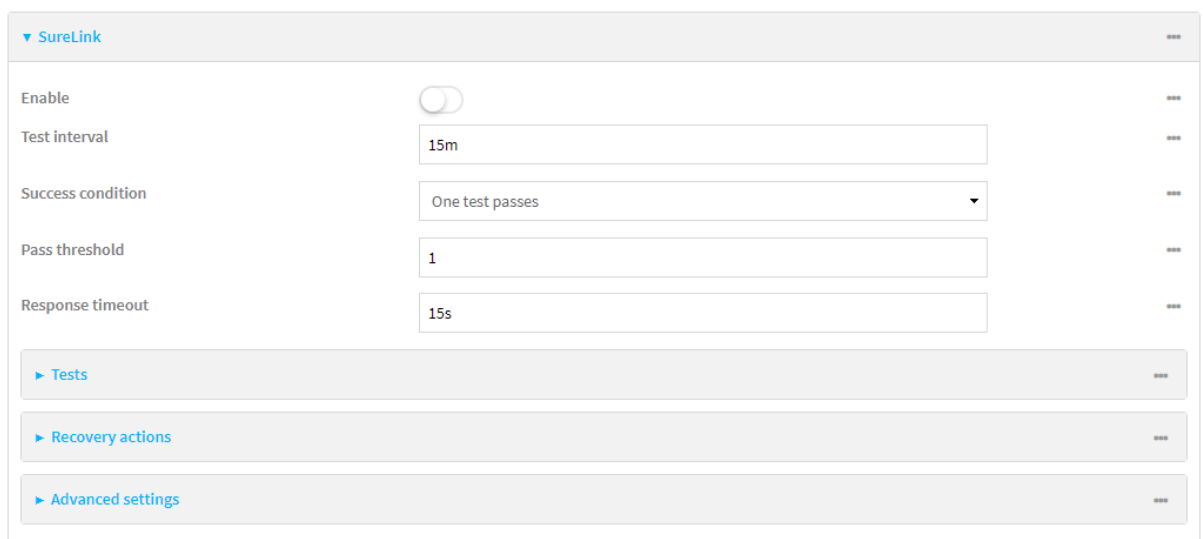
Local Web UI:

- a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



The **Configuration** window is displayed.

3. Click **VPN > OpenVPN > Clients**.
4. Create a new OpenVPN client or select an existing one:
 - To create a new OpenVPN client, see [Configure an OpenVPN client by using an .ovpn file](#) or [Configure an OpenVPN client without using an .ovpn file](#).
 - To edit an existing OpenVPN client, click to expand the appropriate client.
5. After creating or selecting the OpenVPN client, click **SureLink**.


 A screenshot of the 'SureLink' configuration window in the Digi Remote Manager. The window has a title bar with a dropdown arrow and the text 'SureLink'. Below the title bar, there are several configuration fields:

- Enable**: A toggle switch that is currently turned off.
- Test interval**: A text input field containing '15m'.
- Success condition**: A dropdown menu showing 'One test passes'.
- Pass threshold**: A text input field containing '1'.
- Response timeout**: A text input field containing '15s'.

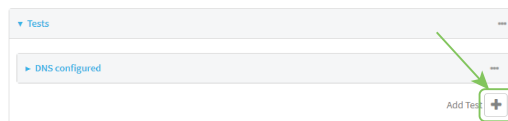
 At the bottom of the window, there are three expandable sections:

- Tests**: Indicated by a blue right-pointing arrow.
- Recovery actions**: Indicated by a blue right-pointing arrow.
- Advanced settings**: Indicated by a blue right-pointing arrow.

6. **Enable** SureLink.
7. (Optional) Change the **Test interval** between connectivity tests.
 Allowed values are any number of weeks, days, hours, minutes, or seconds, and take the format **number{w|d|h|m|s}**.
 For example, to set **Interval** to ten minutes, enter **10m** or **600s**.
 The default is 15 minutes.
8. (Optional) If more than one test target is configured, for **Success condition**, select either:
 - **One test passes**: Only one test needs to pass for Surelink to consider an interface to be up.
 - **All test pass**: All tests need to pass for SureLink to consider the interface to be up.
9. (Optional) For **Pass threshold**, type or select the number of times that the test must pass after failure, before the interface is determined to be working and is reinstated.
10. (Optional) For **Response timeout**, type the amount of time that the device should wait for a response to a test failure before considering it to have failed.
 Allowed values are any number of weeks, days, hours, minutes, or seconds, and take the format **number{w|d|h|m|s}**.
 For example, to set **Response timeout** to ten minutes, enter **10m** or **600s**.
 The default is 15 seconds.
11. Click to expand **Tests**.

By default, **Test DNS servers configured for this interface** is automatically configured and enabled. This test communication with DNS servers that are either provided by DHCP, or statically configured for this interface.

- a. Click 



New tests are enabled by default. To disable, click to toggle off **Enable**.

- b. Type a **Label** for the test.
- c. Click to toggle on **IPv6** if the test should apply to both IPv6 rather than IPv4.
- d. Select the **Test type**.

Available test types:

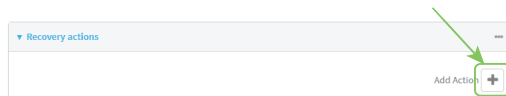
- **Ping test**: Uses ICMP to determine connectivity.

If **Ping test** is selected, complete the following:

- **Ping target**: The type of target for the ping, one of:
 - **Hostname or IP address** of an external server.
 - **Ping host**: hostname or IP address of the server.
 - The **Interface gateway**. If **Interface gateway** is selected, an initial traceroute is sent to the hostname or IP address configured in the SureLink advanced settings, and then the first hop in that route is used for the ping test.

- The **Interface address**.
- The **Interface DNS** server.
- **Ping payload size**: The number of bytes to send as part of the ping payload.
- **DNS test**: Performs a DNS query to the named DNS server.
If **DNS test** is selected, complete the following:
 - **DNS server**: The IP address of the DNS server.
- **HTTP test**: Uses HTTP(s) GET requests to determine connectivity to the configured web server.
If **HTTP test** is selected, complete the following:
 - **Web server**: The URL of the web server.
- **Test DNS servers configured for this interface**: Tests communication with DNS servers that are either provided by DHCP, or statically configured for this interface.
- **Test the interface status**: Tests the current status of the interface. The test fails if the interface is down. Failing this test infers that all other tests fail.
If **Test the interface status** is selected, complete the following:
 - **Down time**: The amount of time that the interface is down before the test can be considered to have failed.
Allowed values are any number of weeks, days, hours, minutes, or seconds, and take the format *number{w|d|h|m|s}*.
For example, to set **Down time** to ten minutes, enter **10m** or **600s**.
 - **Initial connection time**: The amount of time to wait for the interface to connect for the first time before the test is considered to have failed.
Allowed values are any number of weeks, days, hours, minutes, or seconds, and take the format *number{w|d|h|m|s}*.
For example, to set **Initial connection time** to ten minutes, enter **10m** or **600s**.
- **Custom test**: Tests the interface with custom commands.
If **Custom test** is selected, complete the following:
 - The **Commands to run to test**.
- **TCP connection test**: Tests that the interface can reach a destination port on the configured host.
If **TCP connection test** is selected, complete the following:
 - **TCP connect host**: The hostname or IP address of the host to create a TCP connection to.
 - **TCP connect port**: The TCP port to create a TCP connection to.
- **Test another interface's status**: Tests the status of another interface.
If **Test another interface's status** is selected, complete the following:

- **Test interface:** The interface to test.
 - **IP version:** The type of IP connection, one of:
 - **Any:** Either the IPv4 or IPv6 connection must be up.
 - **Both:** Both the IPv4 or IPv6 connection must be up.
 - **IPv4:** The IPv4 connection must be up.
 - **IPv6:** The IPv6 connection must be up.
 - **Expected status:** The status required for the test to pass.
 - **Up:** The test will pass only if the referenced interface is up and passing its own SureLink tests (if applicable).
 - **Down:** The test will pass only if the referenced interface is down or failing its own SureLink tests (if applicable).
- e. Repeat for each additional test.
12. Add recovery actions:
- a. Click to expand **Recovery actions**.
- By default, there are two preconfigured recovery actions:
- **Update routing:** Uses the **Change default gateway** action, which increases the interface's metric by 100 to change the default gateway.
 - **Restart interface.**
- b. Click 



New recovery actions are enabled by default. To disable, click to toggle off **Enable**.

- c. Type a **Label** for the recovery action.
- d. For **Recovery type**, select **Reboot device**.
- e. For **Recovery type**, select the type of recovery action. If multiple recovery actions are configured, they are performed in the order that they are listed.
- **Change default gateway:** Increases the interface's metric to change the default gateway.

If **Change default gateway** is selected, complete the following:

 - **SureLink test failures:** The number of failures for this recovery action to perform, before moving to the next recovery action.
 - **Increase metric to change active default gateway:** Increase the interface's metric by this amount. This should be set to a number large enough to change the routing table to use another default gateway. The default is **100**.
 - **Override wait interval before performing the next recovery action:** The time to wait before the next test is run. If set to the default value of **0s**, the **Test interval** is used.
 - **Restart interface.**

If **Restart interface** is selected, complete the following:

- **SureLink test failures:** The number of failures for this recovery action to perform, before moving to the next recovery action.
 - **Override wait interval before performing the next recovery action:** The time to wait before the next test is run. If set to the default value of **0s**, the **Test interval** is used.
- **Reset modem:** This recovery action is available for WWAN interfaces only.
- If **Reset modem** is selected, complete the following:
- **SureLink test failures:** The number of failures for this recovery action to perform, before moving to the next recovery action.
 - **Override wait interval before performing the next recovery action:** The time to wait before the next test is run. If set to the default value of **0s**, the **Test interval** is used.
- **Switch to alternate SIM:** Switches to an alternate SIM. This recovery action is available for WWAN interfaces only.
- If **Switch to alternate SIM** is selected, complete the following:
- **SureLink test failures:** The number of failures for this recovery action to perform, before moving to the next recovery action.
 - **Override wait interval before performing the next recovery action:** The time to wait before the next test is run. If set to the default value of **0s**, the **Test interval** is used.
- **Reboot device.**
- If **Reboot device** is selected, complete the following:
- **SureLink test failures:** The number of failures for this recovery action to perform, before moving to the next recovery action.
 - **Override wait interval before performing the next recovery action:** The time to wait before the next test is run. If set to the default value of **0s**, the **Test interval** is used.
- **Execute custom Recovery commands.**
- If **Recovery commands** is selected, complete the following:
- **SureLink test failures:** The number of failures for this recovery action to perform, before moving to the next recovery action.
 - The **Commands to run to recovery connectivity.**
 - **Override wait interval before performing the next recovery action:** The time to wait before the next test is run. If set to the default value of **0s**, the **Test interval** is used.
- **Switch eSIM profile** for carrier profile connectivity issue detection and alternate carrier profile selection to help maintain cellular service. For more information, [see Configure SureLink to switch eSIM profiles](#) in the Cellular documentation portal.
- If **Switch eSIM profile** is selected, complete the following:
- **Label**, type a word or phrase to identify the action. For example, *Repower modem - eSIM*.

- **Recovery type**, select **Switch eSIM profile**.
 - **Powercycle the modem**. This recovery action is available for WWAN interfaces only.
 - If **Powercycle the modem** is selected, complete the following:
 - **SureLink test failures**: The number of failures for this recovery action to perform, before moving to the next recovery action.
 - **Override wait interval before performing the next recovery action**: The time to wait before the next test is run. If set to the default value of **0s**, the **Test interval** is used.
 - f. Repeat for each additional recovery action.
13. (Optional) Configure advanced SureLink parameters:
- a. Click to expand **Advanced settings**.
 - b. For **Delayed Start**, type the amount of time to wait while the device is starting before SureLink testing begins. This setting is bypassed when the interface is determined to be up.

Allowed values are any number of weeks, days, hours, minutes, or seconds, and take the format **number{w|d|h|m|s}**.

For example, to set **Delayed start** to ten minutes, enter **10m** or **600s**.

The default is 300 seconds.
 - c. For **Backoff interval**, type the time to add to the test interval when restarting the list of actions. This option is capped at 15 minutes.

Allowed values are any number of weeks, days, hours, minutes, or seconds, and take the format **number{w|d|h|m|s}**.

For example, to set **Backoff interval** to ten minutes, enter **10m** or **600s**.

The default is 300 seconds.
 - d. **Test interface gateway by pinging** is used by the **Interface gateway Ping test** as the endpoint for traceroute to use to determine the interface gateway. The default is 8.8.8.8, and should only be changed if this IP address is not accessible due to networking issues.
14. Click **Apply** to save the configuration and apply the change.

Command line

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Create a new OpenVPN client, or edit an existing one:
 - To create a new OpenVPN client, see [Configure an OpenVPN client by using an .ovpn file](#) or [Configure an OpenVPN client without using an .ovpn file](#).

- To edit an existing OpenVPN client, change to the OpenVPN client's node in the configuration schema. For example, for an OpenVPN client named **openvpn_client1**, change to the **openvpn_client1** node in the configuration schema:

```
(config)> vpn openvpn client openvpn_client1
(config vpn openvpn client openvpn_client1)>
```

4. Enable SureLink:

```
(config vpn openvpn client openvpn_client1)> surelink enable true
(config vpn openvpn client openvpn_client1)>
```

- By default, the **Test DNS servers configured for this interface** test is automatically configured and enabled. This tests communication with DNS servers that are either provided by DHCP, or statically configured for this interface.

To add additional tests:

- Add a test:

```
(config vpn openvpn client openvpn_client1)> add surelink tests end
(config vpn openvpn client openvpn_client1 surelink tests 1)>
```

- New tests are enabled by default. To disable:

```
(config vpn openvpn client openvpn_client1 surelink tests 1)> enable false
(config vpn openvpn client openvpn_client1 surelink tests 1)>
```

- Create a label for the test:

```
(config vpn openvpn client openvpn_client1 surelink tests 1)> label string
(config vpn openvpn client openvpn_client1 surelink tests 1)>
```

- if the test should apply to both IPv6 rather than IPv4, enable IPv6:

```
(config vpn openvpn client openvpn_client1 surelink tests 1)> ipv6 true
(config vpn openvpn client openvpn_client1 surelink tests 1)>
```

- Set the test type:

```
(config vpn openvpn client openvpn_client1 surelink tests 1)> test value
(config vpn openvpn client openvpn_client1 surelink tests 1)>
```

where *value* is one of:

- **ping**: Uses ICMP to determine connectivity.

If **ping** is selected, complete the following:

- Set the **ping_method**:

```
(config vpn openvpn client openvpn_client1 surelink tests 1)> ping_method value
(config vpn openvpn client openvpn_client1 surelink tests 1)>
```

where *value* is one of:

- **hostname:** The hostname or IP address of an external server.
- Set **ping_host** to the hostname or IP address of the server:

```
(config vpn openvpn client openvpn_client1 surelink tests 1)> ping_host
hostname/IP_address
(config vpn openvpn client openvpn_client1 surelink tests 1)>
```

- **interface_gateway.** If set, an initial traceroute is sent to the hostname or IP address configured in the SureLink advanced settings, and then the first hop in that route is used for the ping test.
- **interface_address.**
- **interface_dns:** The interface's DNS server.
- Set the number of bytes to send as part of the ping payload:

```
(config vpn openvpn client openvpn_client1 openvpn_client1 surelink
tests 1)> ping_size int
(config vpn openvpn client openvpn_client1 surelink tests 1)>
```

- **dns:** Performs a DNS query to the named DNS server.

If **dns** is set, set the IPv4 or IPv6 address of the DNS server:

```
(config vpn openvpn client openvpn_client1 surelink tests 1)> dns_server IP_address
(config vpn openvpn client openvpn_client1 surelink tests 1)>
```

- **http:** Uses HTTP(s) GET requests to determine connectivity to the configured web server.

If **http** is set, set the URL of the web server.

```
(config vpn openvpn client openvpn_client1 surelink tests 1)> http url
(config vpn openvpn client openvpn_client1 surelink tests 1)>
```

- **dns_configured:** Tests communication with DNS servers that are either provided by DHCP, or statically configured for this interface.
- **interface_up:** Tests the current status of the interface. The test fails if the interface is down. Failing this test infers that all other tests fail.

If **interface_up** is set, complete the following:

- Set the amount of time that the interface is down before the test can be considered to have failed.

```
(config vpn openvpn client openvpn_client1 surelink tests 1)> interface_down_time
value
(config vpn openvpn client openvpn_client1 surelink tests 1)>
```

where *value* is any number of weeks, days, hours, minutes, or seconds, and takes the format **number{w|d|h|m|s}**.

For example, to set **interface_down_time** to ten minutes, enter either **10m** or **600s**:

```
(config vpn openvpn client openvpn_client1 surelink tests 1)> interface_down_time
600s
(config)>
```

- Set the amount of time to wait for the interface to connect for the first time before the test is considered to have failed.

```
(config vpn openvpn client openvpn_client1 surelink tests 1)> interface_timeout
value
(config vpn openvpn client openvpn_client1 surelink tests 1)>
```

where *value* is any number of weeks, days, hours, minutes, or seconds, and takes the format ***number{w|d|h|m|s}***.

For example, to set **interface_timeout** to ten minutes, enter either **10m** or **600s**:

```
(config vpn openvpn client openvpn_client1 surelink tests 1)> interface_timeout 600s
(config)>
```

- **custom_test**: Tests the interface with custom commands.

If **custom_test** is set, set the commands to run to perform the test:

```
(config vpn openvpn client openvpn_client1 surelink tests 1)> custom_test_commands
"string"
(config vpn openvpn client openvpn_client1 surelink tests 1)>
```

- **tcp_connection**: Tests that the interface can reach a destination port on the configured host.

If **tcp_connection** is selected, complete the following:

- Set the hostname or IP address of the host to create a TCP connection to:

```
(config vpn openvpn client openvpn_client1 surelink tests 1)> tcp_host
hostname/IP_address
(config vpn openvpn client openvpn_client1 surelink tests 1)>
```

- Set the TCP port to create a TCP connection to.

```
(config vpn openvpn client openvpn_client1 surelink tests 1)> tcp_port port
(config vpn openvpn client openvpn_client1 surelink tests 1)>
```

- **other**: Tests the status of another interface.

If **other** is selected, complete the following:

- Set the interface to test.
 - i. Use the **?** to determine available interfaces:
 - ii. Set the interface. For example:

```
(config vpn openvpn client openvpn_client1 surelink tests 1)> other_interface
/network/interface/eth1
(config vpn openvpn client openvpn_client1 surelink tests 1)>
```

- Set the type of IP connection:

```
(config vpn openvpn client openvpn_client1 surelink tests 1)> other_ip_version value
(config vpn openvpn client openvpn_client1 surelink tests 1)>
```

where *value* is one of:

- **any**: Either the IPv4 or IPv6 connection must be up.
- **both**: Both the IPv4 or IPv6 connection must be up.
- **ipv4**: The IPv4 connection must be up.
- **ipv6**: The IPv6 connection must be up.

- The status required for the test to pass.

```
(config vpn openvpn client openvpn_client1 surelink tests 1)> other_status value
(config vpn openvpn client openvpn_client1 surelink tests 1)>
```

where *value* is one of:

- **up**: The test will pass only if the referenced interface is up and passing its own SureLink tests (if applicable).
- **down**: The test will pass only if the referenced interface is down or failing its own SureLink tests (if applicable).

- f. Repeat for each additional test.

6. Add recovery actions:

- a. Type **...** to return to the root of the configuration:

```
(config vpn openvpn client openvpn_client1 surelink tests 1)> ...
(config)>
```

- b. Add a recovery action:

```
(config)> add vpn openvpn client openvpn_client1 surelink actions end
(config vpn openvpn client openvpn_client1 surelink actions 0)>
```

- c. New actions are enabled by default. To disable:

```
(config vpn openvpn client openvpn_client1 surelink actions 0)> enable false
(config vpn openvpn client openvpn_client1 surelink actions 0)>
```

- d. Create a label for the action:

```
(config vpn openvpn client openvpn_client1 surelink actions 0)> label string
(config vpn openvpn client openvpn_client1 surelink actions 0)>
```

- e. Set the type of recovery action to **reboot_device**:

```
(config vpn openvpn client openvpn_client1 surelink actions 0)> action reboot_device
(config vpn openvpn client openvpn_client1 surelink actions 0)>
```

- Set the number of failures for this recovery action to perform, before moving to the next recovery action:

```
(config vpn openvpn client openvpn_client1 surelink actions 0)> test_failures int
(config vpn openvpn client openvpn_client1 surelink actions 0)>
```

The default is **3**.

- Set the time to wait before the next test is run. If set to the default value of **0s**, the test interval is used.

```
(config vpn openvpn client openvpn_client1 surelink actions 0)> override_interval int
(config vpn openvpn client openvpn_client1 surelink actions 0)>
```

- f. Set the type of recovery action. If multiple recovery actions are configured, they are performed in the order that they are listed. The command varies depending on whether the interface is a WAN or WWAN:

```
(config vpn openvpn client openvpn_client1 surelink actions 0)> modem_action value
(config vpn openvpn client openvpn_client1 surelink actions 0)>
```

- WAN interfaces:

```
(config vpn openvpn client openvpn_client1 surelink actions 0)> action value
(config vpn openvpn client openvpn_client1 surelink actions 0)>
```

- WWAN interfaces:

```
(config vpn openvpn client openvpn_client1 surelink actions 0)> modem_action value
(config vpn openvpn client openvpn_client1 surelink actions 0)>
```

where *value* is one of:

- **update_routing_table**: Increases the interface's metric to change the default gateway.

If **update_routing_table** is selected, complete the following:

- Set the number of failures for this recovery action to perform, before moving to the next recovery action:

```
(config vpn openvpn client openvpn_client1 surelink actions 0)> test_failures int
(config vpn openvpn client openvpn_client1 surelink actions 0)>
```

The default is **3**.

- Set the amount that the interface's metric should be increased. This should be set to a number large enough to change the routing table to use another default gateway.

```
(config vpn openvpn client openvpn_client1 surelink actions 0)> metric_adjustment_
modem int
(config vpn openvpn client openvpn_client1 surelink actions 0)>
```

The default is **100**.

- Set the time to wait before the next test is run. If set to the default value of **0s**, the test interval is used.

```
(config vpn openvpn client openvpn_client1 surelink actions 0)> override_interval int
(config vpn openvpn client openvpn_client1 surelink actions 0)>
```

■ **restart_interface.**

If **restart_interface** is selected, complete the following:

- Set the number of failures for this recovery action to perform, before moving to the next recovery action:

```
(config vpn openvpn client openvpn_client1 surelink actions 0)> test_failures int
(config vpn openvpn client openvpn_client1 surelink actions 0)>
```

The default is **3**.

- Set the time to wait before the next test is run. If set to the default value of **0s**, the test interval is used.

```
(config vpn openvpn client openvpn_client1 surelink actions 0)> override_interval int
(config vpn openvpn client openvpn_client1 surelink actions 0)>
```

■ **reset_modem:** This recovery action is available for WWAN interfaces only.

If **reset_modem** is selected, complete the following:

- Set the number of failures for this recovery action to perform, before moving to the next recovery action:

```
(config vpn openvpn client openvpn_client1 surelink actions 0)> test_failures int
(config vpn openvpn client openvpn_client1 surelink actions 0)>
```

The default is **3**.

- Set the time to wait before the next test is run. If set to the default value of **0s**, the test interval is used.

```
(config vpn openvpn client openvpn_client1 surelink actions 0)> override_interval int
(config vpn openvpn client openvpn_client1 surelink actions 0)>
```

■ **switch_sim:** Switches to an alternate SIM. This recovery action is available for WWAN interfaces only.

If **switch_sim** is selected, complete the following:

- Set the number of failures for this recovery action to perform, before moving to the next recovery action:

```
(config vpn openvpn client openvpn_client1 surelink actions 0)> test_failures int
(config vpn openvpn client openvpn_client1 surelink actions 0)>
```

The default is **3**.

- Set the time to wait before the next test is run. If set to the default value of **0s**, the test interval is used.

```
(config vpn openvpn client openvpn_client1 surelink actions 0)> override_interval int
(config vpn openvpn client openvpn_client1 surelink actions 0)>
```

- **modem_power_cycle**: This recovery action is available for WWAN interfaces only.

If **modem_power_cycle** is selected, complete the following:

- Set the number of failures for this recovery action to perform, before moving to the next recovery action:

```
(config vpn openvpn client openvpn_client1 surelink actions 0)> test_failures int
(config vpn openvpn client openvpn_client1 surelink actions 0)>
```

The default is **3**.

- Set the time to wait before the next test is run. If set to the default value of **0s**, the test interval is used.

```
(config vpn openvpn client openvpn_client1 surelink actions 0)> override_interval int
(config vpn openvpn client openvpn_client1 surelink actions 0)>
```

- **reboot_device**.

If **reboot_device** is selected, complete the following:

- Set the number of failures for this recovery action to perform, before moving to the next recovery action:

```
(config vpn openvpn client openvpn_client1 surelink actions 0)> test_failures int
(config vpn openvpn client openvpn_client1 surelink actions 0)>
```

The default is **3**.

- Set the time to wait before the next test is run. If set to the default value of **0s**, the test interval is used.

```
(config vpn openvpn client openvpn_client1 surelink actions 0)> override_interval int
(config vpn openvpn client openvpn_client1 surelink actions 0)>
```

- **custom_action**: Execute custom recovery commands.

If **custom_action** is selected, complete the following:

- Set the number of failures for this recovery action to perform, before moving to the next recovery action:

```
(config vpn openvpn client openvpn_client1 surelink actions 0)> test_failures int
(config vpn openvpn client openvpn_client1 surelink actions 0)>
```

The default is **3**.

- Set the commands to run to attempt to recovery connectivity.

```
(config network interface my_wan surelink actions 0)> custom_action_commands_
modem "string"
(config network interface my_wan surelink actions 0)>
```

- Set the time to wait before the next test is run. If set to the default value of **0s**, the test interval is used.

```
(config vpn openvpn client openvpn_client1 surelink actions 0)> override_interval int
(config vpn openvpn client openvpn_client1 surelink actions 0)>
```

g. Repeat for each additional recovery action.

7. Optional SureLink configuration parameters:

- a. Type ... to return to the root of the configuration:

```
(config vpn openvpn client openvpn_client1 surelink actions 0)> ...
(config)>
```

- b. Set the test interval between connectivity tests:

```
(config)> vpn openvpn client openvpn_client1 surelink interval value
(config)>
```

where *value* is any number of weeks, days, hours, minutes, or seconds, and takes the format **number{w|d|h|m|s}**.

For example, to set **interval** to ten minutes, enter either **10m** or **600s**:

```
(config)> vpn openvpn client openvpn_client1 surelink interval 600s
(config)>
```

The default is **15m**.

- c. If more than one test target is configured, set the success condition:

```
(config)> vpn openvpn client openvpn_client1 surelink success_condition value
(config)>
```

where *value* is either:

- **one**: Only one test needs to pass for Surelink to consider an interface to be up.
- **all**: All tests need to pass for SureLink to consider the interface to be up.

- d. Set the number of times that the test must pass after failure, before the interface is determined to be working and is reinstated.

```
(config)> vpn openvpn client openvpn_client1 surelink pass_threshold int
(config)>
```

The default is **1**.

- e. Set the amount of time that the device should wait for a response to a test attempt before considering it to have failed:

```
(config)> vpn openvpn client openvpn_client1 surelink timeout value
(config)>
```

where *value* is any number of weeks, days, hours, minutes, or seconds, and takes the format ***number{w|d|h|m|s}***.

For example, to set **timeout** to ten minutes, enter either **10m** or **600s**:

```
(config)> vpn openvpn client openvpn_client1 surelink timeout 600s
(config)>
```

The default is **15s**.

- f. Set the amount of time to wait while the device is starting before SureLink testing begins. This setting is bypassed when the interface is determined to be up.

```
(config)> vpn openvpn client openvpn_client1 surelink advanced delayed_start value
(config)>
```

where *value* is any number of weeks, days, hours, minutes, or seconds, and takes the format ***number{w|d|h|m|s}***.

For example, to set **delayed_start** to ten minutes, enter either **10m** or **600s**:

```
(config)> vpn openvpn client openvpn_client1 surelink advanced delayed_start 600s
(config)>
```

The default is **300s**.

- g. Set the time to add to the test interval when restarting the list of actions. This option is capped at 15 minutes.

```
(config)> vpn openvpn client openvpn_client1 surelink advanced backoff_interval value
(config)>
```

where *value* is any number of weeks, days, hours, minutes, or seconds, and takes the format ***number{w|d|h|m|s}***.

For example, to set **backoff_interval** to ten minutes, enter either **10m** or **600s**:

```
(config)> vpn openvpn client openvpn_client1 surelink advanced backoff_interval 600s
(config)>
```

The default is 300 seconds.

- h. The **interface_gateway** parameter is used by the Interface gateway Ping test as the endpoint for traceroute to use to determine the interface gateway. The default is **8.8.8.8**, and should only be changed if this IP address is not accessible due to networking issues. To set to an alternate host:

```
(config)> vpn openvpn client openvpn_client1 surelink advanced interface_gateway
hostname/IP_address
(config)>
```

8. Save the configuration and apply the change.

```
(config vpn openvpn client openvpn_client1 connection_monitor target 0)> save
Configuration saved.
>
```

9. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

See [Show SureLink status and statistics](#) for information about showing Surelink status for OpenVPN clients.

Show OpenVPN server status and statistics

You can view status and statistics for OpenVPN servers from either the web interface or the command line:

Web

1. Log into the XBee Hive WebUI as a user with full Admin access rights.
2. On the menu, select **Status > OpenVPN > Servers**.
The **OpenVPN Servers** page appears.
3. To view configuration details about an OpenVPN server, click the * (configuration) icon in the upper right of the OpenVPN server's status pane.

Command line

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. To display details about all configured OpenVPN servers, type the following at the prompt:

```
> show openvpn server all
```

Server	Enable	Type	Zone	IP Address	Port
OpenVPN_server1	true	tun	internal	192.168.30.1/24	1194
OpenVPN_server2	false	tun	internal	192.168.40.1/24	1194

```
>
```

3. To display details about a specific server:

```
> show openvpn server name OpenVPN_server1
```

Server	: OpenVPN_server1
Enable	: true
Type	: tun

```

Zone           : internal
IP Address      : 192.168.30.1/24
Port           : 1194
Use File        : true
Metric         : 0
Protocol        : udp
First IP        : 80
Last IP         : 99

```

```
>
```

4. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Show OpenVPN client status and statistics

You can view status and statistics for OpenVPN clients from either web interface or the command line:

Web

1. Log into the XBee Hive WebUI as a user with full Admin access rights.
2. On the menu, select **Status > OpenVPN > Clients**.
The **OpenVPN Clients** page appears.
3. To view configuration details about an OpenVPN client, click the ***** (configuration) icon in the upper right of the OpenVPN client's status pane.

Command line

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. To display details about all configured OpenVPN clients, type the following at the prompt:

```
> show openvpn client all
```

```

Client      Enable Status  Username  Use File Zone
-----
OpenVPN_Client1 true  connected      true  internal
OpenVPN_Client2 true  pending        true  internal

```

```
>
```

3. To display details about a specific client:

```
> show openvpn client name OpenVPN_client1
```

Client	: OpenVPN_client1
Enable	: true
Status	: up
Username	: user1
IP address	: 123.122.121.120
Remote	: 120.121.122.123
MTU	: 1492
Zone	: internal
IP Address	: 192.168.30.1/24
Port	: 1194
Use File	: true
Metric	: 0
Protocol	: udp
Port	: 1194
Type	: tun

>

4. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Generic Routing Encapsulation (GRE)

Generic Routing Encapsulation (GRE) is an IP packet encapsulation protocol that allow for networks and routes to be advertized from one network device to another. You can use GRE to encapsulate a wide variety of network layer protocols inside virtual point-to-point links over an IP network.

Configuring a GRE tunnel

Configuring a GRE tunnel involves the following items:

Required configuration items

- A GRE loopback endpoint interface.
- GRE tunnel configuration:
 - Enable the GRE tunnel.
The GRE tunnels are enabled by default.
 - The local endpoint interface.
 - The IP address of the remote device/peer.

Additional configuration items

- A GRE key.
- Enable the device to respond to keepalive packets.

Task One: Create a GRE loopback endpoint interface



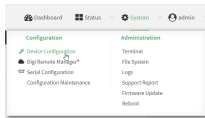
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

Remote Manager:

- a. Locate your device as described in [Use Digi Remote Manager to view and manage your device](#).
- b. Click the **Device ID**.
- c. Click **Settings**.
- d. Click to expand **Config**.

Local Web UI:

- a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



The **Configuration** window is displayed.

3. Click **Network > Interfaces**.
4. For **Add Interface**, type a name for the GRE loopback endpoint interface and click .
5. **Enable** the interface.
New interfaces are enabled by default. To disable, toggle off **Enable**.
6. For **Interface type**, select **Ethernet**.
7. For **Zone**, select **Internal**.
8. For **Device**, select **Ethernet: Loopback**.
9. Click to expand **IPv4**.
10. For **Address**, enter the IP address and subnet mask of the local GRE endpoint, for example **10.10.1.1/24**.
11. Click **Apply** to save the configuration and apply the change.

Command line

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Add the GRE endpoint interface. For example, to add an interface named **gre_endpoint**:

```
(config)> add network interface gre_interface
(config network interface gre_interface)>
```

4. Set the interface zone to **internal**:

```
(config network interface gre_interface)> zone internal
(config network interface gre_interface)>
```

5. Set the interface device to **loopback**:

```
(config network interface gre_interface)> device /network/device/loopback
(config network interface gre_interface)>
```

6. Set the IP address and subnet mask of the local GRE endpoint. For example, to set the local GRE endpoint's IP address and subnet mask to **10.10.1.1/24**:

```
(config network interface gre_interface)> ipv4 address 10.10.1.1/24
(config network interface gre_interface)>
```

7. Save the configuration and apply the change.

```
(config network interface gre_interface)> save
Configuration saved.
>
```

8. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Task Two: Configure the GRE tunnel

Web

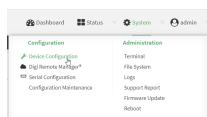
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

Remote Manager:

- a. Locate your device as described in [Use Digi Remote Manager to view and manage your device](#).
- b. Click the **Device ID**.
- c. Click **Settings**.
- d. Click to expand **Config**.

Local Web UI:

- a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



The **Configuration** window is displayed.

3. Click **VPN > IP Tunnels**.
4. For **Add IP tunnel**, type a name for the GRE tunnel and click .
5. **Enable** the tunnel.
New tunnels are enabled by default. To disable, toggle off **Enable**.
6. For **Mode**, select one of the following options:
 - **GRE**: Standard GRE point-to-point protocol.
 - **mGRE**: multipoint GRE protocol.
 - **GRETAP**: Ethernet over GRE.
7. For **Local endpoint**, select the GRE endpoint interface created in [Task One](#).

8. If **GRE** is selected for the **Mode**, for **Remote endpoint**, type the IP address of the GRE endpoint on the remote peer.
9. If **GRETAP** is selected for **Mode**, for **Local endpoint**, select the interface.
10. (Optional) For **Key**, enter a key that will be inserted in GRE packets created by this tunnel. It must match the key set by the remote endpoint. Allowed value is an integer between 0 and 4294967295, or an IP address.
11. (Optional) **Enable keepalive reply** to enable the device to reply to Cisco GRE keepalive packets.
12. (Optional) **Enable open routing** to enable packets destined for an address which is not explicitly in the routing table to exit the IP tunnel.
13. Click **Apply** to save the configuration and apply the change.

Command line

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Add the GRE endpoint tunnel. For example, to add a tunnel named **gre_example**:

```
(config)> add vpn iptunnel gre_example
(config vpn iptunnel gre_example)>
```

GRE tunnels are enabled by default. To disable:

```
(config vpn iptunnel gre_example)> enable false
(config vpn iptunnel gre_example)>
```

4. Set the mode:

```
(config vpn iptunnel gre_example)> type value
(config vpn iptunnel gre_example)>
```

where *value* is either:

- **gre**: Standard GRE point-to-point protocol.
- **mgre**: multipoint GRE protocol.
- **GRETAP**: Ethernet over GRE

5. Set the local endpoint to the GRE endpoint interface created in [Task One](#), for example:

```
(config vpn iptunnel gre_example)> local /network/interface/gre_endpoint
(config vpn iptunnel gre_example)>
```

6. If **type** is set to **gre**, set the IP address of the GRE endpoint on the remote peer:

```
(config vpn iptunnel gre_example)> remote ip_address  
(config vpn iptunnel gre_example)>
```

7. (Optional) Set a key that will be inserted in GRE packets created by this tunnel.
The key must match the key set by the remote endpoint.

```
(config vpn iptunnel gre_example)> key value  
(config vpn iptunnel gre_example)>
```

where value is an integer between 0 and 4294967295, or an IP address.

8. (Optional) Enable the device to reply to Cisco GRE keepalive packets:

```
(config vpn iptunnel gre_example)> keepalive true  
(config vpn iptunnel gre_example)>
```

9. (Optional) Enable the device to allow packets destined for an address which is not explicitly in the routing table to exit the IP tunnel:

```
(config vpn iptunnel gre_example)> open_routing true  
(config vpn iptunnel gre_example)>
```

10. Save the configuration and apply the change.

```
(config vpn iptunnel gre_example)> save  
Configuration saved.  
>
```

11. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Show GRE tunnels

To view information about currently configured GRE tunnels:



1. Log into the XBee Hive WebUI as a user with full Admin access rights.
2. On the menu, click **Status > IP tunnels**.
The **IP Tunnels** page appears.
3. To view configuration details about a GRE tunnel, click the * (configuration) icon in the upper right of the tunnel's status pane.

Example: GRE tunnel over an IPsec tunnel

The XBee Hive device can be configured as an advertised set of routes through an IPsec tunnel. This allows you to leverage the dynamic route advertisement of GRE tunnels through a secured IPsec tunnel.

The example configuration provides instructions for configuring the XBee Hive device with a GRE tunnel through IPsec.



XBee Hive-1 configuration tasks

1. Create an IPsec tunnel named **ipsec_gre1** with:
 - A pre-shared key.
 - **Remote endpoint** set to the public IP address of the XBee Hive-2 device.
 - A policy with:
 - **Local network** set to the IP address and subnet of the local GRE tunnel, **172.30.0.1/32**.
 - **Remote network** set to the IP address and subnet of the remote GRE tunnel, **172.30.0.2/32**.
2. Create an IPsec endpoint interface named **ipsec_endpoint1**:
 - a. **Zone** set to **Internal**.
 - b. **Device** set to **Ethernet: Loopback**.
 - c. **IPv4 Address** set to the IP address of the local GRE tunnel, **172.30.0.1/32**.
3. Create a GRE tunnel named **gre_tunnel1**:
 - a. **Local endpoint** set to the IPsec endpoint interface, **Interface: ipsec_endpoint1**.
 - b. **Remote endpoint** set to the IP address of the GRE tunnel on XBee Hive-2, **172.30.0.2**.
4. Create an interface named **gre_interface1** and add it to the GRE tunnel:
 - a. **Zone** set to **Internal**.
 - b. **Device** set to **IP tunnel: gre_tunnel1**.
 - c. **IPv4 Address** set to a virtual IP address on the GRE tunnel, **172.31.0.1/30**.

XBee Hive-2 configuration tasks

1. Create an IPsec tunnel named **ipsec_gre2** with:
 - The same pre-shared key as the **ipsec_gre1** tunnel on XBee Hive-1.
 - **Remote endpoint** set to the public IP address of XBee Hive-1.
 - A policy with:
 - **Local network** set to the IP address and subnet of the local GRE tunnel, **172.30.0.2/32**.
 - **Remote network** set to the IP address of the remote GRE tunnel, **172.30.0.1/32**.

2. Create an IPsec endpoint interface named **ipsec_endpoint2**:
 - a. **Zone** set to **Internal**.
 - b. **Device** set to **Ethernet: Loopback**.
 - c. IPv4 Address set to the IP address of the local GRE tunnel, **172.30.0.2/32**.
3. Create a GRE tunnel named **gre_tunnel2**:
 - a. **Local endpoint** set to the IPsec endpoint interface, **Interface: ipsec_endpoint2**.
 - b. Remote endpoint set to the IP address of the GRE tunnel on XBee Hive-1, **172.30.0.1**.
4. Create an interface named **gre_interface2** and add it to the GRE tunnel:
 - a. **Zone** set to **Internal**.
 - b. **Device** set to **IP tunnel: gre_tunnel2**.
 - c. IPv4 Address set to a virtual IP address on the GRE tunnel, **172.31.0.2/30**.

Configuration procedures

Configure the XBee Hive-1 device

Task one: Create an IPsec tunnel



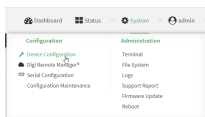
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

Remote Manager:

- a. Locate your device as described in [Use Digi Remote Manager to view and manage your device](#).
- b. Click the **Device ID**.
- c. Click **Settings**.
- d. Click to expand **Config**.

Local Web UI:

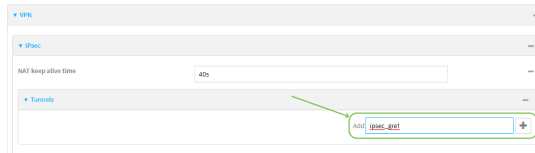
- a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



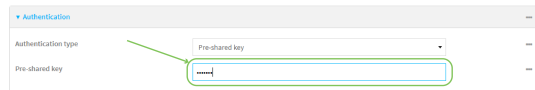
The **Configuration** window is displayed.

3. Click **VPN > IPsec > Tunnels**.

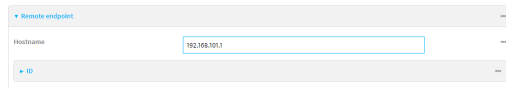
4. To add an IPsec tunnel, type **ipsec_gre1** and click 



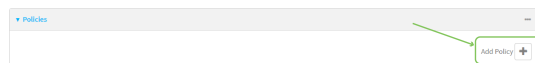
5. Click to expand **Authentication**.
6. For **Pre-shared key**, type **testkey**.



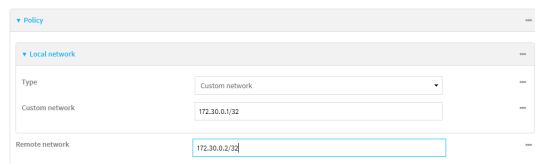
7. Click to expand **Remote endpoint**.
a. Click to expand **Peers**.
b. Click  to add a new peer.
c. For **Hostname**, type the public IP address of the XBee Hive-2 device.



8. Click to expand **Policies**.
9. For **Add Policy**, click  to add a new policy.



10. Click to expand **Local network**.
11. For **Type**, select **Custom network**.
12. For **Address**, type the IP address and subnet of the local GRE tunnel, **172.30.0.1/32**.
13. For **Remote network**, type the IP address and subnet of the remote GRE tunnel, **172.30.0.2/32**.



14. Click **Apply** to save the configuration and apply the change.

Command line

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Add an IPsec tunnel named **ipsec_gre1**:

```
(config)> add vpn ipsec tunnel ipsec_gre1
(config vpn ipsec tunnel ipsec_gre1)>
```

4. Set the pre-shared key to **testkey**:

```
(config vpn ipsec tunnel ipsec_gre1)> auth secret testkey
(config vpn ipsec tunnel ipsec_gre1)>
```

5. Set the remote endpoint to the public IP address of the XBee Hive-2 device:

```
config vpn ipsec tunnel ipsec_gre1> remote hostname 192.101.1
(config vpn ipsec tunnel ipsec_gre1)>
```

```
(config vpn ipsec tunnel ipsec_gre1)> remote
(config vpn ipsec tunnel ipsec_gre1 remote)>
```

```
(config vpn ipsec tunnel ipsec_gre1)> peers
(config vpn ipsec tunnel ipsec_gre1 peers)> 192.168.101.1
```

6. Add a policy:

```
(config vpn ipsec tunnel ipsec_gre1)> add policy end
(config vpn ipsec tunnel ipsec_gre1 policy 0)>
```

7. Set the local network policy type to **custom**:

```
(config vpn ipsec tunnel ipsec_gre1 policy 0)> local type custom
(config vpn ipsec tunnel ipsec_gre1 policy 0)>
```

8. Set the local network address to the IP address and subnet of the local GRE tunnel, **172.30.0.1/32**:

```
(config vpn ipsec tunnel ipsec_gre1 policy 0)> local custom 172.30.0.1/32
(config vpn ipsec tunnel ipsec_gre1 policy 0)>
```

9. Set the remote network address to the IP address and subnet of the remote GRE tunnel, **172.30.0.2/32**:

```
(config vpn ipsec tunnel ipsec_gre1 policy 0)> remote network 172.30.0.2/32
(config vpn ipsec tunnel ipsec_gre1 policy 0)>
```

10. Save the configuration and apply the change.

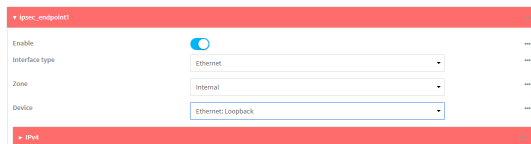
```
(config ipsec tunnel ipsec_gre1 policy 0)> save
Configuration saved.
>
```

Task two: Create an IPsec endpoint interface

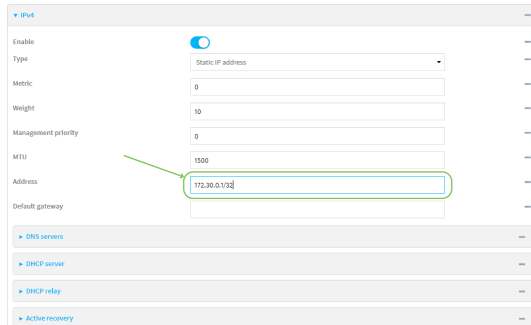
1. Click **Network > Interface**.
2. For **Add Interface**, type **ipsec_endpoint1** and click 



3. For **Zone**, select **Internal**.
4. For **Device**, select **Ethernet: loopback**.



5. Click to expand **IPv4**.
6. For **Address**, type the IP address of the local GRE tunnel, **172.30.0.1/32**.



7. Click **Apply** to save the configuration and apply the change.

Command line

1. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

2. Add an interface named **ipsec_endpoint1**:

```
(config)> add network interface ipsec_endpoint1
(config network interface ipsec_endpoint1)>
```

3. Set the zone to **internal**:

```
(config network interface ipsec_endpoint1)> zone internal
(config network interface ipsec_endpoint1)>
```

4. Set the device to **/network/device/loopback**:

```
(config network interface ipsec_endpoint1)> device /network/device/loopback
(config network interface ipsec_endpoint1)>
```

5. Set the IPv4 address to the IP address of the local GRE tunnel, **172.30.0.1/32**:

```
(config network interface ipsec_endpoint1)> ipv4 address 172.30.0.1/32
(config network interface ipsec_endpoint1)>
```

6. Save the configuration and apply the change.

```
(config vpn ipsec tunnel ipsec_endpoint1 policy 0)> save
Configuration saved.
>
```

Task three: Create a GRE tunnel

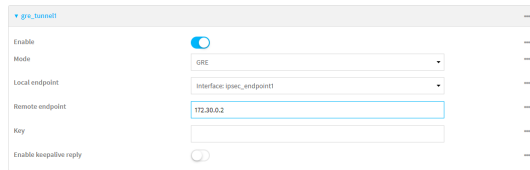


1. Click **VPN > IP Tunnels**.
2. For **Add IP Tunnel**, type **gre_tunnel1** and click **⊕**



3. For **Local endpoint**, select the IPsec endpoint interface created in [Task two](#) (Interface: **ipsec_endpoint1**).

4. For **Remote endpoint**, type the IP address of the GRE tunnel on XBee Hive-2, **172.30.0.2**.



5. Click **Apply** to save the configuration and apply the change.

Command line

1. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

2. Add a GRE tunnel named **gre_tunnel1**:

```
(config)> add vpn iptunnel gre_tunnel1
(config vpn iptunnel gre_tunnel1)>
```

3. Set the local endpoint to the IPsec endpoint interface created in [Task two](#) (**/network/interface/ipsec_endpoint1**):

```
(config vpn iptunnel gre_tunnel1)> local /network/interface/ipsec_endpoint1
(config vpn iptunnel gre_tunnel1)>
```

4. Set the remote endpoint to the IP address of the GRE tunnel on XBee Hive-2, **172.30.0.2**:

```
(config vpn iptunnel gre_tunnel1)> remote 172.30.0.2
(config vpn iptunnel gre_tunnel1)>
```

5. Save the configuration and apply the change.

```
(config vpn iptunnel gre_tunnel1)> save
Configuration saved.
>
```

Task four: Create an interface for the GRE tunnel device

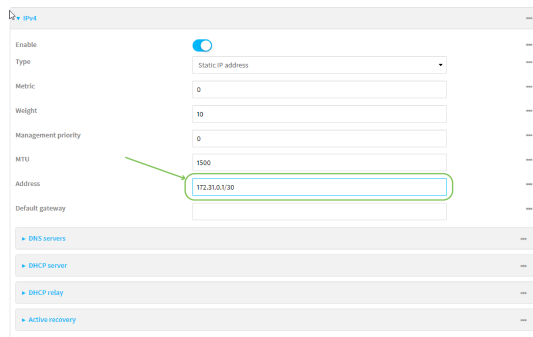
1. Click **Network > Interfaces**.
2. For **Add Interface**, type **gre_interface1** and click **Go**.



3. For **Zone**, select **Internal**.
4. For **Device**, select the GRE tunnel created in [Task three](#) (IP tunnel: **gre_tunnel1**).



5. Click to expand **IPv4**.
6. For **Address**, type **172.31.0.1/30** for a virtual IP address on the GRE tunnel.



7. Click **Apply** to save the configuration and apply the change.

Command line

1. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

2. Add an interface named **gre_interface1**:

```
(config)> add network interface gre_interface1
(config network interface gre_interface1)>
```

3. Set the zone to **internal**:

```
(config network interface gre_interface1)> zone internal
(config network interface gre_interface1)>
```

4. Set the device to the GRE tunnel created in [Task three \(/vpn/iptunnel/gre_tunnel1\)](#):

```
(config network interface gre_interface1)> device /vpn/iptunnel/gre_tunnel1
(config network interface gre_interface1)>
```

5. Set **172.31.0.1/30** as the virtual IP address on the GRE tunnel:

```
(config network interface gre_interface1)> ipv4 address 172.31.0.1/30
(config network interface gre_interface1)>
```

6. Save the configuration and apply the change.

```
(config network interface gre_interface1)> save
Configuration saved.
>
```

7. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Configure the XBee Hive-2 device

Task one: Create an IPsec tunnel



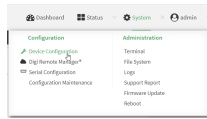
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

Remote Manager:

- a. Locate your device as described in [Use Digi Remote Manager to view and manage your device](#).
- b. Click the **Device ID**.
- c. Click **Settings**.
- d. Click to expand **Config**.

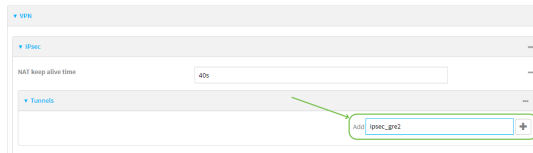
Local Web UI:

- a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

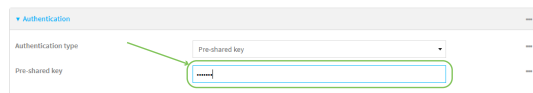


The **Configuration** window is displayed.

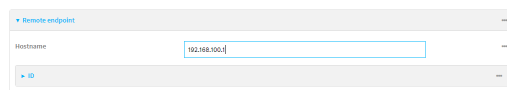
3. Click **VPN > IPsec > Tunnels**.
4. For **Add IPsec Tunnel**, type **ipsec_gre2** and click **+**



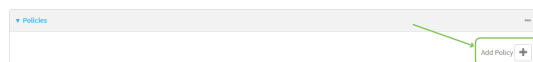
5. Click to expand **Authentication**.
6. For **Pre-shared key**, type the same pre-shared key that was configured for the XBee Hive-1 (**testkey**).



7. Click to expand **Remote endpoint**.
 - a. Click to expand **Peers**.
 - b. Click **+** to add a new peer.
 - c. For **Hostname**, type public IP address of the XBee Hive-1 device.



8. Click to expand **Policies**.
9. For **Add Policy**, click **+** to add a new policy.



10. Click to expand **Local network**.
11. For **Type**, select **Custom network**.
12. For **Address**, type the IP address and subnet of the local GRE tunnel, **172.30.0.2/32**.
13. For **Remote network**, type the IP address and subnet of the remote GRE tunnel, **172.30.0.1/32**.

The screenshot shows a configuration window with a 'Policy' tab. Under the 'Local network' section, the 'Type' is 'Custom network' and the 'Custom network' field contains '172.30.0.2/32'. Under the 'Remote network' section, the field contains '172.30.0.1/32'.

14. Click **Apply** to save the configuration and apply the change.

Command line

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Add an IPsec tunnel named **ipsec_gre2**:

```
(config)> add vpn ipsec tunnel ipsec_gre2
(config vpn ipsec tunnel ipsec_gre2)>
```

4. Set the pre-shared key to the same pre-shared key that was configured for the XBee Hive-1 (**testkey**):

```
(config vpn ipsec tunnel ipsec_gre2)> auth secret testkey
(config vpn ipsec tunnel ipsec_gre2)>
```

5. Set the remote endpoint to public IP address of the XBee Hive-1 device:

```
(config vpn ipsec tunnel ipsec_gre2)> remote hostname 192.168.100.1
(config vpn ipsec tunnel ipsec_gre2)>
```

6. Add a policy:

```
(config vpn ipsec tunnel ipsec_gre2)> add policy end
(config vpn ipsec tunnel ipsec_gre2 policy 0)>
```

7. Set the local network policy type to **custom**:

```
(config vpn ipsec tunnel ipsec_gre2 policy 0)> local type custom
(config vpn ipsec tunnel ipsec_gre2 policy 0)>
```

8. Set the local network address to the IP address and subnet of the local GRE tunnel, **172.30.0.2/32**:

```
(config vpn ipsec tunnel ipsec_gre2 policy 0)> local custom 172.30.0.2/32
(config vpn ipsec tunnel ipsec_gre2 policy 0)>
```

9. Set the remote network address to the IP address and subnet of the remote GRE tunnel, **172.30.0.1/32**:

```
(config vpn ipsec tunnel ipsec_gre2 policy 0)> remote network 172.30.0.1/32
(config vpn ipsec tunnel ipsec_gre2 policy 0)>
```

10. Save the configuration and apply the change.

```
(config vpn ipsec tunnel ipsec_gre2 policy 0)> save
Configuration saved.
>
```

Task two: Create an IPsec endpoint interface



1. Click **Network > Interfaces**.
2. For **Add Interface**, type **ipsec_endpoint2** and click .

3. For **Zone**, select **Internal**.
4. For **Device**, select **Ethernet: loopback**.

5. Click to expand **IPv4**.
6. For **Address**, type the IP address of the local GRE tunnel, **172.30.0.2/32**.

7. Click **Apply** to save the configuration and apply the change.

Command line

1. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

2. Add an interface named **ipsec_endpoint2**:

```
(config)> add network interface ipsec_endpoint2
(config network interface ipsec_endpoint2)>
```

3. Set the zone to **internal**:

```
(config network interface ipsec_endpoint2)> zone internal
(config network interface ipsec_endpoint2)>
```

4. Set the device to **/network/device/loopback**:

```
(config network interface ipsec_endpoint2)> device /network/device/loopback
(config network interface ipsec_endpoint2)>
```

5. Set the IPv4 address to the IP address of the local GRE tunnel, **172.30.0.2/32**:

```
(config network interface ipsec_endpoint2)> ipv4 address 172.30.0.2/32
(config network interface ipsec_endpoint2)>
```

6. Save the configuration and apply the change.

```
(config vpn ipsec tunnel ipsec_endpoint2)> save
Configuration saved.
>
```

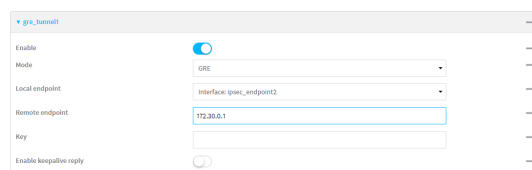
Task three: Create a GRE tunnel



1. Click **VPN > IP Tunnels**.
2. For **Add IP Tunnel**, type **gre_tunnel2** and click **+**



3. For **Local endpoint**, select the IPsec endpoint interface created in [Task two](#) (Interface: **ipsec_endpoint2**).
4. For **Remote endpoint**, type the IP address of the GRE tunnel on XBee Hive-1, **172.30.0.1**.



- Click **Apply** to save the configuration and apply the change.

Command line

- At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

- Add a GRE tunnel named **gre_tunnel2**:

```
(config)> add vpn iptunnel gre_tunnel2
(config vpn iptunnel gre_tunnel2)>
```

- Set the local endpoint to the IPsec endpoint interface created in [Task two \(/network/interface/ipsec_endpoint2\)](#):

```
(config vpn iptunnel gre_tunnel2)> local /network/interface/ipsec_endpoint2
(config vpn iptunnel gre_tunnel2)>
```

- Set the remote endpoint to the IP address of the GRE tunnel on XBee Hive-1, **172.30.0.1**:

```
(config vpn iptunnel gre_tunnel2)> remote 172.30.0.1
(config vpn iptunnel gre_tunnel2)>
```

- Save the configuration and apply the change.

```
(config vpn iptunnel gre_tunnel2)> save
Configuration saved.
>
```

Task four: Create an interface for the GRE tunnel device



Web

- Click **Network > Interfaces**.
- For **Add Interface**, type **gre_interface2** and click **Go**.



- For **Zone**, select **Internal**.

- For **Device**, select the GRE tunnel created in [Task three](#) (IP tunnel: gre_tunnel2).

The screenshot shows the 'gre_interface' configuration window. The 'Device' dropdown menu is expanded, showing 'IP tunnel: gre_tunnel2' as the selected option. Other options like 'Ethernet', 'Internal', and 'Device' are visible in the dropdown list.

- Click to expand **IPv4**.
- For **Address**, type **172.31.0.2/30** for a virtual IP address on the GRE tunnel.

The screenshot shows the 'IPv4' configuration window. The 'Address' field is highlighted with a green circle and contains the text '172.31.0.2/30'. Other fields like 'Enable', 'Type', 'Metric', 'Weight', 'Management priority', and 'MTU' are also visible.

- Click **Apply** to save the configuration and apply the change.

Command line

- At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

- Add an interface named **gre_interface2**:

```
(config)> add network interface gre_interface2
(config network interface gre_interface2)>
```

- Set the zone to **internal**:

```
(config network interface gre_interface2)> zone internal
(config network interface gre_interface2)>
```

- Set the device to the GRE tunnel created in [Task three](#) (/vpn/iptunnel/gre_tunnel2):

```
(config network interface gre_interface2)> device /vpn/iptunnel/gre_tunnel2
(config network interface gre_interface2)>
```

- Set **172.31.0.2/30** as the virtual IP address on the GRE tunnel:

```
(config network interface gre_interface2)> ipv4 address 172.31.0.2/30
(config network interface gre_interface2)>
```

- 6. Save the configuration and apply the change.

```
(config network interface gre_interface2)> save
Configuration saved.
>
```

- 7. Type **exit** to exit the Admin CLI.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Dynamic Multipoint VPN (DMVPN)

Dynamic Multipoint Virtual Private Network (DMVPN) is a dynamic tunneling form of a virtual private network (VPN), using a multi spoke-to-hub network in which the network addresses of the spoke routers do not need to be known, and therefore do not need to be configured in the hub router.

One advantage to this form of VPN is a scalable network in which the size of the hub configuration is minimized. When one spoke of the network needs to send traffic to another spoke, a direct transfer is possible without having to add any load onto the hub. This is achieved by the creation of a dynamic GRE tunnel directly to the other spoke. The network address of the target spoke is resolved with the use of Next Hop Resolution Protocol (NHRP).

This section contains the following topics:

Configure a DMVPN spoke 535

Configure a DMVPN spoke

To configure a DMVPN spoke:

Web

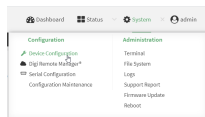
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

Remote Manager:

- a. Locate your device as described in [Use Digi Remote Manager to view and manage your device](#).
- b. Click the **Device ID**.
- c. Click **Settings**.
- d. Click to expand **Config**.

Local Web UI:

- a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



The **Configuration** window is displayed.

3. Create an IP tunnel.
 - a. Click **VPN > IP Tunnels**.
 - b. In **Add IP tunnel**, type the name of the tunnel and click 



- c. For **Mode**, select **mGRE**.
- d. For **Local endpoint**, select the interface that will serve as the local endpoint of the tunnel.

- e. For **Key**, type a four-octet value that matches the key on the remote endpoint.

dmvpn_tunnel

Enable ☒

Mode mGRE

Local endpoint Interface: ETH

Key 1.1.1.1

Enable keep-alive reply ☐

- f. (Optional) **Enable keep-alive reply** to enable the device to reply to Cisco GRE keep-alive packets.
- g. (Optional) **Enable open routing** to enable packets destined for an address which is not explicitly in the routing table to exit the IP tunnel.
4. Assign an IP address to the IP tunnel:
- Click **Network > Interfaces**.
 - For **Add Interface**, type a name for the interface and click

Network

Interfaces

Modem

ETH

Loopback

Default IP

Default Link local IP

Digi sView tunnel endpoint

Add dmvpn_tunnel_interface

- For **Zone**, select **Internal**.
- For **Device**, select the IP tunnel created above.
- Click to expand **IPv4**.
- For **Address**, type the IP address and netmask of the tunnel. The netmask must be set to **/32**.

dmvpn_tunnel_interface

Enable ☒

Interface type Ethernet

Zone Internal

Device IP tunnel: dmvpn_tunnel

802.1x

IPv4

Enable ☒

Type Static IP address

Metric 0

Weight 10

Management priority 0

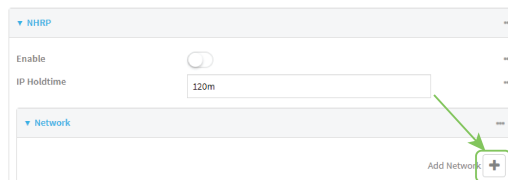
MTU 1500

Use DNS Always

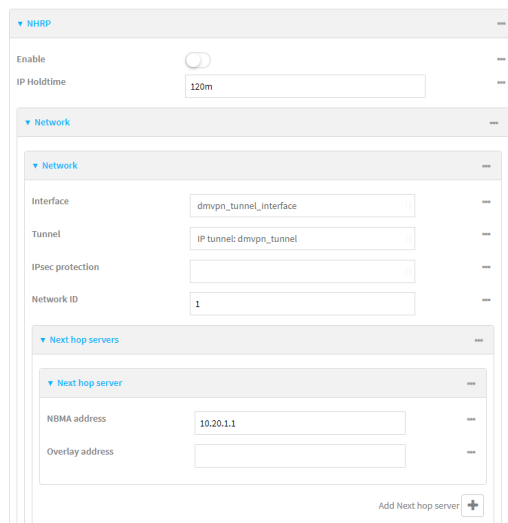
Address 10.20.1.4/32

Default gateway

5. Configure **NHRP**:
 - a. Click **Network > Routing Services**.
 - b. **Enable** routing services.
 - c. Click to expand **NHRP**.
 - d. **Enable** NHRP.
 - e. Click to expand Network.
 - f. Click  to add a network.



- g. For **Interface**, select the interface created above.
- h. For **Tunnel**, select the IP tunnel created above.
- i. Click to expand **Next hop servers**.
- j. Click  to add a server.
- k. For **NBMA address**, type the hostname or IP address of the node that will be the next hop server.



6. To enable redirection of packets between spokes, configure OSPF routing:
 - a. Click **Network > Routes > Routing services > OSPF**.
 - b. **Enable** OSPF.
 - c. For **ABR behavior**, choose the Area Border Router for the network.
 - d. For **Reference bandwidth**, type the link bandwidth.
 - e. **Enable** the Opaque-LSA standard.
 - f. **Enable** the RFC1583 standard.

7. Configure the overlay connection:
 - a. Click **Network > Routing services > BGP**.
 - b. **Enable** BGP.
 - c. For **AS number**, type the autonomous system number for this device.
 - d. For **Best path criteria**, select **Multipath**.
 - e. Click to expand **Neighbours**.
 - f. Click **+** to add a neighbour.
 - g. For **IP address**, type the IP address of the hub.
 - h. Click to toggle on **eBGP multihop**.

8. Repeat to add additional spokes.
9. Click **Apply** to save the configuration and apply the change.

Command line

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Create an IP tunnel.
 - a. Add an IP tunnel. For example, to add a tunnel named **dmvpn_tunnel**:

```
(config)> add vpn iptunnel dmvpn_tunnel
(config vpn iptunnel dmvpn_tunnel)>
```

- b. Set the type to multipoint:

```
(config vpn iptunnel dmvpn_tunnel)> type multipoint
(config vpn iptunnel dmvpn_tunnel)>
```

- c. Set the local interface:

- i. Use the ? to determine available interfaces:
- ii. Set the interface. For example:

```
(config vpn iptunnel dmvpn_tunnel)> local /network/interface/eth1
(config vpn iptunnel dmvpn_tunnel)>
```

- d. Set the key to a four-octet value that matches the key on the remote endpoint. For example:

```
(config vpn iptunnel dmvpn_tunnel)> key 1.1.1.1
(config vpn iptunnel dmvpn_tunnel)>
```

- e. (Optional) Enable the device to reply to Cisco GRE keepalive packets:

```
(config vpn iptunnel dmvpn_tunnel)> keepalive true
(config vpn iptunnel dmvpn_tunnel)>
```

- f. (Optional) Enable the device to allow packets destined for an address which is not explicitly in the routing table to exit the IP tunnel:

```
(config vpn iptunnel dmvpn_tunnel)> open_routing true
(config vpn iptunnel dmvpn_tunnel)>
```

4. Assign an IP address to the IP tunnel:

- a. Type ... to return to the top level of the configuration schema:

```
(config vpn iptunnel dmvpn_tunnel)> ...
(config)>
```

- b. And a network interface. For example, to add an interface named dmvpn_tunnel_interface:

```
(config)> add network interface dmvpn_tunnel_interface
(config network interface dmvpn_tunnel_interface)>
```

- c. Set the zone to **internal**:

```
(config network interface dmvpn_tunnel_interface)> zone internal
(config network interface dmvpn_tunnel_interface)>
```

- d. Set the device to the IP tunnel created above:

```
(config network interface dmvpn_tunnel_interface)> device /vpn/iptunnel/dmvpn_tunnel
(config network interface dmvpn_tunnel_interface)>
```

- e. Set the IP address and netmask of the tunnel. The netmask must be set to /32. For example, to set the IP address to 10.20.1.4/32:

```
(config network interface dmvpn_tunnel_interface)> ipv4 address 10.20.1.4/32
(config network interface dmvpn_tunnel_interface)>
```

5. Configure NHRP:

- a. Type ... to return to the top level of the configuration schema:

```
(config network interface dmvpn_tunnel_interface)> ...
(config)>
```

- b. Enable routing services:

```
(config)> network route service enable true
(config)>
```

- c. Enable NHRP:

```
(config)> network route service nhrp enable true
(config)>
```

- d. Add an NHRP network:

```
(config)> add network route service nhrp network end
(config network route service nhrp network 0)>
```

- e. Set the interface to the interface that was created above:

```
(config network route service nhrp network 0)> interface dmvpn_tunnel_interface
(config network route service nhrp network 0)>
```

- f. Set the tunnel to the IP tunnel created above:

```
(config network route service nhrp network 0)> tunnel /vpn/iptunnel/dmvpn_tunnel
(config network route service nhrp network 0)>
```

- g. Add a net hop server:

```
(config network route service nhrp network 0)> add nhs end
(config network route service nhrp network 0 nhs 0)>-
```

6. Set the hostname or IP address of the node that will be the next hop server:

```
(config network route service nhrp network 0 nhs 0)> nbma hostname/IP_address
(config network route service nhrp network 0 nhs 0)>
```

7. Configure OSPF routing:

```
(config network route service ospf)
(config)>
```

8. Configure the overlay connection using BGP:

- a. Type ... to return to the top level of the configuration schema:

```
(config network interface dmvpn_tunnel_interface)> ...
(config)>
```

- b. Enable BGP:

```
(config)> network route service bgp enable true
(config)>
```

- c. Set the autonomous system number for this device. For example, to set the autonomous system number to 66007:

```
(config)> network route service bgp asn 66007
(config)>
```

- d. Set the best path criteria to multipath:

```
(config)> network route service bgp as_path multipath-relax
(config)>
```

- e. Add a neighbour:

```
(config)> add network route service bgp neighbour end
(config network route service bgp neighbour 0)>
```

- f. Set
- ip**
- to the IP address of the hub. For example:

```
(config network route service bgp neighbour 0)> ip 10.20.1.1
(config network route service bgp neighbour 0)>
```

- g. Enable eBGP multihop:

```
(config network route service bgp neighbour 0)> ebgp_multihop true
(config network route service bgp neighbour 0)>
```

9. Repeat to add additional spokes.

10. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

11. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

L2TP

Your XBee Hive device supports PPP-over-L2TP (Layer 2 Tunneling Protocol).

Configure a PPP-over-L2TP tunnel

Your XBee Hive device supports PPP-over-L2TP (Layer 2 Tunneling Protocol). The tunnel endpoints are known as L2TP Access Concentrators (LAC) and L2TP Network Servers (LNS). Each endpoint terminates the PPP session.

Required configuration items

- For L2TP access concentrators:
 - The hostname or IP address of the L2TP network server.
 - The firewall zone for the tunnel.
- For L2TP network servers:
 - The IP address of the L2TP access concentrator.
 - The local IP address assigned to the L2TP virtual network interface.
 - The IP address assigned to the remote peer.
 - The firewall zone for the tunnel.

Additional configuration items

- The UDP port that L2TP servers will listen on, if other than the default of **1701**.
- Access control for the L2TP tunnel.
- For L2TP access concentrators:
 - L2TP network server port.
 - The username and password of the L2TP server.
 - The metric for the tunnel.
 - Enable custom PPP configuration options for the tunnel.
 - Whether to override the default configuration and only use the custom options.
 - Optional configuration data in the format of a pppd options file.
- For L2TP network servers:
 - The Authentication method.
 - The metric for the tunnel.
 - Enable custom PPP configuration options for the tunnel.
 - Whether to override the default configuration and only use the custom options.
 - Optional configuration data in the format of a pppd options file.



1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

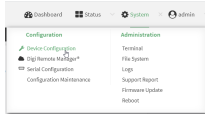
Remote Manager:

- a. Locate your device as described in [Use Digi Remote Manager to view and manage your device](#).
- b. Click the **Device ID**.

- c. Click **Settings**.
- d. Click to expand **Config**.

Local Web UI:

- a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



The **Configuration** window is displayed.

3. Click **VPN > L2TP**.
4. (Optional) Type the **UDP listening port** that L2TP servers will listen on, if other than the default of **1701**.
5. Set the access control for L2TP tunnels:
 - To limit access to specified IPv4 addresses and networks:
 - a. Click **IPv4 Addresses**.
 - b. For **Add Address**, click .
 - c. For **Address**, enter the IPv4 address or network that can access the device's service-type. Allowed values are:
 - A single IP address or host name.
 - A network designation in CIDR notation, for example, 192.168.1.0/24.
 - **any**: No limit to IPv4 addresses that can access the service-type.
 - d. Click  again to list additional IP addresses or networks.
 - To limit access to specified IPv6 addresses and networks:
 - a. Click **IPv6 Addresses**.
 - b. For **Add Address**, click .
 - c. For **Address**, enter the IPv6 address or network that can access the device's service-type. Allowed values are:
 - A single IP address or host name.
 - A network designation in CIDR notation, for example, 2001:db8::/48.
 - **any**: No limit to IPv6 addresses that can access the service-type.
 - d. Click  again to list additional IP addresses or networks.
 - To limit access to hosts connected through a specified interface on the device:
 - a. Click **Interfaces**.
 - b. For **Add Interface**, click .
 - c. For **Interface**, select the appropriate interface from the dropdown.
 - d. Click  again to allow access through additional interfaces.
 - To limit access based on firewall zones:
 - a. Click **Zones**. By default, there are three firewall zones already configured: Internal, Edge, and IPsec.
 - b. For **Add Zone**, click .

- c. For **Zone**, select the appropriate firewall zone from the dropdown.
See [Firewall configuration](#) for information about firewall zones.
 - d. Click  again to allow access through additional firewall zones.
- 6. To add an L2TP access concentrator:
 - a. Click to expand **L2TP access concentrators**.
 - b. For **Add L2TP access concentrator**, type a name for the LAC and click .
 - c. LACs are enabled by default. To disable, toggle off **Enable**.
 - d. For **L2TP network server**, type the hostname or IP address of the L2TP network server.
 - e. (Optional) Type the **L2TP network server port** to use to connect to the server, if other than the default of **1701**.
 - f. (Optional) Type the **Username** to use to log into the server.
 - g. (Optional) Type the **Password** to use to log into the server.
 - h. (Optional) Type the **Metric** for the tunnel, if other than the default of **1**.
 - i. Select a firewall **Zone** for the tunnel. This is used by packet filtering rules and access control lists to restrict network traffic on the tunnel.
 - j. (Optional): Custom PPP configuration:
 - i. **Enable** custom PPP configuration.
 - ii. Enable **Override** if the custom configuration should override the default configuration and only use the custom options.
 - iii. For **Configuration file**, paste or type the configuration data in the format of a pppd options file.
- 7. To add an L2TP network server:
 - a. Click to expand **L2TP network servers**.
 - b. For **Add L2TP network server**, type a name for the LNS and click .
 - c. LNSs are enabled by default. To disable, toggle off **Enable**.
 - d. For **L2TP access concentrator**, type the IP address of the L2TP access concentrator that this server will allow connections from. This can also be:
 - A range of IP addresses, using the format x.x.x.x-y.y.y.y, for example **192.168.188.1-192.168.188.254**.
 - The keyword **any**, which means that the server will accept connections from any IP address.
 - e. For **Local IP address**, type the IP address of the L2TP virtual network interface.
 - f. For **Remote IP address**, type the IP address to assign to the remote peer.
 - g. (Optional) For **Authentication method**, select one of the following:
 - **None**: No authentication is required.
 - **Automatic**: The device will attempt to connect using CHAP first, and then PAP.
 - **CHAP**: Uses the Challenge Handshake Authentication Profile (CHAP) to authenticate.
 - **PAP**: Uses the Password Authentication Profile (PAP) to authenticate.

If **Automatic**, **CHAP**, or **PAP** is selected, enter the **Username** and **Password** required to authenticate.

The default is **None**.

- h. (Optional) For **Authentication method**, select the authentication method, one of:
 - **None**: No authentication is required.
 - **Automatic**: The device will attempt to connect using CHAP first, and then PAP.
 - **CHAP**: Uses the Challenge Handshake Authentication Profile (CHAP) to authenticate.
 - **PAP**: Uses the Password Authentication Profile (PAP) to authenticate.
 - **MS-CHAPv2**: Uses the Microsoft version of the Challenge Handshake Authentication Profile (CHAP) to authenticate.
 - If **Automatic**, **CHAP**, **PAP**, or **MS-CHAPv2** is selected, enter the **Username** and **Password** required to authenticate.
 - The default is **None**.
 - i. (Optional) Type the **Metric** for the tunnel, if other than the default of **1**.
 - j. Select a firewall **Zone** for the tunnel. This is used by packet filtering rules and access control lists to restrict network traffic on the tunnel.
 - k. (Optional): Custom PPP configuration:
 - i. **Enable** custom PPP configuration.
 - ii. Enable **Override** if the custom configuration should override the default configuration and only use the custom options.
 - iii. For **Configuration file**, paste or type the configuration data in the format of a pppd options file.
8. Click **Apply** to save the configuration and apply the change.

Command line

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. (Optional) Set the UDP listening port that L2TP servers will listen on:

```
(config)> vpn l2tp port value
(config)>
```

where *value* is an integer between **1** and **65535**. The default is **1701**.

4. Set the access control for L2TP tunnels:
 - To limit access to specified IPv4 addresses and networks:

```
(config)> add vpn l2tp acl address end value
(config)>
```

Where *value* can be:

- A single IP address or host name.
- A network designation in CIDR notation, for example, 192.168.1.0/24.
- **any**: No limit to IPv4 addresses that can access the service-type.

Repeat this step to list additional IP addresses or networks.

- To limit access to specified IPv6 addresses and networks:

```
(config)> add vpn l2tp acl address6 end value
(config)>
```

Where *value* can be:

- A single IP address or host name.
- A network designation in CIDR notation, for example, 2001:db8::/48.
- **any**: No limit to IPv6 addresses that can access the service-type.

Repeat this step to list additional IP addresses or networks.

- To limit access to hosts connected through a specified interface on the XBee Hive device:

```
(config)> add vpn l2tp acl interface end value
(config)>
```

Where *value* is an interface defined on your device.

Display a list of available interfaces:

Use ... **network interface ?** to display interface information:

Repeat this step to list additional interfaces.

- To limit access based on firewall zones:

```
(config)> add vpn l2tp acl zone end value
(config)>
```

Where *value* is a firewall zone defined on your device, or the **any** keyword.

Display a list of available firewall zones:

Type ... **firewall zone ?** at the config prompt:

```
(config)> ... firewall zone ?
```

Zones: A list of groups of network interfaces that can be referred to by packet filtering rules and access control lists.

Additional Configuration

```
any
dynamic_routes
edge
external
internal
```

```
ipsec
loopback
setup
```

```
(config)>
```

Repeat this step to include additional firewall zones.

5. To add an L2TP access concentrator:

a. Add an LAC:

```
(config)> add vpn l2tp lac name
(config add vpn l2tp lac name)>
```

where *name* is the name of the LAC. For example, to add an LAC named `lac_tunnel`:

```
(config)> add vpn l2tp lac lac_tunnel
(config vpn l2tp lac lac_tunnel)>
```

LACs are enabled by default. To disable:

```
(config vpn l2tp lac lac_tunnel)> enable false
(config vpn l2tp lac lac_tunnel)>
```

b. Set the hostname or IP address of the L2TP network server:

```
(config vpn l2tp lac lac_tunnel)> ins hostname
(config vpn l2tp lac lac_tunnel)>
```

c. (Optional) Set the UDP port to use to connect to the L2TP network server:

```
(config vpn l2tp lac lac_tunnel)> port int
(config vpn l2tp lac lac_tunnel)>
```

where *int* is an integer between **1** and **65535**. The default is **1701**.

d. (Optional) Set the username to use to log into the server:

```
(config vpn l2tp lac lac_tunnel)> username username
(config vpn l2tp lac lac_tunnel)>
```

e. (Optional) Set the password to use to log into the server:

```
(config vpn l2tp lac lac_tunnel)> password password
(config vpn l2tp lac lac_tunnel)>
```

f. (Optional) Set the metric for the tunnel:

```
(config vpn l2tp lac lac_tunnel)> metric int
(config vpn l2tp lac lac_tunnel)>
```

where *int* is an integer between **0** and **65535**. The default is **1**.

g. Set the firewall zone for the tunnel. This is used by packet filtering rules and access control lists to restrict network traffic on the tunnel.

- i. Use the ? to determine available zones:

```
(config vpn l2tp lac lac_tunnel)> zone ?
```

Zone: The firewall zone assigned to this tunnel. This can be used by packet filtering rules and access control lists to restrict network traffic on this tunnel.

Format:

```
any
dynamic_routes
edge
external
internal
ipsec
loopback
setup
```

Current value:

```
(config vpn l2tp lac lac_tunnel)>
```

- ii. Set the zone:

```
(config vpn l2tp lac lac_tunnel)> zone zone
(config vpn l2tp lac lac_tunnel)>
```

- h. (Optional): Custom PPP configuration:

- i. Enable custom PPP configuration:

```
(config vpn l2tp lac lac_tunnel)> custom enable true
(config vpn l2tp lac lac_tunnel)>
```

- ii. Enable overriding, if the custom configuration should override the default configuration and only use the custom options:

```
(config vpn l2tp lac lac_tunnel)> custom override true
(config vpn l2tp lac lac_tunnel)>
```

- iii. Paste or type the configuration data in the format of a pppd options file:

```
(config vpn l2tp lac lac_tunnel)> custom config_file data
(config vpn l2tp lac lac_tunnel)>
```

6. To add an L2TP network server:

- a. Add an LNS:

```
(config)> add vpn l2tp lns name
(config add vpn l2tp lac name)>
```

where *name* is the name of the LNS. For example, to add an LNS named *lns_server*:

```
(config)> add vpn l2tp lns lns_server
(config vpn l2tp lns lns_server)>
```

LACs are enabled by default. To disable:

```
(config vpn l2tp lns lns_server)> enable false
(config vpn l2tp lns lns_server)>
```

- b. Set the IP address of the L2TP access concentrator that this server will allow connections from:

```
(config vpn l2tp lns lns_server)> lac IP_address
(config vpn l2tp lns lns_server)>
```

This can also be:

- A range of IP addresses, using the format x.x.x.x-y.y.y.y, for example **192.168.188.1-192.168.188.254**.
- The keyword **any**, which means that the server will accept connections from any IP address.

- c. Set the IP address of the L2TP virtual network interface:

```
(config vpn l2tp lns lns_server)> local_address IP_address
(config vpn l2tp lns lns_server)>
```

- d. Set the IP address to assign to the remote peer:

```
(config vpn l2tp lns lns_server)> remote_address IP_address
(config vpn l2tp lns lns_server)>
```

- e. (Optional) Set the authentication method:

```
(config vpn l2tp lns lns_server)> auth method
(config)>
```

where *method* is one of the following:

- **none**: No authentication is required.
- **auto**: The device will attempt to connect using CHAP first, and then PAP.
- **chap**: Uses the Challenge Handshake Authentication Profile (CHAP) to authenticate.
- **pap**: Uses the Password Authentication Profile (PAP) to authenticate.
- **mschapv2**: Uses the Microsoft version of the Challenge Handshake Authentication Profile (CHAP) to authenticate.

If **auto**, **chap**, **pap** or **mschapv2** is selected, enter the **Username** and **Password** required to authenticate:

```
(config vpn l2tp lns lns_server)> username username
(config vpn l2tp lns lns_server)> password password
(config vpn l2tp lns lns_server)>
```

The default is **none**.

- f. (Optional) Set the metric for the tunnel:

```
(config vpn l2tp lns lns_server)> metric int
(config vpn l2tp lns lns_server)>
```

where *int* is an integer between **0** and **65535**. The default is **1**.

- g. Set the firewall zone for the tunnel. This is used by packet filtering rules and access control lists to restrict network traffic on the tunnel.
- i. Use the **?** to determine available zones:

```
(config vpn l2tp lns lns_server)> zone ?
```

Zone: The firewall zone assigned to this tunnel. This can be used by packet filtering rules and access control lists to restrict network traffic on this tunnel.

Format:

```
any
dynamic_routes
edge
external
internal
ipsec
loopback
setup
```

Current value:

```
(config vpn l2tp lns lns_server)>
```

- ii. Set the zone:

```
(config vpn l2tp lns lns_server)> zone zone
(config vpn l2tp lns lns_server)>
```

- h. (Optional): Custom PPP configuration:

- i. Enable custom PPP configuration:

```
(config vpn l2tp lac lns lns_server)> custom enable true
(config vpn l2tp lns lns_server)>
```

- ii. Enable overriding, if the custom configuration should override the default configuration and only use the custom options:

```
(config vpn l2tp lns lns_server)> custom override true
(config vpn l2tp lns lns_server)>
```

- iii. Paste or type the configuration data in the format of a pppd options file:

```
(config vpn l2tp lns lns_server)> custom config_file data
(config vpn l2tp lns lns_server)>
```

7. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

8. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

L2TP with IPsec

L2TP is commonly used in conjunction with IPsec in transport mode (to provide security).

Your XBee Hive supports L2TP with IPsec by configuring a transport-mode IPsec tunnel between the two endpoints, and then an L2TP tunnel with its LNS and LAC configured the same as the IPsec tunnel's endpoints. See [Configure an IPsec tunnel](#) for information about configuring an IPsec tunnel.

Note The XBee Hive does not currently support the configuration of IPsec protocol/port traffic selectors. This means that you cannot restrict traffic on the IPsec tunnel to L2TP traffic (typically UDP port 1701).

While multiple L2TP clients are supported on the XBee Hive by configuring a separate LNS for each client, multiple clients behind a Network Address Translation (NAT) device are not supported, because they will all appear to have the same IP address.

Show L2TP tunnel status



Show the status of L2TP access connectors from the WebUI

1. Log into the XBee Hive WebUI as a user with full Admin access rights.
2. On the menu, select **Status**. Under VPN, select **L2TP > Access Connectors**.
The **L2TP Access Connectors** page appears.
3. To view configuration details about an L2TP access connector, click the ★ (configuration) icon in the upper right of the tunnel's status pane.

Show the status of L2TP network servers from the WebUI

Log into the XBee Hive WebUI as a user with full Admin access rights.

1. On the menu, select **Status**. Under VPN, select **L2TP > Network Servers**.
The **L2TP Network Servers** page appears.
2. To view configuration details about an L2TP network server, click the ★ (configuration) icon in the upper right of the tunnel's status pane.

Command line

Show the status of L2TP access connectors from the Admin CLI

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. To display details about all configured L2TP access connectors, type the following at the prompt:

```
> show l2tp lac
```

Name	Enabled	Status	Device
lac_test1	true	up	test_device0
lac_test2	true	pending	

```
>
```

3. To display details about a specific tunnel:

```
> show l2tp lac name lac_test2
```

```
lac_test2 L2TP Access Concentrator Status
```

```
Enabled      : true
Status       : pending
```

```
>
```

4. Type **exit** to exit the Admin CLI.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Show the status of L2TP network servers from the Admin CLI

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. To display details about all configured L2TP access connectors, type the following at the prompt:

```
> show l2tp lns
```

Name	Enabled	Status	Device
lns_test1	true	up	test_device0
lns_test2	true	pending	

```
>
```

3. To display details about a specific tunnel:

```
> show l2tp lns name lns_test2

lns_test2 L2TP Access Concentrator Status
-----
Enabled      : true
Status       : pending

>
```

4. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

L2TPv3 Ethernet

Your XBee Hive device supports Layer 2 Tunneling Protocol Version 3 (L2TPv3) static unmanaged Ethernet tunnels.

Configure an L2TPv3 tunnel

Your XBee Hive device supports Layer 2 Tunneling Protocol Version 3 (L2TPv3) static unmanaged Ethernet tunnels.

Required configuration items

- A name for the L2TPv3 tunnel.
- Enable the tunnel.
- The remote endpoint IP address.
- The local endpoint IP address.
- The session ID.
- The peer session ID.

Additional configuration items

- Encapsulation type. If UDP is selected:
 - The ID for the tunnel.
 - The ID of the peer's tunnel.
 - Determine whether to enable UDP checksum.
- The session cookie.
- The peer session cookie.
- The Layer2SpecificHeader type.
- The Sequence numbering control.



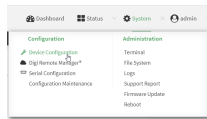
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

Remote Manager:

- a. Locate your device as described in [Use Digi Remote Manager to view and manage your device](#).
- b. Click the **Device ID**.
- c. Click **Settings**.
- d. Click to expand **Config**.

Local Web UI:

- a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



The **Configuration** window is displayed.

3. Click **VPN > L2TPv3 ethernet**.
4. For **Add L2TPv3 ethernet tunnel**, type a name for the tunnel and click .
5. For **Remote endpoint**, type the IPv4 address of the remote endpoint.
6. For **Local endpoint**, select the interface that will be the local endpoint.
7. For **Tunnel ID**, type the tunnel identifier for this tunnel. This must match the value for **Peer tunnel ID** on the remote peer. Allowed value is any integer between 1 and 4294967295.
8. For **Peer tunnel ID**, type the **Tunnel ID** of the remote peer.
9. (Optional) For **Encapsulation type**, select either **UDP** or **IP**. If **UDP** is selected:
 - a. For **UDP source port**, type the number of the source UDP port to be used for the tunnel.
 - b. For **UDP destination port**, type the number of the destination UDP port to be used for the tunnel.
 - c. (Optional) Click to enable **UDP checksum** to calculate and check the UDP checksum.
10. Click to expand **Sessions**.
 - a. For **Add Session**, type a name for a session carried by the parent tunnel and click .
 - b. For **Session ID**, type the session identifier for this session. This must match the value for **Peer session ID** on the remote peer. Allowed value is any integer between 1 and 4294967295.
 - c. For **Peer session ID**, type the **Session ID** of the remote peer.
 - d. (Optional) For **Cookie**, type the cookie value to be assigned to the session. Allowed value is 8 or 16 hex digits.
 - e. (Optional) For **Peer cookie**, type the **Cookie** value of the remote peer.
 - f. For **Layer2SpecificHeader type**, select the Layer2Specific header type. This must match what is configured on the remote peer.

- g. For **Sequence numbering control**, determine the sequence number control to prevent or detect out of order packets. Allowed values are:

- **None**: No sequence numbering.
- **Send**: Add a sequence number to each outgoing packet.
- **Receive**: Reorder packets if they are received out of order.
- **Both**: Add a sequence number to each outgoing packet, and reorder packets if they are received out of order.

The default is **None**.

- h. Repeat for additional sessions.
11. Click **Apply** to save the configuration and apply the change.

Command line

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Add a L2TPv3 Ethernet tunnel. For example, to add a tunnel named **L2TPv3_example**:

```
(config)> add vpn l2tpv3 L2TPv3_example
(config vpn l2tpeth L2TPv3_example)>
```

The tunnel is enabled by default. To disable:

```
(config vpn l2tpeth L2TPv3_example)> enable false
(config vpn l2tpeth L2TPv3_example)>
```

4. Set the IPv4 address of the remote endpoint:

```
(config vpn l2tpeth L2TPv3_example)> remote IP_address
(config vpn l2tpeth L2TPv3_example)>
```

5. Set the interface of the local endpoint:

- i. Use the **?** to determine available interfaces:
- ii. Set the interface. For example:

```
(config vpn l2tpeth L2TPv3_example)> local /network/interface/eth1
(config vpn l2tpeth L2TPv3_example)>
```

6. Set the tunnel identifier for this tunnel. This must match the value for peer tunnel ID on the remote peer.

```
(config vpn l2tpeth L2TPv3_example)> tunnel_id value
(config vpn l2tpeth L2TPv3_example)>
```

where *value* is any integer between 1 and 4294967295.

7. Set the tunnel ID of the remote peer:

```
(config vpn l2tpeth L2TPv3_example)> peer_tunnel_id value
(config vpn l2tpeth L2TPv3_example)>
```

where *value* is any integer between 1 and 4294967295.

8. (Optional) Set the encapsulation type:

```
(config vpn l2tpeth L2TPv3_example)> encapsulation value
(config vpn l2tpeth L2TPv3_example)>
```

where *value* is either **udp** or **ip**. The default is **udp**.

If **udp** is set:

- a. Set the source UDP port to be used for the tunnel:

```
(config vpn l2tpeth L2TPv3_example)> udp_source_port port
(config vpn l2tpeth L2TPv3_example)>
```

- b. Set the destination UDP port to be used for the tunnel.

```
(config vpn l2tpeth L2TPv3_example)> udp_destination_port port
(config vpn l2tpeth L2TPv3_example)>
```

- c. (Optional) To calculate and check the UDP checksum:

```
(config vpn l2tpeth L2TPv3_example)> udp_checksum true
(config vpn l2tpeth L2TPv3_example)>
```

9. Add a session carried by the parent tunnel:

```
(config vpn l2tpeth L2TPv3_example)> add session session_example
(config vpn l2tpeth L2TPv3_example session_example)>
```

10. Set the session identifier for this session. This must match the value for peer session ID on the remote peer.

```
(config vpn l2tpeth L2TPv3_example session_example)> session_id value
(config vpn l2tpeth L2TPv3_example session_example)>
```

where *value* is any integer between 1 and 4294967295.

11. Set the session ID of the remote peer:

```
(config vpn l2tpeth L2TPv3_example session_example)> peer_session_id value
(config vpn l2tpeth L2TPv3_example session_example)>
```

where *value* is any integer between 1 and 4294967295.

12. (Optional) Set the cookie value to be assigned to the session.

```
(config vpn l2tpeth L2TPv3_example session_example)> cookie value
(config vpn l2tpeth L2TPv3_example session_example)>
```

Allowed *value* is 8 or 16 hex digits.

13. (Optional) Set the cookie value of the remote peer:

```
(config vpn l2tpeth L2TPv3_example session_example)> peer cookie value
(config vpn l2tpeth L2TPv3_example session_example)>
```

Allowed *value* is 8 or 16 hex digits.

14. Set the Layer2Specific header type. This must match what is configured on the remote peer.

```
(config vpn l2tpeth L2TPv3_example session_example)> l2spec_type value
(config vpn l2tpeth L2TPv3_example session_example)>
```

where *value* is either **none** or **default**. The default is **default**.

15. Set the sequence number control to prevent or detect out of order packets.

```
(config vpn l2tpeth L2TPv3_example session_example)> seq value
(config vpn l2tpeth L2TPv3_example session_example)>
```

where *value* is one of:

- **none**: No sequence numbering.
- **send**: Add a sequence number to each outgoing packet.
- **recv**: Reorder packets if they are received out of order.
- **both**: Add a sequence number to each outgoing packet, and reorder packets if they are received out of order.

The default is **none**.

16. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

17. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Show L2TPV3 tunnel status



Web

1. Log into the XBee Hive WebUI as a user with full Admin access rights.
2. On the menu, select **Status**. Under VPN, select **L2TPv3 Ethernet**.
The **L2TPv3 Ethernet** page appears.
3. To view configuration details about an L2TPV3 tunnel, click the **✱** (configuration) icon in the upper right of the tunnel's status pane.

Command line

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. To display details about all configured L2TPv3 Ethernet tunnels, type the following at the prompt:

```
> show l2tpeth

Tunnel Session  Enabled Device    Status
-----
test/session/test true  le_test_test up

>
```

3. To display details about a specific tunnel:

```
> show l2tpeth name /vpn/l2tpeth/test/session/test

test/session/test Tunnel Session Status
-----
Enabled           : true
Status            : up

Local IP          : 4.3.2.1
Remote IP         : 10.10.10.1
Tunnel ID         : modem xbee_cellular
Peer Tunnel ID    : 10.10.10.1 === 4.3.2.1
Session ID        : 255
Peer Session ID   : 1476
Lifetime (Actual) : 600

Device           : le_test_test
RX Packets       : 2,102
RX Bytes         : 462
TX Packets       : 2,787
TX Bytes         : 3,120

>
```

4. Type **exit** to exit the Admin CLI.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

MACsec

MACsec (Media Access Control Security) is a 802.1ae (Layer2) VPN protocol that can be used to create a secure MACsec tunnel over a wired Ethernet LAN. The MACsec uses keys to provide multiple authentications between hosts in a network.

A MACsec tunnel must be tied to a physical interface. You cannot create a MACsec tunnel for a bridge.

Security modes

Two security modes are available for a MACsec tunnel.

- **Automatic:** Uses a pre-shared key to generate association key information, which is periodically rotated through using 802.1x.
- **Manual:** Uses connectivity association key information that is manually entered in the **CAK** and **CKN** fields.

Configure a MACsec tunnel

Your XBee Hive device supports MACsec (Layer 2 Tunneling Protocol).

Required configuration items

- The local network device to connect to the peer device.
- When using **Manual** mode, the connectivity association key and key name.

Web

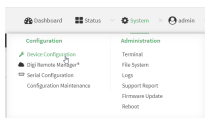
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

Remote Manager:

- a. Locate your device as described in [Use Digi Remote Manager to view and manage your device](#).
- b. Click the **Device ID**.
- c. Click **Settings**.
- d. Click to expand **Config**.

Local Web UI:

- a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



The **Configuration** window is displayed.

3. Click **VPN > MACsec**.
4. For **Add MACsec tunnel**, click .
5. Click **Enable**.
6. For **Local endpoint**, select the local network device you want to use to connect to the peer device.
7. For **Security mode**, select your desired mode.
 - **Automatic:** Uses a pre-shared key to generate association key information, which is periodically rotated through using 802.1x.

- **Manual:** Uses connectivity association key information that is manually entered in the **CAK** and **CKN** fields.
8. If you selected **Manual**, additional required fields display.
 - a. For **CAK**, enter the connectivity associated key. The key format is 16 hex digits.
 - b. For **CKN**, enter the connectivity associated key name. The key format is 32 hex digits.
 9. Click **Apply** to save the configuration and apply the change.

Command line

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Name the tunnel. At the config prompt, type:

```
(config)> add vpn macsec name
(config)>
```

where *name* is a string.

4. Enable the tunnel:

```
(config vpn macsec tunnel1) enable true
(config vpn macsec tunnel1)>
```

5. Specify the local endpoint:

```
(config vpn macsec tunnel1) local value
(config vpn macsec tunnel1)>
```

where *value* is one of the available options.

6. Specify the security mode:

```
(config vpn macsec tunnel1) type value
(config vpn macsec tunnel1)>
```

where *value* is one of the following:

- **automatic:** Uses a pre-shared key to generate association key information, which is periodically rotated through using 802.1x.
 - **manual:** Uses connectivity association key information that is manually entered.
7. If you specified the **manual** security mode, enter the connectivity association key and key name.

- a. Specify the connectivity association key:

```
(config vpn macsec tunnel1) association cak value
(config vpn macsec tunnel1)>
```

where *value* is the association key. The key format is 16 hex digits.

- b. Specify the connectivity association key name:

```
(config vpn macsec tunnel1) association ckn value
(config vpn macsec tunnel1)>
```

where *value* is the association key name. The key format is 32 hex digits.

8. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

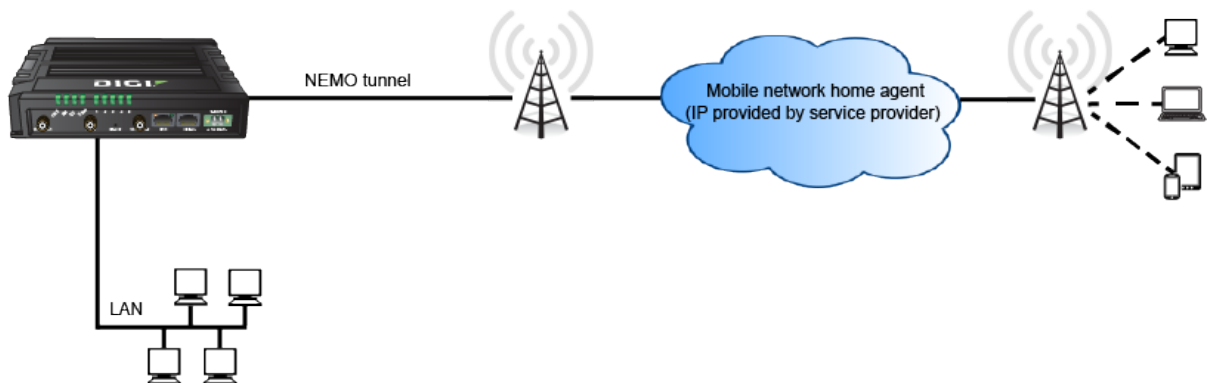
9. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

NEMO

Network Mobility (NEMO) is a mobile networking technology that provides access to one or more Local Area Networks (LANs) on your device. NEMO creates a tunnel between the home agent on the mobile private network and the XBee Hive device, isolating the connection from internet traffic and advertising the IP subnets of the LANs for remote access and device management.

Dynamic Mobile Network Routing (DMNR) is the implementation of NEMO for Verizon Wireless Private Networks. DMNR support requires the use of Verizon SIM cards that have DMNR enabled.



Configure a NEMO tunnel

Configuring an NEMO tunnel with a remote device involves configuring the following items:

Required configuration items

- Enable the NEMO tunnel.
The NEMO tunnel is enabled by default.
- The IP address of the NEMO virtual network interface.
- The firewall zone of the NEMO tunnel.
- The IP address of the NEMO home agent server. This is provided by your cellular carrier.
- The home agent's authentication key. This is provided by your cellular carrier.
- Home agent registration lifetime. This is provided by your cellular carrier.
- The local network interfaces that will be advertised on NEMO.

Additional configuration items

- The home agent Software Parameter Index (SPI).
- Path MTU discovery.
Path MTU discovery is enabled by default. If it is disabled, identify the MTU.
- Care of address: the local network interface that is used to communicate with the peer.
 - If set to **Interface**, identify the local interface to be used. Generally, this will be the Wireless WAN (**Modem**).
 - If set to **IP address**, enter the IP address.
- The local network of the GRE endpoint negotiated by NEMO.
 - If the local network is set to Interface, identify the local interface to be used.

Web

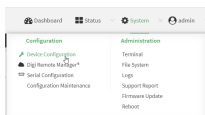
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

Remote Manager:

- a. Locate your device as described in [Use Digi Remote Manager to view and manage your device](#).
- b. Click the **Device ID**.
- c. Click **Settings**.
- d. Click to expand **Config**.

Local Web UI:

- a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



The **Configuration** window is displayed.

3. Click **VPN > NEMO**.

The NEMO tunnel is enabled by default. To disable, toggle off **Enable**.

4. For **Home IP address**, type the IPv4 address of the NEMO virtual network interface.

5. For **Zone**, select **Internal**.

The Internal firewall zone configures the XBee Hive device to trust traffic going to the tunnel and allows it through the network.

6. For **Home agent server IP address**, type the IPv4 address of the NEMO home agent. This is provided by your cellular carrier.

7. For **Key**, type the key used to authenticate to the home agent. This is provided by your cellular carrier.

8. For **Home agent SPI**, type the Security Parameter Index (SPI) value, which is used in the authentication extension when registering. This should be normally left at the default setting of **256** unless your service provider indicates a different value.

9. For **Home agent registration lifetime, in seconds**, type the number of seconds number of seconds until the authorization key expires. This is provided by your cellular carrier.

10. For **MTU discovery**, leave enabled to determine the maximum transmission unit (MTU) size.

If disabled, for **MTU**, type the MTU size. The default MTU size for LANs on the XBee Hive device is 1500. The MTU size of the NEMO tunnel will be smaller, to take into account the required headers.

11. Click to expand **Care of address** to configure the local WAN interface of the internet facing network.

- a. For **Type**, select the method to determine the local network interface that is used to communicate with the peer.
 - If **Default route** is selected, the network interface that is used will be the same as the default route.
 - If **Interface** is selected, specify the local network interface.
 - If **IP address** is selected, type the IP address.

The default is **Default route**.

12. Click to expand **GRE tunnel local endpoint**.

- a. For **Type**, select the local endpoint of the GRE endpoint negotiated by NEMO.
 - If **Default route** is selected, the network interface that is used will be the same as the default route.
 - If **Interface** is selected, specify the local network interface.

The default is **Default route**.

13. Click to expand **Local networks**.

- a. For **Add Interface**, click  to add a local network to use as a virtual NEMO network interface.



- b. For **Interface**, select the local interface to use as a virtual NEMO network interface.

Generally, this will be the a Local Area Network (LAN).

- c. (Optional) Repeat for additional interfaces.
14. Click **Apply** to save the configuration and apply the change.

Command line

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Add a NEMO tunnel. For example, to add a NEMO tunnel named **nemo_example**:

```
(config)> add vpn nemo nemo_example
(config vpn nemo nemo_example)>
```

The NEMO tunnel is enabled by default. To disable:

```
(config vpn nemo nemo_example)> enable false
(config vpn nemo nemo_example)>
```

4. Set the IPv4 address of the NEMO virtual network interface:

```
(config vpn nemo nemo_example)> home_address IPv4_address
(config vpn nemo nemo_example)>
```

5. Set the IPv4 address of the NEMO home agent. This is provided by your cellular carrier.

```
(config vpn nemo nemo_example)> home_agent IPv4_address
(config vpn nemo nemo_example)>
```

6. Set the key used to authenticate to the home agent. This is provided by your cellular carrier.

```
(config vpn nemo nemo_example)> key value
(config vpn nemo nemo_example)>
```

7. Set the the number of seconds number of seconds until the authorization key expires. This is provided by your cellular carrier.

```
(config vpn nemo nemo_example)> lifetime integer
(config vpn nemo nemo_example)>
```

Allowed values are any integer between 1 and 65535.

8. MTU discovery is enabled by default, which allows the device to determine the maximum transmission unit (MTU) size. To disable:

```
(config vpn nemo nemo_example)> mtu_discovery false
(config vpn nemo nemo_example)>
```

If disabled, set the MTU size. The default MTU size for LANs on the XBee Hive device is 1500. The MTU size of the NEMO tunnel will be smaller, to take into account the required headers.

```
(config vpn nemo nemo_example)> mtu integer
(config vpn nemo nemo_example)>
```

Allowed values are any integer between 68 and 1476.

9. Set the Security Parameter Index (SPI) value, which is used in the authentication extension when registering. This should be normally left at the default setting of **256** unless your service provider indicates a different value.

```
(config vpn nemo nemo_example)> spi integer
(config vpn nemo nemo_example)>
```

Allowed values are any integer between 256 and 4294967295.

10. Set the firewall zone for the NEMO tunnel to internal:

```
(config vpn nemo nemo_example)> zone internal
(config vpn nemo nemo_example)>
```

The Internal firewall zone configures the XBee Hive device to trust traffic going to the tunnel and allows it through the network.

11. Configure the Care-of-Address, the local WAN interface of the internet facing network.
 - a. Set the method to determine the Care-of-Address:

```
(config vpn nemo nemo_example)> coaddress type value
(config vpn nemo nemo_example)>
```

where *value* is one of:

- **defaultroute**: Uses the same network interface as the default route.
- **interface**

If **interface** is used, set the interface:

- i. Use the **?** to determine available interfaces:
- ii. Set the interface. For example:

```
(config vpn nemo nemo_example)> coaddress interface eth1
(config vpn nemo nemo_example)>
```

- **ip**

If **ip** is used, set the IP address:

```
(config vpn nemo nemo_example)> coaddress address IP_address
(config vpn nemo nemo_example)>
```

The default is **defaultroute**.

12. Set the GRE tunnel local endpoint:
 - a. Set the method to determine the GRE tunnel local endpoint:

```
(config vpn nemo nemo_example)> tun_local type value
(config vpn nemo nemo_example)>
```

where *value* is one of:

- **defaultroute**: Uses the same network interface as the default route.
- **interface**

If **interface** is used, set the interface.

- i. Use the **?** to determine available interfaces:
- ii. Set the interface. For example:

```
(config vpn nemo nemo_example)> tun_local interface eth1
(config vpn nemo nemo_example)>
```

The default is **defaultroute**.

13. Configure one or more local networks to use as a virtual NEMO network interface. Generally, this will be a Local Area Network (LAN):
 - a. Add a local network to use as a virtual NEMO network interface:

```
(config vpn nemo nemo_example)> add network end eth
(config vpn nemo nemo_example)>
```

- b. (Optional) Repeat for additional interfaces.

14. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

15. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Show NEMO status



Web

1. Log into the XBee Hive WebUI as a user with full Admin access rights.
2. On the menu, select **Status > NEMO**.
The **NEMO** page appears.
3. To view configuration details about an NEMO tunnel, click the **✱** (configuration) icon in the upper right of the tunnel's status pane.

Command line

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. To display details about all configured NEMO tunnels, type the following at the prompt:

```
> show nemo

NEMO Enable Status Address Agent CoAddress
----
demo false
test true up 1.2.3.4 4.3.2.1 10.10.10.1

>
```

3. To display details about a specific tunnel:

```
> show nemo name test

test NEMO Status
-----
Enabled      : true
Status       : up
Home Agent   : 4.3.2.1
Care of Address : 10.10.10.1
Interface    : modem xbee_cellular
GRE Tunnel   : 10.10.10.1 === 4.3.2.1
Metric       : 255
MTU          : 1476
Lifetime (Actual) : 600

Local Network Subnet Status
-----
lan1 192.168.2.1/24 Advertized
LAN2 192.168.3.1/24 Advertized

>
```

4. Type **exit** to exit the Admin CLI.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

WireGuard VPN

WireGuard is a [VPN¹](#) is a protocol that operates at the network layer to provide communication between devices over a public network. It encrypts and encapsulates traffic to protect information. WireGuard supports full networking capabilities including standard, policy-based, and static routes, as well as firewalls. In addition to having IPs inside the tunnel, like IPsec and OpenVPN, you can

¹virtual private network

use this WireGuard tunnel for policy-based routing: send only certain traffic through the tunnel or use it for static routes to send routing and networking through regardless of the source IP. You can also have multiple tunnels.

There are two modes available when [configuring a WireGuard VPN](#):

- **Client mode:** Configure the XBee Hive device to act as a client, so it establishes an outbound WireGuard VPN tunnel to a remote server.
- **Server mode:** Configure the XBee Hive device to act as a server, so one or more remote devices can establish an inbound WireGuard VPN tunnel to the device.

Configure the WireGuard VPN

Your XBee Hive device supports using WireGuard VPN. You can configure the device for either client or server mode. For client mode, your XBee Hive is establishing an outbound WireGuard VPN connection to the WireGuard server. For server mode, your XBee Hive is acting as a WireGuard server and accepts incoming WireGuard VPN connections from one or more client devices. Regardless of how you configure the device, you will need to create a Wireguard tunnel and corresponding interface.

Before you begin

Decide whether you want your device to establish an outbound WireGuard VPN connection or if you want it to act as a WireGuard server. Each mode requires different information.

For client mode You need the following information from the WireGuard server: ▪ Private key ▪ Remote endpoint address or hostname ▪ Remote endpoint port ▪ Remote endpoint public key ▪ Preshared key (optional) ▪ Local and remote IP addresses	For server mode You need the following information: ▪ Client public key Note This key can come from the client device or you can generate it from the Digi device's Admin CLI console using the <code>wireguard generate [tunnel_name] [client_name]</code> command after configuring the Wireguard server settings on the Digi device. ▪ Pre-shared key (optional) ▪ Local and remote IP addresses

 Web

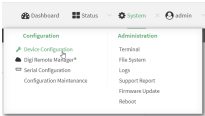
- 1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
- 2. Access the device configuration:

Remote Manager:

- a. Locate your device as described in [Use Digi Remote Manager to view and manage your device](#).
- b. Click the **Device ID**.
- c. Click **Settings**.
- d. Click to expand **Config**.

Local Web UI:

- a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



The **Configuration** window is displayed.

- 1. To create a WireGuard tunnel, navigate to **VPN > WireGuard > WireGuard tunnel**.
- 2. Click  to add a new WireGuard tunnel.
- 3. Type a name for the tunnel.
- 4. Click **OK**.

The settings for your new tunnel appear.

Tunnel setting	UI configuration
Enable	The new tunnel is enabled by default. It can be disabled if the tunnel is being set up for future use or if you want to stop the tunnel while testing other configuration changes.

Tunnel setting	UI configuration
Peers	a. Click  to add a new peer. ■ If this XBee Hive is the WireGuard client, then only add one peer. The peer is the remote Wireguard server to which it connects. ■ If this XBee Hive is the WireGuard server, add one or more peers. The peer(s) are the remote WireGuard clients that will connect to this device. b. Configure the settings for the new peer(s). If the new peer is to act as the WireGuard server, make sure to configure the following settings: ■ [Remote] Public key ■ [Remote] Pre-shared key (optional) ■ [Remote] Allowed addresses: Only traffic destined for an IP address added here is sent to this peer. ■ [Remote] Endpoint address ■ [Remote] Endpoint port If the new peer is to act as a remote WireGuard client, make sure to configure the following settings: ■ [Client] Public key ■ [Client] Pre-shared key (optional) ■ [Local and Remote] Allowed addresses
Device managed private key	Enable to allow the XBee Hive to generate its own public and private keys. If this setting is enabled, it triggers the XBee Hive to automatically generate a private key and corresponding public key. This private and public key is used to establish the encrypted communication between the client and peer via the Wireguard tunnel. To see the public key, navigate to Status > VPN > WireGuard.

Tunnel setting	UI configuration
Private key	Type the private key for the Wireguard tunnel, if the Device managed private key setting is disabled.
Endpoint port	The WireGuard connection value of 51820 is populated by default.

5. Modify the settings.
6. To create the WireGuard interface, navigate to **Network > Interfaces > Interface**.
7. Click  to add a new interface.
8. Type a name for the interface.
9. Click **OK**.
10. The settings for your new interface appear.

Tunnel setting	UI configuration
Enable	The new interface is enabled by default. It can be disabled if it is being set up for future use or if you want to stop using the interface while testing other configuration changes.
Zone	Select External .
Device	Select the device the interface will use, which is the new WireGuard tunnel you created.
IPv4	a. Click IPv4 to expand the settings menu. b. For Address, type the IP address and netmask assigned to this interface (SYNTAX: IPv4_address/netmask). For example, 10.200.200.1/24. c. Click to expand DNS servers. d. Click  to add a new DNS server. e. For DNS Server, type the IP address of the DNS server (SYNTAX: IPv4_address). For example, 10.200.200.1.

11. Click **Apply** to save the new configuration settings.

Command line

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

- At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

- Save the configuration and apply the change.

```
(config vpn iptunnel gre_example)> save
Configuration saved.
>
```

- Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

- At the command line, type **VPN** to enter configuration mode for VPN:

```
> config vpn
(config vpn)>
```

- Type **wireguard** to enter configuration mode for WireGuard.

```
> config vpn wireguard
(config vpn wireguard)>
```

- The table below lists the required settings for creating and configuring a client WireGuard tunnel.

Configuration	Description
add	Add a new WireGuard tunnel. <pre>> config vpn wireguard add <i>name</i> (config)></pre> Where <i>name</i> is the name of the new WireGuard tunnel. For example, <i>newtunnel1</i>.
enable	The WireGuard tunnel is enabled by default. You may want to temporarily disable the tunnel while it is being set up, for future use, or if you want to stop the tunnel while testing other configuration changes. To disable: <pre>(config)> vpn wireguard <i>name</i> enable false (config)></pre> To enable: <pre>(config)> vpn wireguard <i>name</i> enable true (config)></pre>

peer

- a. Determine if the XBee Hive will act as a client or server.
 - If this XBee Hive is the WireGuard client, then only add one peer. The peer is the remote Wireguard server to which it connects.
 - If this XBee Hive is the WireGuard server, add one or more peers. The peer(s) are the remote WireGuard clients that will connect to this device.
- b. Create the peer(s).

```
(config)> vpn wireguard name add peer
(config)>
```

For a peer that acts as the remote Wireguard server, configure the following settings:

- [Remote] Device managed public key

```
(config vpn wireguard [name])> generate
```

Parameters

tunnel	Tunnel Name (Required)
peer	Peer (Required)

- [Remote] Public key

```
(config)> vpn wireguard name peer public_key
(config)>
```

- [Remote] Pre-shared key (optional)

```
(config)> vpn wireguard name peer psk
(config)>
```

- [Remote] Allowed addresses: Only traffic destined for an IP address added here will be sent to this peer.

```
(config)> vpn wireguard name peer overlay
(config)>
```

- [Remote] Endpoint address

```
(config)> vpn wireguard name peer endpoint
(config)>
```

- [Remote] Endpoint port

```
(config)> vpn wireguard name peer port
(config)>
```

For a peer(s) that acts as the remote WireGuard client, configure the following settings:

	▪ [Client] Public key <pre>(config)> vpn wireguard <i>name</i> peer public_key (config)></pre> ▪ [Client] Pre-shared key (optional) <pre>(config)> vpn wireguard <i>name</i> peer psk (config)></pre> ▪ [Local and Remote] Allowed addresses
autogenerate	Enable to allow the XBee Hive to generate its own public and private keys. If this setting is enabled, it triggers the XBee Hive to automatically generate a private key and corresponding public key. To enable: <pre>> config vpn wireguard add <i>name</i> autogenerate true (config)></pre> To disable: <pre>> config vpn wireguard add <i>name</i> autogenerate false (config)></pre>
port	The WireGuard connection value of 51820 is populated by default. <pre>(config)> vpn wireguard <i>name</i> port (config)></pre>
private-key	Type the private key for the Wireguard tunnel, if the Device managed private key setting is disabled. <pre>> config vpn wireguard add <i>name</i> private key <i>value</i> (config)></pre> With <i>value</i> being a 32-byte string encoded in base 64.

8. The table below lists the required settings for creating and configuring a new interface.

Configuration	Description
add	Add a new interface. <pre>> (config network interface) > add <i>name</i> (config)></pre> Where <i>name</i> is the name of the new interface. For example, add newWGtunnel1.
enable	The interface is enabled by default. You may want to temporarily disable the tunnel while it is being set up, for future use, or if you want to stop the tunnel while testing other

	configuration changes. To disable: <pre>(config network interface) > name enable false</pre> <pre>(config)></pre> To enable: <pre>(config network interface) > name enable true</pre> <pre>(config)></pre> Where <i>name</i> is the name of the new interface.
zone	Set the zone to external. <pre>(config network interface [name]) > zone external</pre> <pre>(config)></pre>
device	Add the network device used by this interface. <pre>(config network interface [name]) > device /vpn/wireguard/[name]</pre> For example, device /vpn/wireguard/newWGtunnel1.
IPv4	a. Add the address and netmask assigned to this interface. <pre>config network interface [name] ipv4) > address IPv4_[IPAddress]/[netmask]</pre> For example, ipv4_10.200.200.1/24. b. Add the IP address of the DNS server. <pre>(config network interface [name] ipv4) > dns</pre> <pre>(config network interface [name] ipv4 dns) > ipv4_[address].</pre> Address is the IP address of the DNS server. For example, ipv4_10.200.200.1.

Services

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Allow remote access for web administration and SSH

By default, only devices connected to the XBee Hive's LAN have access to the device via web administration and SSH. To enable these services for access from remote devices:

- The XBee Hive device must have a publicly reachable IP address.
- The **External** firewall zone must be added to the web administration or SSH service. See [Firewall configuration](#) for information on zones.
- See [Set the idle timeout for XBee Hive users](#) for information about setting the inactivity timeout for the web administration and SSH services.

To allow web administration or SSH for the External firewall zone:

Add the External firewall zone to the web administration service

Web

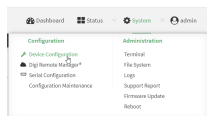
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

Remote Manager:

- a. Locate your device as described in [Use Digi Remote Manager to view and manage your device](#).
- b. Click the **Device ID**.
- c. Click **Settings**.
- d. Click to expand **Config**.

Local Web UI:

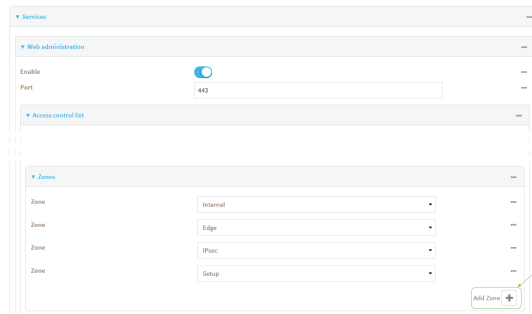
- a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



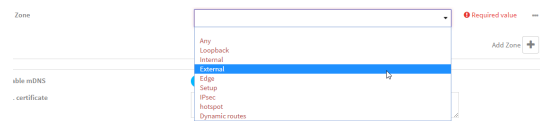
The **Configuration** window is displayed.

3. Click **Services > Web administration > Access Control List > Zones**.

4. For **Add Zone**, click 



5. Select **External**.



6. Click **Apply** to save the configuration and apply the change.

Command line

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the Xbee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Add the external zone to the web administration service:

```
(config)> add service web_admin acl zone end external
(config)>
```

4. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

5. Type **exit** to exit the Admin CLI.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Add the External firewall zone to the SSH service

Web

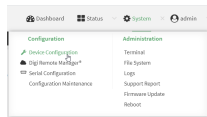
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

Remote Manager:

- a. Locate your device as described in [Use Digi Remote Manager to view and manage your device](#).
- b. Click the **Device ID**.
- c. Click **Settings**.
- d. Click to expand **Config**.

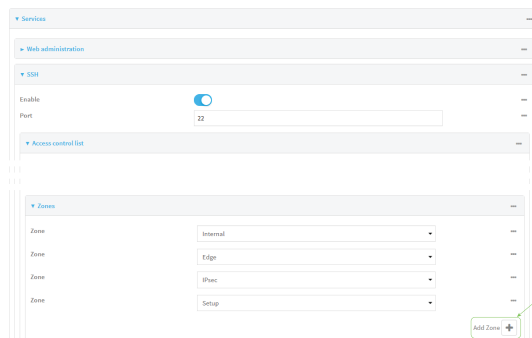
Local Web UI:

- a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

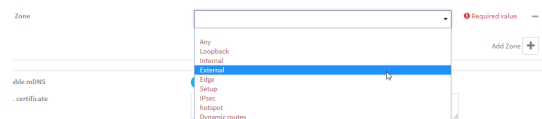


The **Configuration** window is displayed.

3. Click **Configuration > Services > SSH > Access Control List > Zones**.
4. For **Add Zone**, click 



5. Select **External**.



6. Click **Apply** to save the configuration and apply the change.

Command line

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Add the **External** zone to the SSH service:

```
(config)> add service ssh acl zone end external
(config)>
```

4. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

5. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Configure the web administration service

The web administration service allows you to monitor and configure the XBee Hive device by using the WebUI, a browser-based interface.

By default, the web administration service is enabled and uses the standard HTTPS port, 443. The default access control for the service uses the **Internal** firewall zone, which means that only devices connected to the XBee Hive's LAN can access the WebUI. If this configuration is sufficient for your needs, no further configuration is required. See [Allow remote access for web administration and SSH](#) for information about configuring the web administration service to allow access from remote devices.

Required configuration items

- The web administration service is enabled by default.
- Configure access control for the service.

Additional configuration items

- Port to use for web administration service communication.
- Multicast DNS (mDNS) support.
- An SSL certificate to use for communications with the service.
- Support for legacy encryption protocols.

See [Set the idle timeout for XBee Hive users](#) for information about setting the inactivity timeout for the web administration services.

Enable or disable the web administration service

The web administration service is enabled by default. To disable the service, or enable it if it has been disabled:

Web

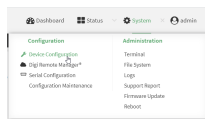
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

Remote Manager:

- a. Locate your device as described in [Use Digi Remote Manager to view and manage your device](#).
- b. Click the **Device ID**.
- c. Click **Settings**.
- d. Click to expand **Config**.

Local Web UI:

- a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



The **Configuration** window is displayed.

3. Click **Services > Web administration**.
4. Click **Enable**.
5. Click **Apply** to save the configuration and apply the change.

Command line

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the Xbee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Enable or disable the web administration service:
 - To enable the service:

```
(config)> service web_admin enable true
(config)>
```

- To disable the service:

```
(config)> service web_admin enable false
(config)>
```

4. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

5. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Configure the service

Web

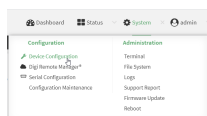
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

Remote Manager:

- a. Locate your device as described in [Use Digi Remote Manager to view and manage your device](#).
- b. Click the **Device ID**.
- c. Click **Settings**.
- d. Click to expand **Config**.

Local Web UI:

- a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



The **Configuration** window is displayed.

3. Click **Services > Web administration**.
4. (Optional) For **Port**, enter the port number for the service. Normally this should not be changed.
5. Click **Access control list** to configure access control:
 - To limit access to specified IPv4 addresses and networks:
 - a. Click **IPv4 Addresses**.
 - b. For **Add Address**, click **Y**.
 - c. For **Address**, enter the IPv4 address or network that can access the device's web administration service. Allowed values are:

- A single IP address or host name.
 - A network designation in CIDR notation, for example, 192.168.1.0/24.
 - **any**: No limit to IPv4 addresses that can access the web administration service.
- d. Click  again to list additional IP addresses or networks.
- To limit access to specified IPv6 addresses and networks:
 - a. Click **IPv6 Addresses**.
 - b. For **Add Address**, click .
 - c. For **Address**, enter the IPv6 address or network that can access the device's web administration service. Allowed values are:
 - A single IP address or host name.
 - A network designation in CIDR notation, for example, 2001:db8::/48.
 - **any**: No limit to IPv6 addresses that can access the web administration service.
 - d. Click  again to list additional IP addresses or networks.
 - To limit access to hosts connected through a specified interface on the device:
 - a. Click **Interfaces**.
 - b. For **Add Interface**, click .
 - c. For **Interface**, select the appropriate interface from the dropdown.
 - d. Click  again to allow access through additional interfaces.
 - To limit access based on firewall zones:
 - a. Click **Zones**. By default, there are three firewall zones already configured: Internal, Edge, and IPsec.
 - b. For **Add Zone**, click .
 - c. For **Zone**, select the appropriate firewall zone from the dropdown.
See [Firewall configuration](#) for information about firewall zones.
 - d. Click  again to allow access through additional firewall zones.
6. Multicast DNS (mDNS) is enabled by default. mDNS is a protocol that resolves host names in small networks that do not have a DNS server. To disable mDNS, or enable it if it has been disabled, click **Enable mDNS**.
7. For **SSL certificate**, if you have your own signed SSL certificate, paste the certificate and private key. If **SSL certificate** is blank, the device will use an automatically-generated, self-signed certificate.
- The SSL certificate and private key must be in PEM format.
 - The private key can use one of the following algorithms:
 - RSA
 - DSA
 - ECDSA
 - ECDH

Note Password-protected certificate keys are not supported.

Example:

- a. Generate the SSL certificate and private key, for example:

```
# openssl req -newkey rsa:2048 -nodes -keyout key.pem -x509 -days 365 -out certificate.pem
```

- b. Paste the contents of **certificate.pem** and **key.pem** into the **SSL certificate** field. The contents of the **certificate.pem** must be first. For example:

[illegible]

8. **View** is set to **Auto** by default and normally should not be changed.
9. **Legacy port redirection** is used to redirect client HTTP requests to the HTTPS service. Legacy port redirection is enabled by default, and normally these settings should not be changed. To disable legacy port redirection, click to expand **Legacy port redirection** and deselect **Enable**.
10. For **Minimum TLS version**, select the minimum TLS version that can be used by client to negotiate the HTTPS session.
11. Click **Apply** to save the configuration and apply the change.

Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

- ### 3. Configure access control:

- To limit access to specified IPv4 addresses and networks:

```
(config)# add service web_admin acl address end value
(config)#
```

Where *value* can be:

- A single IP address or host name.
- A network designation in CIDR notation, for example, 192.168.1.0/24.
- **any**: No limit to IPv4 addresses that can access the web administration service.

Repeat this step to list additional IP addresses or networks.

- To limit access to specified IPv6 addresses and networks:

```
(config)> add service web_admin acl address6 end value
(config)>
```

Where *value* can be:

- A single IP address or host name.
- A network designation in CIDR notation, for example, 2001:db8::/48.
- **any**: No limit to IPv6 addresses that can access the web administration service.

Repeat this step to list additional IP addresses or networks.

- To limit access to hosts connected through a specified interface on the XBee Hive device:

```
(config)> add service web_admin acl interface end value
(config)>
```

Where *value* is an interface defined on your device.

Display a list of available interfaces:

Use ... **network interface ?** to display interface information:

Repeat this step to list additional interfaces.

- To limit access based on firewall zones:

```
(config)> add service web_admin acl zone end value
(config)>
```

Where *value* is a firewall zone defined on your device, or the **any** keyword.

Display a list of available firewall zones:

Type ... **firewall zone ?** at the config prompt:

```
(config)> ... firewall zone ?
```

Zones: A list of groups of network interfaces that can be referred to by packet filtering rules and access control lists.

Additional Configuration

```
any
dynamic_routes
edge
external
internal
```

```
ipsec
loopback
setup
```

```
(config)>
```

Repeat this step to include additional firewall zones.

4. (Optional) If you have your own signed SSL certificate, if you have your own signed SSL certificate, set the certificate and private key by pasting their contents into the **service web_admin cert** command. Enclose the certificate and private key contents in quotes (").

```
(config)> service web_admin cert "ssl-cert-and-private-key"
(config)>
```

- If **SSL certificate** is blank, the device will use an automatically-generated, self-signed certificate.
- The SSL certificate and private key must be in PEM format.
- The private key can use one of the following algorithms:
 - RSA
 - DSA
 - ECDSA
 - ECDH

Note Password-protected certificate keys are not supported.

Example

- a. Generate the SSL certificate and private key, for example:

```
# openssl req -newkey rsa:2048 -nodes -keyout key.pem -x509 -days 365 -out certificate.pem
```

- b. Paste the contents of **certificate.pem** and **key.pem** into the **service web_admin cert** command. Enclose the contents of **certificate.pem** and **key.pem** in quotes. For example:

```
(config)> service web_admin cert "-----BEGIN CERTIFICATE-----
MIID8TCCAatmgAwIBAgIULOWezcmbnQmIC9pT9txwCfUbkWQwDQYJKoZIhvcNAQEL
BQAwgYcxCzAJBgNVBAYTAIVTMQ8wDQYDVQQIDAZPcmVnb24xDjAMBgNVBAcMBUFS
b2hhMRMwEQYDVQQKDApNY0JhbmUgSW5jMRAwDgYDVQQLEAdTdBWb3J0MQ8wDQYD
VQDDAZtY2JhbmUxHjAdBgkqhkiG9w0BCQEWEGptY2JhbmVAZGlnaS5jb20wHhcN
MjAwOTlyMTY1OTUyWhcNMjEwOTlyMTY1OTUyWjCBhZELMAkGA1UEBhMCVVMxZDZAN
BgNVBAgMBk9yZWdvbjEOMAwGA1UEBwwFQWxvaGEzEzARBgNVBAoMCK1jQmFuZSBj
bmMxZDAOBgNVBAsMB1N1cHBvcnQxZDZANBgNVBAMMBm1jYmFuZTEfMB0GCSqGSIb3
DQEJARYQam1jYmFuZUBkaWdpLmNvbTCCASIwDQYJKoZIhvcNAQEBBQADggEPADCC
AQoCggEBAOBn19AX01LO9pIYtFRZq0bETwNwSCYGeEIOGJ7gHt/rihLVBJS1woYv
u1Oq1ohYxlawBY1iIPBD2GtzyEJXzBZdQRhwi/dRyRi4vr7EkjGDr0Vb/NVT0L5w
UzcMeT+71DYvKYm6GpcWx+LoKqFTjbMFBIZE5pbBfru+Sicld6joCHluYq8Ehflx
6sy6s4MDbyTUAEN2YhsBaOljej64LNzcsHeISbAWibXWjOSsK+N1MivQq5uwlYw/
```

```

1fsnD8KDS43Wg57+far9fQ2MIHsgnoAGz+w6PIKJR594y/MfqQffDFNCh2IJY49F
hOqEtA5B9TyXRKwoa3j/IIc/t5cplBcCAwEAAaNTMFewHQYDVR0OBBYEFdVtrWBH
E1ZcBg9TRRxMn7chKYjXMB8GA1UdIwQYMBaAFDVRtrWBHE1ZcBg9TRRxMn7chKYjX
MA8GA1UdEwEB/wQFMAMBAf8wDQYJKoZIhvcNAQELBQADggEBALj/mrgaKDNTspv9
ThyZTBIRQ59wlzwRWRyRxUmkVcR8eBcjwdBTWjSBLnFID2WFOEEEnVz2Dzcixmj4
/Fw7GQNcYIKj+alGJzbcKgox10mZB3VKYRmPnpzHCkvFi4o81+bC8HJQfK9U80e
vDV0/vA5OB2j/DrjvIOrapCTkuyA0TVyGvgTASx2ATu9U45KZofm4odThQs/9FRQ
+cwSTb5v47KYffeyY+g3dyJw1/KgMJGpBUYNDIsFQC9RfzPjKE2kz41hx4VksT/
q81WGstDXH++QTu2sj7vWkFJH5xPFt80HjtWKKplfeOIIbPGeRHvdH2PQibx0Oot
Sa+P5O8=
-----END CERTIFICATE-----
-----BEGIN PRIVATE KEY-----
MIIEvQIBADANBgkqhkiG9w0BAQEFAASCBAKcwgSjAgEAAoIBAQQDgZ9fQF9NSzvaZ
WLX0WatGxE8DcEgmBnhCDhie4B7f64oS1QSUtcKGL7tTqtaIWMSSGsAWNYiDwQ9hr
c8hCV8wWXUEYclv3UckYuL6+xJlXg69FW/zVU9C+cFM3DhK/u9Q2LymJuhqXFsf
6CqhU42zBQSM3uaWwX67vkonCHeo6AhyLmKvBIX5cerMurODA28k1ABDdmlbAWjp
Y3o+uCzc3LB3iEmwFom11ozkrCvjdTlr0KubsCGMP9X7Jw/CgOuN1oOe/n2q/X0N
jCB7D56ABs/sOjyCiUefeMvzH6kH3wxTQodPSWOPRYTqhLQOQfU8I0SsKgt4/5SA
v7eXKSAXAgMBAAECggEBAMDKdi7hSTyrclDsVeZH4044+WkK3fNPaQCWESmZ+AY
i9cCC513SlfeSiHnc8hP+wd70kIVNNc2coheQH4+z6enFnXYu2cPbKVAkx9x4eel
Ktx72wurpnr2JYf1v3Vx+S9T9WvN52pGuBPJQla3YdWbSf18wr5iHm9NXleMTsFc
esdjEW07JRnxQEMZ1GPWT+YtH1+FzQ3+W9rFsFFzt0vcp5Lh1RGg0huzL2NQ5EcF
3brzLzJNAavMsdBFzdc2hcbYnbv7o1uGLujbtZ7WurNy7+Tc54gu2Ds25J0/0mgf
OxmQFevlqVkpq2wOmeLt4o77y6uCbhfA6I+GWTZEYECgYEAu/DzIbPMRcWuUig0
CymOKlhEpx9qxid2Ike0G57ykFaEsKxVMKHkv/yvAEHwazIEzlc2kcQrLWnDQYx
oKmXf87Y1T5AXs+ml1PlepXgveKpKrWwORsdDBd+OS34lyNJ0KCqqqlzWaaaf8lcSW
tyShAZzvU9H9GW9WICc8g3ifp9WUCgYEA4WSSfqFkQLA09sl76VLvUqMbb31bNgOk
ZuPg7uxuDk3yNY58LGQCoV8tUZuHtBJdrBDCtcJa5sasJZQrWUIZ8y/5zgCZmqQn
MzTD062xaqTenL0jKgKQrWig4DpUUhfc4BFJmHyeitosDPG98oCxuh6HfuMOeM1v
Xag6Z391VcsCgYBgBnpfFU1JoC+L7m+IIPPZykWbPT/qBeYBBki5+0lhzebR9Stn
VicrmROjojQk/sRGxR7fDixaGZolUwcRg7N7SH/y3zA7SDp4WvhjFeKFR8b6O1d4
PFnWO2envUUIE/50ZoPFWsv1o8eK2XT67Qbn56t9NB5a7QPvzSSR7jG77QKBgD/w
BrqTT9w4DBrsxEiLK+1g0/iMKCM8dkaJbHBMgsuw1m7/K+fAzWbWtpWk21aIGX+
Ly3eX2j9zNGwMYfXjgO1hViRxQEgNdqJyk9fA2gsMtYltTbymVYHYzMweMD88fRC
Ey2FIHfxIfPeE7MaHNCEXnN5N56/MCtSUJcRihh3AoGAey0BGi4xLqSJESqZZ58p
e71JHg4M46rLlrx+4FXaop64LCxM8kPpROfasJJu5nIPpYHYe959BBQnYcAheZZ
0siGswlauBd8BrZMIWf8JBUIc5EGkMilyNpLJqPbGEImMUXk4Zane/cL7e06U8ft
BUtOtMefbBDDxpP+E+ilium=
-----END PRIVATE KEY-----"
(config)>

```

5. (Optional) Configure Multicast DNS (mDNS):

mDNS is a protocol that resolves host names in small networks that do not have a DNS server. mDNS is enabled by default. To disable mDNS, or enable it if it has been disabled:

- To enable the mDNS protocol:

```

(config)> service web_admin mdns enable true
(config)>

```

- To disable the mDNS protocol:

```
(config)> service web_admin mdns enable false
(config)>
```

6. (Optional) Set the port number for this service.

The default setting of 443 normally should not be changed.

```
(config)> service web_admin port 444
(config)>
```

7. (Optional) Set the minimum TLS version that can be used by client to negotiate the HTTPS session:

```
(config)> service web_admin legacy_encryption value
(config)>
```

where *value* is one of:

- TLS-1_1
- TLS-1_2
- TLS-1_3

The default is **TLS-1_2**.

8. (Optional) Disable legacy port redirection.

Legacy port redirection is used to redirect client HTTP requests to the HTTPS service. Legacy port redirection is enabled by default, and normally these settings should not be changed.

To disable legacy port redirection:

```
(config)> service web_admin legacy enable false
(config)>
```

9. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

10. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Configure SSH access

The XBee Hive's default configuration has SSH access enabled, and allows SSH access to the device from authorized users within the **Internal** firewall zone. If this configuration is sufficient for your needs, no further configuration is required. See [Allow remote access for web administration and SSH](#) for information about configuring the SSH service to allow access from remote devices.

Required configuration items

- Enable SSH access.
- Configure access control for the SSH service.

Additional configuration items

- Port to use for communications with the SSH service.
- Multicast DNS (mDNS) support.
- A private key to use for communications with the SSH service.
- Create custom SSH configuration settings.

See [Set the idle timeout for XBee Hive users](#) for information about setting the inactivity timeout for the SSH service.

Enable or disable the SSH service

The SSH service is enabled by default. To disable the service, or enable it if it has been disabled:

Web

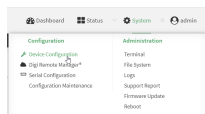
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

Remote Manager:

- a. Locate your device as described in [Use Digi Remote Manager to view and manage your device](#).
- b. Click the **Device ID**.
- c. Click **Settings**.
- d. Click to expand **Config**.

Local Web UI:

- a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



The **Configuration** window is displayed.

3. Click **Services** > **SSH**.
4. Click **Enable**.
5. Click **Apply** to save the configuration and apply the change.

Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Enable or disable the SSH service:

- To enable the service:

```
(config)> service ssh enable true
(config)>
```

- To disable the service:

```
(config)> service ssh enable false
(config)>
```

4. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

5. Type **exit** to exit the Admin CLI.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Configure the service



1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

Remote Manager:

- a. Locate your device as described in [Use Digi Remote Manager to view and manage your device](#).
- b. Click the **Device ID**.
- c. Click **Settings**.
- d. Click to expand **Config**.

Local Web UI:

- a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



The **Configuration** window is displayed.

3. Click **Services > SSH**.
4. (Optional) For **Port**, enter the port number for the service. Normally this should not be changed.
5. Click **Access control list** to configure access control:
 - To limit access to specified IPv4 addresses and networks:
 - a. Click **IPv4 Addresses**.
 - b. For **Add Address**, click .
 - c. For **Address**, enter the IPv4 address or network that can access the device's SSH service. Allowed values are:
 - A single IP address or host name.
 - A network designation in CIDR notation, for example, 192.168.1.0/24.
 - **any**: No limit to IPv4 addresses that can access the SSH service.
 - d. Click  again to list additional IP addresses or networks.
 - To limit access to specified IPv6 addresses and networks:
 - a. Click **IPv6 Addresses**.
 - b. For **Add Address**, click .
 - c. For **Address**, enter the IPv6 address or network that can access the device's SSH service. Allowed values are:
 - A single IP address or host name.
 - A network designation in CIDR notation, for example, 2001:db8::/48.
 - **any**: No limit to IPv6 addresses that can access the SSH service.
 - d. Click  again to list additional IP addresses or networks.
 - To limit access to hosts connected through a specified interface on the device:
 - a. Click **Interfaces**.
 - b. For **Add Interface**, click .
 - c. For **Interface**, select the appropriate interface from the dropdown.
 - d. Click  again to allow access through additional interfaces.
 - To limit access based on firewall zones:
 - a. Click **Zones**. By default, there are three firewall zones already configured: Internal, Edge, and IPsec.
 - b. For **Add Zone**, click .
 - c. For **Zone**, select the appropriate firewall zone from the dropdown.
See [Firewall configuration](#) for information about firewall zones.

- d. Click **Yes** again to allow access through additional firewall zones.
6. Multicast DNS (mDNS) is enabled by default. mDNS is a protocol that resolves host names in small networks that do not have a DNS server. To disable mDNS, or enable it if it has been disabled, click **Enable mDNS**.
7. For **Private key**, type the private key in PEM format. If **Private key** is blank, the device will use an automatically-generated key.
8. To create custom SSH configuration settings:
 - a. Click to expand **Custom configuration**.
 - b. Click **Enable**.
 - c. For **Override**:
 - If **Override** is enabled, entries in **Configuration file** will be used in place of the standard SSH configuration.
 - If **Override** is not enabled, entries in **Configuration file** will be added to the standard SSH configuration.
 - d. For **Configuration file**, type configuration settings in the form of an OpenSSH sshd_config file.
For example, to enable the diffie-hellman-group-sha-14 key exchange algorithm:
 - i. Click **Enable** to enable SSH custom configuration.
 - ii. Leave **Override** disabled.
 - iii. For **Configuration file**, type the following:

```
KexAlgorithms +diffie-hellman-group14-sha1
```

9. Click **Apply** to save the configuration and apply the change.

Command line

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Configure access control:
 - To limit access to specified IPv4 addresses and networks:

```
(config)> add service ssh acl address end value
(config)>
```

Where *value* can be:

- A single IP address or host name.
- A network designation in CIDR notation, for example, 192.168.1.0/24.
- **any**: No limit to IPv4 addresses that can access the SSH service.

Repeat this step to list additional IP addresses or networks.

- To limit access to specified IPv6 addresses and networks:

```
(config)> add service ssh acl address6 end value
(config)>
```

Where *value* can be:

- A single IP address or host name.
- A network designation in CIDR notation, for example, 2001:db8::/48.
- **any**: No limit to IPv6 addresses that can access the SSH service.

Repeat this step to list additional IP addresses or networks.

- To limit access to hosts connected through a specified interface on the XBee Hive device:

```
(config)> add service ssh acl interface end value
(config)>
```

Where *value* is an interface defined on your device.

Display a list of available interfaces:

Use ... **network interface ?** to display interface information:

Repeat this step to list additional interfaces.

- To limit access based on firewall zones:

```
(config)> add service ssh acl zone end value
(config)>
```

Where *value* is a firewall zone defined on your device, or the **any** keyword.

Display a list of available firewall zones:

Type ... **firewall zone ?** at the config prompt:

```
(config)> ... firewall zone ?
```

Zones: A list of groups of network interfaces that can be referred to by packet filtering rules and access control lists.

Additional Configuration

```
any
dynamic_routes
edge
external
internal
ipsec
loopback
setup
```

```
(config)>
```

Repeat this step to include additional firewall zones.

4. (Optional) Set the private key in PEM format. If not set, the device will use an automatically-generated key.

```
(config)> service ssh key key.pem
(config)>
```

5. (Optional) Configure Multicast DNS (mDNS)

mDNS is a protocol that resolves host names in small networks that do not have a DNS server. mDNS is enabled by default. To disable mDNS, or enable it if it has been disabled:

- To enable the mDNS protocol:

```
(config)> service ssh mdns enable true
(config)>
```

- To disable the mDNS protocol:

```
(config)> service ssh mdns enable false
(config)>
```

6. (Optional) Set the port number for this service.

The default setting of 22 normally should not be changed.

```
(config)> service ssh port 24
(config)>
```

7. To create custom SSH configuration settings:

- a. Enable custom configurations:

```
(config)> service ssh custom enable true
(config)>
```

- b. To override the standard SSH configuration and only use the **config_file** parameter:

```
(config)> service ssh custom override true
(config)>
```

- If **override** is set to **true**, entries in **Configuration file** will be used in place of the standard SSH configuration.
- If **override** is set to **false**, entries in **Configuration file** will be added to the standard SSH configuration.

The default is **false**.

- c. Set the configuration settings:

```
(config)> service ssh custom config_file value
(config)>
```

where *value* is one or more entries in the form of an OpenSSH sshd_config file. For example, to enable the diffie-helman-group-sha-14 key exchange algorithm:

```
(config)> service ssh custom config_file "KexAlgorithms +diffie-hellman-group14-sha1"
(config)>
```

8. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

9. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Use SSH with key authentication

Rather than using passwords, you can use SSH keys to authenticate users connecting via SSH, SFTP, or SCP. SSH keys provide security and scalability:

- **Security:** Using SSH keys for authentication is more secure than using passwords. Unlike a password that can be guessed by an unauthorized user, SSH key pairs provide more sophisticated security. A public key configured on the Digi XBee Hive Gateway device is paired with a private key on the user's PC. The private key, once generated, remains on the user's PC.
- **Scalability:** SSH keys can be used on more than one Digi XBee Hive Gateway device.

Generating SSH key pairs

On a Microsoft Windows PC, you can generate SSH key pairs using a terminal emulator application, such as **PuTTY** or **Tera Term**.

On a Linux host, an SSH key pair is usually created automatically in the user's **.ssh** directory. The private and public keys are named **id_rsa** and **id_rsa.pub**. If you need to generate an SSH key pair, you can use the **ssh-keygen** application.

For example, the following entry generates an RSA key pair in the user's **.ssh** directory:

```
ssh-keygen -t rsa -f ~/.ssh/id_rsa
```

The private key file is named **id_rsa** and the public key file is named **id_rsa.pub**. (The **.pub** extension is automatically appended to the name specified for the private key output file.)

Required configuration items

- Name for the user
- SSH public key for the user

Additional configuration items

- If you want to access the Digi XBee Hive Gateway device using SSH over a WAN interface, configure the access control list for the SSH service to allow SSH access for the **External** firewall zone.

Web

1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

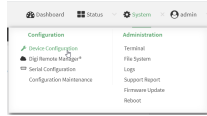
Remote Manager:

- a. Locate your device as described in [Use Digi Remote Manager to view and manage your device](#).
- b. Click the **Device ID**.
- c. Click **Settings**.

- d. Click to expand **Config**.

Local Web UI:

- a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



The **Configuration** window is displayed.

3. Click **Authentication > Users**.
4. Select an existing user or create a new user. See [User authentication](#) for information about creating a new user.
5. Click **SSH keys**.
6. In **Add SSH key**, enter a name for the SSH key and click **Go**.
7. Enter the public SSH key by pasting or typing a public encryption key that this user can use for passwordless SSH login.
8. Click **Apply** to save the configuration and apply the change.

Command line

You can add configure passwordless SSH login for an existing user or include the support when creating a new user. See [User authentication](#) for information about creating a new user. These instructions assume an existing user named **temp_user**.

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Add an SSH key for the user by using the `ssh_key` command and pasting or typing a public encryption key:

```
(config)> add auth user maria ssh_key key_name key
(config)>
```

where:

- `key_name` is a name for the key.
 - `key` is a public SSH key, which you can enter by pasting or typing a public encryption key that this user can use for passwordless SSH login
4. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

5. Type **exit** to exit the Admin CLI.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Configure telnet access

By default, the telnet service is disabled.

Note Telnet is an insecure protocol and should only be used for backward-compatibility reasons, and only if the network connection is otherwise secured.

Required configuration items

- Enable telnet access.
- Configure access control for the telnet service.

Additional configuration items

- Port to use for communications with the telnet service.
- Multicast DNS (mDNS) support.

See [Set the idle timeout for XBee Hive users](#) for information about setting the inactivity timeout for the telnet service.

Enable the telnet service

The telnet service is disabled by default. To enable the service:

Web

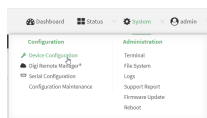
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

Remote Manager:

- a. Locate your device as described in [Use Digi Remote Manager to view and manage your device](#).
- b. Click the **Device ID**.
- c. Click **Settings**.
- d. Click to expand **Config**.

Local Web UI:

- a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



The **Configuration** window is displayed.

3. Click **Services > telnet**.

4. Click **Enable**.
5. Click **Apply** to save the configuration and apply the change.

Command line

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Enable the telnet service:

```
(config)> service telnet enable true
(config)>
```

4. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

5. Type **exit** to exit the Admin CLI.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Configure the service



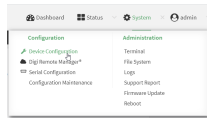
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

Remote Manager:

- a. Locate your device as described in [Use Digi Remote Manager to view and manage your device](#).
- b. Click the **Device ID**.
- c. Click **Settings**.
- d. Click to expand **Config**.

Local Web UI:

- a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



The **Configuration** window is displayed.

3. Click **Services > telnet**.
4. (Optional) For **Port**, enter the port number for the service. Normally this should not be changed.
5. Click **Access control list** to configure access control:
 - To limit access to specified IPv4 addresses and networks:
 - a. Click **IPv4 Addresses**.
 - b. For **Add Address**, click .
 - c. For **Address**, enter the IPv4 address or network that can access the device's telnet service. Allowed values are:
 - A single IP address or host name.
 - A network designation in CIDR notation, for example, 192.168.1.0/24.
 - **any**: No limit to IPv4 addresses that can access the telnet service.
 - d. Click  again to list additional IP addresses or networks.
 - To limit access to specified IPv6 addresses and networks:
 - a. Click **IPv6 Addresses**.
 - b. For **Add Address**, click .
 - c. For **Address**, enter the IPv6 address or network that can access the device's telnet service. Allowed values are:
 - A single IP address or host name.
 - A network designation in CIDR notation, for example, 2001:db8::/48.
 - **any**: No limit to IPv6 addresses that can access the telnet service.
 - d. Click  again to list additional IP addresses or networks.
 - To limit access to hosts connected through a specified interface on the device:
 - a. Click **Interfaces**.
 - b. For **Add Interface**, click .
 - c. For **Interface**, select the appropriate interface from the dropdown.
 - d. Click  again to allow access through additional interfaces.
 - To limit access based on firewall zones:
 - a. Click **Zones**. By default, there are three firewall zones already configured: Internal, Edge, and IPsec.
 - b. For **Add Zone**, click .
 - c. For **Zone**, select the appropriate firewall zone from the dropdown.
See [Firewall configuration](#) for information about firewall zones.
 - d. Click  again to allow access through additional firewall zones.

6. Multicast DNS (mDNS) is disabled by default. mDNS is a protocol that resolves host names in small networks that do not have a DNS server. To enable mDNS, click **Enable mDNS**.
7. Click **Apply** to save the configuration and apply the change.

Command line

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Configure access control:

- To limit access to specified IPv4 addresses and networks:

```
(config)> add service telnet acl address end value
(config)>
```

Where *value* can be:

- A single IP address or host name.
- A network designation in CIDR notation, for example, 192.168.1.0/24.
- **any**: No limit to IPv4 addresses that can access the telnet service.

Repeat this step to list additional IP addresses or networks.

- To limit access to specified IPv6 addresses and networks:

```
(config)> add service telnet acl address6 end value
(config)>
```

Where *value* can be:

- A single IP address or host name.
- A network designation in CIDR notation, for example, 2001:db8::/48.
- **any**: No limit to IPv6 addresses that can access the telnet service.

Repeat this step to list additional IP addresses or networks.

- To limit access to hosts connected through a specified interface on the XBee Hive device:

```
(config)> add service telnet acl interface end value
(config)>
```

Where *value* is an interface defined on your device.

Display a list of available interfaces:

Use ... **network interface ?** to display interface information:

Repeat this step to list additional interfaces.

- To limit access based on firewall zones:

```
(config)> add service telnet acl zone end value
(config)>
```

Where *value* is a firewall zone defined on your device, or the **any** keyword.

Display a list of available firewall zones:

Type ... **firewall zone ?** at the config prompt:

```
(config)> ... firewall zone ?
```

Zones: A list of groups of network interfaces that can be referred to by packet filtering rules and access control lists.

Additional Configuration

```
any
dynamic_routes
edge
external
internal
ipsec
loopback
setup
```

```
(config)>
```

Repeat this step to include additional firewall zones.

4. (Optional) Configure Multicast DNS (mDNS)

mDNS is a protocol that resolves host names in small networks that do not have a DNS server. mDNS is disabled by default. To enable:

```
(config)> service telnet mdns enable true
(config)>
```

5. (Optional) Set the port number for this service.

The default setting of 23 normally should not be changed.

```
(config)> service telnet port 25
(config)>
```

6. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

7. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Configure DNS

The XBee Hive device includes a caching DNS server which forwards queries to the DNS servers that are associated with the network interfaces, and caches the results. This server is used within the device, and cannot be disabled. Use the access control list to restrict external access to this server.

Required configuration items

- Configure access control for the DNS service.

Additional configuration items

- Whether the device should cache negative responses.
- Whether the device should always perform DNS queries to all available DNS servers.
- Whether to prevent upstream DNS servers from returning private IP addresses.
- Additional DNS servers, in addition to the ones associated with the device's network interfaces.
- Specific host names and their IP addresses.

The device is configured by default with the hostname **digi.device**, which corresponds to the **192.168.210.1** IP address.

To configure the DNS server:

Web

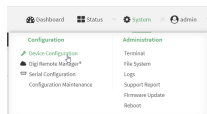
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

Remote Manager:

- a. Locate your device as described in [Use Digi Remote Manager to view and manage your device](#).
- b. Click the **Device ID**.
- c. Click **Settings**.
- d. Click to expand **Config**.

Local Web UI:

- a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



The **Configuration** window is displayed.

3. Click **Services > DNS**.

4. Click **Access control list** to configure access control:
 - To limit access to specified IPv4 addresses and networks:
 - a. Click **IPv4 Addresses**.
 - b. For **Add Address**, click .
 - c. For **Address**, enter the IPv4 address or network that can access the device's DNS service. Allowed values are:
 - A single IP address or host name.
 - A network designation in CIDR notation, for example, 192.168.1.0/24.
 - **any**: No limit to IPv4 addresses that can access the DNS service.
 - d. Click  again to list additional IP addresses or networks.
 - To limit access to specified IPv6 addresses and networks:
 - a. Click **IPv6 Addresses**.
 - b. For **Add Address**, click .
 - c. For **Address**, enter the IPv6 address or network that can access the device's DNS service. Allowed values are:
 - A single IP address or host name.
 - A network designation in CIDR notation, for example, 2001:db8::/48.
 - **any**: No limit to IPv6 addresses that can access the DNS service.
 - d. Click  again to list additional IP addresses or networks.
 - To limit access to hosts connected through a specified interface on the device:
 - a. Click **Interfaces**.
 - b. For **Add Interface**, click .
 - c. For **Interface**, select the appropriate interface from the dropdown.
 - d. Click  again to allow access through additional interfaces.
 - To limit access based on firewall zones:
 - a. Click **Zones**. By default, there are three firewall zones already configured: Internal, Edge, and IPsec.
 - b. For **Add Zone**, click .
 - c. For **Zone**, select the appropriate firewall zone from the dropdown.
See [Firewall configuration](#) for information about firewall zones.
 - d. Click  again to allow access through additional firewall zones.
5. (Optional) **Cache negative responses** is enabled by default. Disabling this option may improve performance on networks with transient DNS results, when one or more DNS servers may have positive results. To disable, click to toggle off **Cache negative responses**.
6. (Optional) **Query all servers** is enabled by default. This option is useful when only some DNS servers will be able to resolve hostnames. To disable, click to toggle off **Query all servers**.
7. (Optional) **Rebind protection**, if enabled, prevents upstream DNS servers from returning private IP addresses. To enable, click **Rebind protection**.

8. (Optional) **Allow localhost rebinding** is enabled by default if **Rebind protection** is enabled. This is useful for Real-time Black List (RBL) servers.
9. (Optional) Type the IP address of the **Fallback server**. This is a DNS server to be used in the absence of any other server. The default is **8.8.8.8**.
10. (Optional) To add additional DNS servers:
 - a. Click **DNS servers**.
 - b. For **Add Server**, click 
 - c. (Optional) Enter a label for the DNS server.
 - d. For **DNS server**, enter the IP address of the DNS server.
 - e. **Domain** restricts the device's use of this DNS server based on the domain. If no domain are listed, then all queries may be sent to this server.
11. (Optional) To add host names and their IP addresses that the device's DNS server will resolve:
 - a. Click **Additional DNS hostnames**.
 - b. For **Add Host**, click 
 - c. Type the **IP address** of the host.
 - d. For **Name**, type the hostname.
12. Click **Apply** to save the configuration and apply the change.

Command line

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Configure access control:
 - To limit access to specified IPv4 addresses and networks:

```
(config)> add service dns acl address end value
(config)>
```

Where *value* can be:

- A single IP address or host name.
- A network designation in CIDR notation, for example, 192.168.1.0/24.
- **any**: No limit to IPv4 addresses that can access the DNS service.

Repeat this step to list additional IP addresses or networks.

- To limit access to specified IPv6 addresses and networks:

```
(config)> add service dns acl address6 end value
(config)>
```

Where *value* can be:

- A single IP address or host name.
- A network designation in CIDR notation, for example, 2001:db8::/48.
- **any**: No limit to IPv6 addresses that can access the DNS service.

Repeat this step to list additional IP addresses or networks.

- To limit access to hosts connected through a specified interface on the XBee Hive device:

```
(config)> add service dns acl interface end value
(config)>
```

Where *value* is an interface defined on your device.

Display a list of available interfaces:

Use ... **network interface ?** to display interface information:

Repeat this step to list additional interfaces.

- To limit access based on firewall zones:

```
(config)> add service dns acl zone end value
(config)>
```

Where *value* is a firewall zone defined on your device, or the **any** keyword.

Display a list of available firewall zones:

Type ... **firewall zone ?** at the config prompt:

```
(config)> ... firewall zone ?
```

Zones: A list of groups of network interfaces that can be referred to by packet filtering rules and access control lists.

Additional Configuration

```
any
dynamic_routes
edge
external
internal
ipsec
loopback
setup
```

```
(config)>
```

Repeat this step to include additional firewall zones.

4. (Optional) Cache negative responses

By default, the device's DNS server caches negative responses. Disabling this option may improve performance on networks with transient DNS results, when one or more DNS servers may have positive results. To disable:

```
(config)> service dns cache_negative_responses false
(config)>
```

5. (Optional) Query all servers

By default, the device's DNS server queries all available DNS servers. Disabling this option may improve performance on networks with transient DNS results, when one or more DNS servers may have positive results. To disable:

```
(config)> service dns query_all_servers false
(config)>
```

6. (Optional) Rebind protection

By default, rebind protection is disabled. If enabled, this prevents upstream DNS servers from returning private IP addresses. To enable:

```
(config)> service dns stop_dns_rebind false
(config)>
```

7. (Optional) Allow localhost rebinding

By default, localhost rebinding is enabled by default if rebind protection is enabled. This is useful for Real-time Black List (RBL) servers. To disable:

```
(config)> service dns rebind_localhost_ok false
(config)>
```

8. (Optional) Fallback server

Configure the IP address of the DNS server to be used in the absence of any other server. The default is **8.8.8.8**.

```
(config)> service dns fallback_server value
(config)>
```

9. (Optional) Add additional DNS servers

a. Add a DNS server:

```
(config)> add service dns server end
(config service dns server 0)>
```

b. Set the IP address of the DNS server:

```
(config service dns server 0)> address ip-addr
(config service dns server 0)>
```

c. To restrict the device's use of this DNS server based on the domain, use the **domain** command. If no domain are listed, then all queries may be sent to this server.

```
(config service dns server 0)> domain domain
(config service dns server 0)>
```

- d. (Optional) Set a label for this DNS server:

```
(config service dns server 0)> label label
(config service dns server 0)>
```

10. (Optional) Add host names and their IP addresses that the device's DNS server will resolve

- a. Add a host:

```
(config)> add service dns host end
(config service dns host 0)>
```

- b. Set the IP address of the host:

```
(config service dns host 0)> address ip-addr
(config service dns host 0)>
```

- c. Set the host name:

```
(config service dns host 0)> name host-name
(config service dns host 0)>
```

11. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

12. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Show DNS server

You can display status for DNS servers. This command is available only at the Admin CLI.

Command line

Show DNS information

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. Use the **show dns** command at the system prompt:

```
> show dns
```

Interface	Label	Server	Domain
eth1		192.168.3.1	
eth1		fd00:2704::1	

```
eth1      fe80::227:4ff:fe2b:ae12
eth1      fe80::227:4ff:fe44:105b
eth1      fe80::240:fff:fe80:23b0
```

```
>
```

3. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

WAN bonding

You can now find all [WAN bonding content](#)—including feature overviews, workflows, FAQs, and step-by-step tasks—consolidated on the Cellular documentation portal.

Use Digi Remote Manager to enable and configure WAN bonding on multiple devices

You can now find all [WAN bonding content](#)—including feature overviews, workflows, FAQs, and step-by-step tasks—consolidated on the Cellular documentation portal.

Configure WAN bonding on your local device

You can now find all [WAN bonding content](#)—including feature overviews, workflows, FAQs, and step-by-step tasks—consolidated on the Cellular documentation portal. The CLI-based procedure remains in the DAL product-specific user guide for now, and will be migrated to the Cellular documentation portal in a future update.

Command line

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Enable the WAN bonding service:

```
(config)> network sdwan wan_bonding enable true
(config)>
```

Note The WAN bonding service must be enabled for this device in Digi Remote Manager. Contact your Digi sales representative for information.

4. Add a new external server, which will host the WAN bonding service. Add as many servers as needed.

```
(config)> network sdwan wan_bonding servers
(config network sdwan wan_bonding servers)> add end
(config network sdwan wan_bonding servers 0)>
```

5. Set the hostname or IPv4 address of the external server hosting the WAN bonding service:

```
(config network sdwan wan_bonding servers 0)>hostname-or-IPv4-address
(config)>
```

6. (Optional) Set the port number that the external server uses for the WAN bonding connection:

```
(config network sdwan wan_bonding servers 0)>host_port value
(config)>
```

Allowed values are any port number, or the keyword **any**. The default is **443**.

7. (Optional) Set the Channel UDP Listener Port:

```
(config network sdwan wan_bonding servers 0)>udpListenerPort value
(config)>
```

Allowed values are any Channel UDP Listener Port, or the keyword **any**. The default is **44344**.

Add as many external servers as needed.

8. Set the username and password to authenticate with the WAN bonding service:

```
(config)> network sdwan wan_bonding username username
(config)> network sdwan wan_bonding password password
(config)>
```

9. Set the firewall zone for this interface. To treat the interface as a normal WAN interface, this would be left at the default of **external**.

- a. Use the **?** to determine available zones:

```
(config)> network sdwan wan_bonding zone ?
```

Zone: The zone for the new bonded interface. To treat the interface as a typical WAN interface, this should be set to External.

Format:

```
any
dynamic_routes
edge
external
internal
ipsec
loopback
setup
```

Default value: external

Current value: external

```
(config)>
```

- b. Set the zone:

```
(config)> network sdwan wan_bonding zone zone  
(config)>
```

10. Configure the device's WAN interfaces that will be bonded:

- a. Add the first interface:

```
(config)> add network sdwan wan_bonding interfaces end  
(config network sdwan wan_bonding interfaces 0)>
```

- i. Set the interface:

- i. Use the **?** to determine available interfaces:
- ii. Set the interface. For example:

```
(config network sdwan wan_bonding interfaces 0)> interface /network/interface/eth1  
(config network sdwan wan_bonding interfaces 0)>
```

- ii. (Optional) Set the mode for the interface:

```
(config network sdwan wan_bonding interfaces 0)> mode value  
(config network sdwan wan_bonding interfaces 0)>
```

where *value* is one of:

- **auto**: Automatically sets the mode to Cellular Optimized for Speed-mode for cellular, and Ethernet for non-cellular. This is the default mode.
- **mobileAggressive**: A general-purpose configuration suitable for most lines (4G, DSL, etc), with a fair tolerance for packet loss and latency.
- **mobileLowLatency**: Another preset for mobile connections with an even higher focus on latency.
- **ethernet**: A preset for direct Ethernet connections, very sensitive to latency and packet loss.
- **lowLatency**: Similar to Ethernet preset, but with higher tolerance for packet loss.
- **genericTCP**: Utilizes TCP instead of UDP. Higher throughput rate at the cost of latency. Useful in scenarios where UDP is throttled or blocked.

- b. Repeat for each additional interface.

11. (Optional) Enable **Encryption** to encrypt the traffic between the client and the WAN bonding server.
12. Enable **Bonding Proxy** to further optimize standard TCP traffic.

```
(config network sdwan wan_bonding)  
(config)>
```

- Set the password for authentication to the WAN bonding web interface.

The WAN bonding web interface can be used to view detailed WAN bonding statistics and to fine-tune the WAN bonding process, and is accessed via a web browser at `http://ip-address:8088`, where *ip-address* is the IP address of the local XBee Hive device.

```
(config)> network sdwan wan_bonding web_interface password password
(config)>
```

- Enable **SureLink** to validate the WAN Bonding connection by adding tests, and then the actions to be taken if those tests fail.

```
(config) > network sdwan wan_bonding surelink) >
```

Parameters

enable	false	Enable
interval	15m	Test interval
pass_threshold	1	Pass threshold
success_condition	one	Success condition
timeout	15s	Response timeout

Additional Configuration

actions	Recovery actions
advanced	Advanced settings
tests	Tests

- Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

- Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Show WAN bonding details and statistics

You can now find all [WAN bonding content](#)—including feature overviews, workflows, FAQs, and step-by-step tasks—consolidated on the Cellular documentation portal. The CLI-based procedure remains in the DAL product-specific user guide for now, and will be migrated to the Cellular documentation portal in a future update.

Command line

To show WAN bonding information:

- Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. Use the `show wan-bonding` command at the system prompt:

```
> show wan-bonding

WAN Bonding Status
-----
Status       : Connected
Server Address : 133.183.203.237
Tunnel Username : test1
Tunnel Address  : 146.78.40.226

WAN Bonded Interfaces
-----
Channel #0:   : eth1 (eth1)
Channel #1:   : modem xbee_cellular (wwan0.1)

>
```

3. Use the `show wan-bonding` command to view additional status and statistics:

```
> show wan-bonding verbose

WAN Bonding Status
-----
Tunnel Info
-----
Status      connected
Endpoint    133.183.203.237:443 (#0)
Network     146.78.40.226/255.255.255.0 gw 146.78.40.1
Total Bytes  0 in, 427 out
Channel Online 2

Channel #0 (eth1)
-----
Enabled      Yes
Status       "connected"
Uptime       5 sec
Latency      41ms (current) / 41ms (idle)
In Transit   0
Last Error   null
Current (1sec) RX 4 sent, 0 lost; TX 5 sent, 0 lost, 4 acked
Total        RX 16 sent, 0 lost; TX 18 sent, 0 lost, 18 acked

Channel #1 (wwan0.1)
-----
Enabled      Yes
Status       "connected"
Uptime       5 sec
```

```
Latency    55ms (current) / 57ms (idle)
In Transit  0
Last Error  null
Current (1sec) RX 4 sent, 0 lost; TX 4 sent, 0 lost, 4 acked
Total      RX 17 sent, 0 lost; TX 19 sent, 0 lost, 19 acked
```

>

4. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Simple Network Management Protocol (SNMP)

Simple Network Management Protocol (SNMP) is a protocol for remotely managing and monitoring network devices. Network administrators can use the SNMP architecture to manage nodes, including servers, workstations, routers, switches, hubs, and other equipment on an IP network, manage network performance, find and solve network problems, and plan for network growth.

The XBee Hive device supports both SNMPv3 and SNMPv2c in read-only mode. Both are disabled by default. SNMPv1 is not supported.

SNMP Security

By default, the XBee Hive device automatically blocks SNMP packets from being received over WAN and LAN interfaces. As a result, if you want a XBee Hive device to receive SNMP packets, you must configure the SNMP access control list to allow the device to receive the packets. See [Configure Simple Network Management Protocol \(SNMP\)](#).

Standard and custom Management Information Bases (MIB)

The standard MIB defines the properties and access permissions for various managed objects so that you can query standard information about a device, like *system contact* or *system location* via SNMP monitoring. The custom MIB defines the unique properties and access permissions not found in the standard MIB. To view the MIB list, see [Download MIBs](#).

Dynamic SNMP

To expose a specific device property for SNMP monitoring that is not included in the standard MIB - properties like *serial number*, *system firmware version*, *hardware model name*, and *dynamic properties* - you can query the runtime database for the property value and then add a Dynamic SNMP. The device property is added to the custom MIB.

Configure Simple Network Management Protocol (SNMP)

Required configuration items

- Enable SNMP.
- Firewall configuration using access control to allow remote connections to the SNMP agent.
- The user name and password used to connect to the SNMP agent.

Additional configuration items

- The port used by the SNMP agent.
- Authentication type (either MD5 or SHA1).
- Privacy protocol (either DES or AES128).
- Privacy passphrase, if different than the SNMP user password.
- Enable Multicast DNS (mDNS) support.

To configure the SNMP agent on your XBee Hive device:



Web

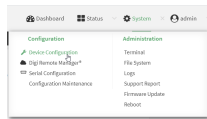
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

Remote Manager:

- a. Locate your device as described in [Use Digi Remote Manager to view and manage your device](#).
- b. Click the **Device ID**.
- c. Click **Settings**.
- d. Click to expand **Config**.

Local Web UI:

- a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



The **Configuration** window is displayed.

3. Click **Services > SNMP**.
4. Click **Enable**.
5. Click **Access control list** to configure access control:
 - To limit access to specified IPv4 addresses and networks:
 - a. Click **IPv4 Addresses**.
 - b. For **Add Address**, click **+**
 - c. For **Address**, enter the IPv4 address or network that can access the device's SNMP agent. Allowed values are:
 - A single IP address or host name.
 - A network designation in CIDR notation, for example, 192.168.1.0/24.
 - **any**: No limit to IPv4 addresses that can access the SNMP agent.
 - d. Click **+** again to list additional IP addresses or networks.
 - To limit access to specified IPv6 addresses and networks:
 - a. Click **IPv6 Addresses**.
 - b. For **Add Address**, click **+**
 - c. For **Address**, enter the IPv6 address or network that can access the device's SNMP agent. Allowed values are:
 - A single IP address or host name.
 - A network designation in CIDR notation, for example, 2001:db8::/48.
 - **any**: No limit to IPv6 addresses that can access the SNMP agent.
 - d. Click **+** again to list additional IP addresses or networks.

- To limit access to hosts connected through a specified interface on the device:
 - a. Click **Interfaces**.
 - b. For **Add Interface**, click .
 - c. For **Interface**, select the appropriate interface from the dropdown.
 - d. Click  again to allow access through additional interfaces.
 - To limit access based on firewall zones:
 - a. Click **Zones**. By default, there are three firewall zones already configured: Internal, Edge, and IPsec.
 - b. For **Add Zone**, click .
 - c. For **Zone**, select the appropriate firewall zone from the dropdown.
See [Firewall configuration](#) for information about firewall zones.
 - d. Click  again to allow access through additional firewall zones.
- 6. Type the **Username** used to connect to the SNMP agent.
- 7. Type the **Password** used to connect to the SNMP agent.
- 8. (Optional) For **Port**, type the port number. The default is **161**.
- 9. (Optional) Multicast DNS (mDNS) is disabled by default. mDNS is a protocol that resolves host names in small networks that do not have a DNS server. To enable mDNS, click **Enable mDNS**.
- 10. (Optional) Select the **Authentication type**, either **MD5** or **SHA1**. The default is **MD5**.
- 11. (Optional) Type the **Privacy passphrase**. If not set, the password, entered above, is used.
- 12. (Optional) Select the **Privacy protocol**, either **DES** or **AES128**. The default is **DES**.
- 13. (Optional) Add **Dynamic SNMP Properties** to expose specific details about your device for SNMP monitoring that are not included in the standard MIB. To query the runtime database to find the device property you want to expose to SNMP, see [Use digidevice runtime to access the runtime database](#).
 - a. Click .
 - b. For **Property**, type the device property (e.g., "system.cpu_temp" or "system.name").
 - c. Click  again to add another dynamic SNMP property.
- 14. (Optional) Enable read-only access to SNMP version 2c.
 - a. Click **Enable version 2c access** to enable read-only access to SNMP version 2c.
 - b. The **Community Name** field displays. The default name is **public**. You can change the name if needed.
- 15. Click **Apply** to save the configuration and apply the change.

Command line

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Enable the SNMP agent:

```
(config)> service snmp enable true
(config)>
```

4. Configure access control:

- To limit access to specified IPv4 addresses and networks:

```
(config)> add service snmp acl address end value
(config)>
```

Where *value* can be:

- A single IP address or host name.
- A network designation in CIDR notation, for example, 192.168.1.0/24.
- **any**: No limit to IPv4 addresses that can access the SNMP service.

Repeat this step to list additional IP addresses or networks.

- To limit access to specified IPv6 addresses and networks:

```
(config)> add service snmp acl address6 end value
(config)>
```

Where *value* can be:

- A single IP address or host name.
- A network designation in CIDR notation, for example, 2001:db8::/48.
- **any**: No limit to IPv6 addresses that can access the SNMP service.

Repeat this step to list additional IP addresses or networks.

- To limit access to hosts connected through a specified interface on the XBee Hive device:

```
(config)> add service snmp acl interface end value
(config)>
```

Where *value* is an interface defined on your device.

Display a list of available interfaces:

Use ... **network interface ?** to display interface information:

Repeat this step to list additional interfaces.

- To limit access based on firewall zones:

```
(config)> add service snmp acl zone end value
(config)>
```

Where *value* is a firewall zone defined on your device, or the **any** keyword.

Display a list of available firewall zones:

Type ... **firewall zone ?** at the config prompt:

```
(config)> ... firewall zone ?
```

Zones: A list of groups of network interfaces that can be referred to by packet filtering rules and access control lists.

Additional Configuration

```
any
dynamic_routes
edge
external
internal
ipsec
loopback
setup
```

```
(config)>
```

Repeat this step to include additional firewall zones.

5. Set the name of the user that will be used to connect to the SNMP agent.

```
(config)> service snmp username name
(config)>
```

6. Set the password for the user that will be used to connect to the SNMP agent:

```
(config)> service snmp password pwd
(config)>
```

7. (Optional) Set the port number for the SNMP agent. The default is **161**.

```
(config)> service snmp port port
(config)>
```

8. (Optional) Configure Multicast DNS (mDNS)

mDNS is a protocol that resolves host names in small networks that do not have a DNS server. For the SNMP agent, mDNS is disabled by default. To enable:

```
(config)> service snmp mdns enable true
(config)>
```

9. (Optional) Set the authentication type. Allowed values are **MD5** or **SHA1**. The default is **MD5**.

```
(config)> service snmp auth_type SHA1
(config)>
```

10. (Optional) Set the privacy passphrase. If not set, the password, entered above, is used.

```
(config)> service snmp privacy pwd
(config)>
```

11. (Optional) Set the privacy protocol, either **DES** or **AES128**. The default is **DES**.

```
(config)> service snmp privacy_protocol AES128
(config)>
```

12. (Optional) Add **Dynamic SNMP Properties** to expose specific details about your device for SNMP monitoring that are not included in the standard MIB.

```
(config) service snmp runt> add end value
(config)>
```

Where *value* can be any element in the runtime table you want to expose to SNMP monitoring (for example, "system.cpu_temp" or "system.name").

13. (Optional) Enable read-only access to to SNMP version 2c.

```
(config)> service snmp enable 2c true
(config)>
```

The community name is set to **public** by default. You can change it if desired.

```
(config)> service snmp community_name <name>
(config)>
```

Where *name* is the new community name.

14. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

15. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Download MIBs

This procedure is available from the WebUI only.

Required configuration items

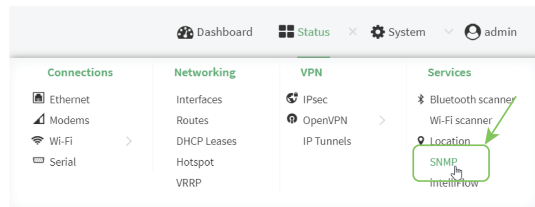
- Enable SNMP.

To download a .zip archive of the SNMP MIBs supported by this device:



1. Log into the XBee Hive WebUI as a user with full Admin access rights.
2. Enable SNMP.
See [Configure Simple Network Management Protocol \(SNMP\)](#) for information about enabling and configuring SNMP support on the XBee Hive device.
3. On the main menu, click **Status**. Under **Services**, click **SNMP**.

Note If you have recently enabled SNMP and the SNMP option is not visible, refresh your browser.



The **SNMP** page is displayed.



4. Click **Download**.

Location information

Your XBee Hive device can be configured to use the following location sources:

- Dead reckoning, by using an external USB GNSS receiver. External dead reckoning USB GNSS receivers are available to be purchased separately from Digi.
- User-defined static location.
- Location messages forwarded to the device from other location-enabled devices.

You can also configure your XBee Hive device to forward location messages, either from the XBee Hive device or from external sources, to a remote host. Additionally, the device can be configured to use a geofence, to allow you to determine actions that will be taken based on the physical location of the device.

This section contains the following topics:

Use a dead reckoning external USB GNSS receiver	624
Configure the device to use a user-defined static location	626
Configure the device to accept location messages from external sources	628
Forward location information to a remote host	632
Configure geofencing	639
Show location information	650

Use a dead reckoning external USB GNSS receiver

The XBee Hive device supports an external USB GNSS receiver to provide dead reckoning-based location information. The USB GNSS receiver is available for purchase from Digi International Inc..

The ability to use an external USB GNSS receiver is enabled by default. After purchasing the USB GNSS receiver, plug it into a USB port on the XBee Hive, and it will begin providing location information.

To disable support for the external GNSS receiver, or enable it if it has been disabled:

Web

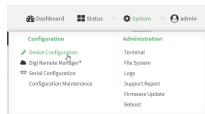
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

Remote Manager:

- a. Locate your device as described in [Use Digi Remote Manager to view and manage your device](#).
- b. Click the **Device ID**.
- c. Click **Settings**.
- d. Click to expand **Config**.

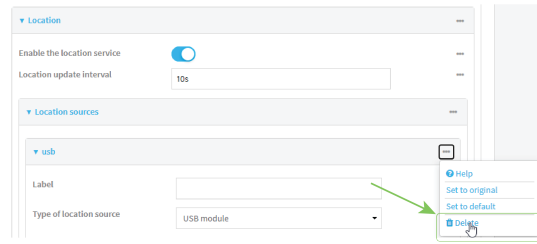
Local Web UI:

- a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



The **Configuration** window is displayed.

3. Click **Services > Location > Location sources > usb**.
4. (Optional) Type a **Label** for the USB location source.
5. For **Type of location source**, leave the selection at **USB module**.
6. Click **Enable the location source** to disable the USB GNSS receiver, or to enable it if it has been disabled.
7. Alternatively, you can also delete the **usb** location source:
 - a. Click the menu icon (...) next to the **usb** location source.
 - b. Click **Delete**.



8. Click **Apply** to save the configuration and apply the change.

Command line

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Enable or disable the USB module:

- a. Use the show command to determine the index number of the USB location source:

```
(config)> show service location source
0
  enable true
  no label
  type usb
1
  enable true
  no label
  type gnss
(config)>
```

- b. Use the index number to enable or disable the module:

- To enable the module:

```
(config)> service location source 0 enable true
(config)>
```

- To disable the module:

```
(config)> service location source 0 enable false
(config)>
```

4. Alternatively, you can use the index number to delete the USB location source:

```
(config)> del service location 0
(config)>
```

5. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

6. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Configure the device to use a user-defined static location

You can configured your XBee Hive device to use a user-defined static location.

Web

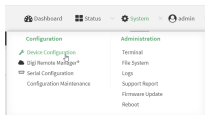
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

Remote Manager:

- a. Locate your device as described in [Use Digi Remote Manager to view and manage your device](#).
- b. Click the **Device ID**.
- c. Click **Settings**.
- d. Click to expand **Config**.

Local Web UI:

- a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



The **Configuration** window is displayed.

3. Click **Services > Location > Location sources**.
4. Click  to add a location source.
5. (Optional) Type a **Label** for this location source.
6. For **Type of location source**, select **User-defined location**.
7. The location source is enabled by default. Click **Enable the location source** to disable the location source, or to enable it if it has been disabled.
8. For **Latitude**, type the latitude of the device. Allowed values are **-90** and **90**, with up to six decimal places.
9. For **Longitude**, type the longitude of the device. Allowed values are **-180** and **180**, with up to six decimal places.

10. For **Altitude**, type the altitude of the device. Allowed values are an integer followed by **m** or **km**, for example, **100m** or **1km**.
11. Click **Apply** to save the configuration and apply the change.

Command line

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Add a location source:

```
(config)> add service location source end
(config service location source 0)>
```

The location source is enabled by default. To disable:

```
(config service location source 0)> enable false
(config service location source 0)>
```

4. (Optional) Set a label for this location source:

```
(config service location source 0)> label "label"
(config)>
```

5. Set the **type** of location source to **user_defined**:

```
(config service location source 0)> type user_defined
(config service location source 0)>
```

6. Set the latitude of the device:

```
(config service location source 0 coordinates latitude int
(config service location source 0)>
```

where *int* is any integer between **-90** and **90**, with up to six decimal places.

7. Set the longitude of the device:

```
(config service location source 0 coordinates longitude int
(config service location source 0)>
```

where *int* is any integer between **-180** and **180**, with up to six decimal places.

8. Set the altitude of the device:

```
(config service location source 0 coordinates altitude alt
(config service location source 0)>
```

Where *alt* is an integer followed by **m** or **km**, for example, **100m** or **1km**.

9. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

10. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Configure the device to accept location messages from external sources

You can configure the XBee Hive device to accept NMEA and TAIP messages from external sources. For example, location-enabled devices connected to the XBee Hive device can forward their location information to the device, and then the XBee Hive device can serve as a central repository for this location information and forward it to a remote host. See [Forward location information to a remote host](#) for information about configuring the XBee Hive device to forward location messages.

This procedure configures a UDP port on the XBee Hive device that will be used to listen for incoming messages.

Required configuration items

- The location server must be enabled.
- UDP port that the Digi XBee Hive Gateway device will listen to for incoming location messages.
- Access control list configuration to provide access to the port through the firewall.

To configure the device to accept location messages from external sources:



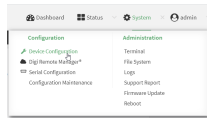
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

Remote Manager:

- a. Locate your device as described in [Use Digi Remote Manager to view and manage your device](#).
- b. Click the **Device ID**.
- c. Click **Settings**.
- d. Click to expand **Config**.

Local Web UI:

- a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



The **Configuration** window is displayed.

3. Click **Services > Location > Location sources**.
4. Click to add a location source.
5. (Optional) Type a **Label** for this location source.
6. For **Type of location source**, select **Server**.
7. For **Location server port**, type the number of the UDP port that will receive incoming location messages.
8. Click **Access control list** to configure access control:
 - To limit access to specified IPv4 addresses and networks:
 - a. Click **IPv4 Addresses**.
 - b. For **Add Address**, click .
 - c. For **Address**, enter the IPv4 address or network that can access the device's location server UDP port. Allowed values are:
 - A single IP address or host name.
 - A network designation in CIDR notation, for example, 192.168.1.0/24.
 - **any**: No limit to IPv4 addresses that can access the location server UDP port.
 - d. Click again to list additional IP addresses or networks.
 - To limit access to specified IPv6 addresses and networks:
 - a. Click **IPv6 Addresses**.
 - b. For **Add Address**, click .
 - c. For **Address**, enter the IPv6 address or network that can access the device's location server UDP port. Allowed values are:
 - A single IP address or host name.
 - A network designation in CIDR notation, for example, 2001:db8::/48.
 - **any**: No limit to IPv6 addresses that can access the location server UDP port.
 - d. Click again to list additional IP addresses or networks.
 - To limit access to hosts connected through a specified interface on the device:
 - a. Click **Interfaces**.
 - b. For **Add Interface**, click .
 - c. For **Interface**, select the appropriate interface from the dropdown.
 - d. Click again to allow access through additional interfaces.
 - To limit access based on firewall zones:
 - a. Click **Zones**. By default, there are three firewall zones already configured: Internal, Edge, and IPsec.
 - b. For **Add Zone**, click .

- c. For **Zone**, select the appropriate firewall zone from the dropdown.
See [Firewall configuration](#) for information about firewall zones.
 - d. Click **Yes** again to allow access through additional firewall zones.
9. Click **Apply** to save the configuration and apply the change.

Command line

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Add a location source:

```
(config)> add service location source end
(config service location source 0)>
```

4. (Optional) Set a label for this location source:

```
(config service location source 0)> label "label"
(config service location source 0)>
```

5. Set the **type** of location source to **server**:

```
(config service location source 0)> type server
(config service location source 0)>
```

6. Set the UDP port that will receive incoming location messages.

```
(config service location source 0)> server port port
(config service location source 0)>
```

7. Click **Access control list** to configure access control:

- To limit access to specified IPv4 addresses and networks:

```
(config)> add service location source 1 acl address end value
(config)>
```

Where *value* can be:

- A single IP address or host name.
- A network designation in CIDR notation, for example, 192.168.1.0/24.
- **any**: No limit to IPv4 addresses that can access the location server UDP port.

Repeat this step to list additional IP addresses or networks.

- To limit access to specified IPv6 addresses and networks:

```
(config)> add service location source 1 acl address6 end value
(config)>
```

Where *value* can be:

- A single IP address or host name.
- A network designation in CIDR notation, for example, 2001:db8::/48.
- **any**: No limit to IPv6 addresses that can access the location server UDP port.

Repeat this step to list additional IP addresses or networks.

- To limit access to hosts connected through a specified interface on the XBee Hive device:

```
(config)> add service location source 1 acl interface end value
(config)>
```

Where *value* is an interface defined on your device.

Display a list of available interfaces:

Use ... **network interface ?** to display interface information:

Repeat this step to list additional interfaces.

- To limit access based on firewall zones:

```
(config)> add service location source 1 acl zone end value
(config)>
```

Where *value* is a firewall zone defined on your device, or the **any** keyword.

Display a list of available firewall zones:

Type ... **firewall zone ?** at the config prompt:

```
(config)> ... firewall zone ?
```

Zones: A list of groups of network interfaces that can be referred to by packet filtering rules and access control lists.

Additional Configuration

```
any
dynamic_routes
edge
external
internal
ipsec
loopback
setup
```

```
(config)>
```

Repeat this step to include additional firewall zones.

8. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

2. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Forward location information to a remote host

You can configure location clients on the XBee Hive device that forward location messages in either NMEA or TAIP format to a remote host.

Required configuration items

- Enable the location service.
- The hostname or IP address of the remote host to which the location messages will be forwarded.
- The communication protocol, either TCP or UDP.
- The destination port on the remote host to which the messages will be forwarded.
- Message protocol type of the messages being forwarded, either NMEA or TAIP.

Additional configuration items

- Additional remote hosts to which the location messages will be forwarded.
- Location update interval, which determines how often the device will forward location information to the remote hosts.
- A description of the remote hosts.
- Specific types of NMEA or TAIP messages that should be forwarded.
- If the message protocol is NMEA, configure a talker ID to be used for all messages.
- Text that will be prepended to the forwarded message.
- A vehicle ID that is used in the TAIP ID message and can also be prepended to the forwarded message.

Configure the Digi XBee Hive Gateway device to forward location information:

Web

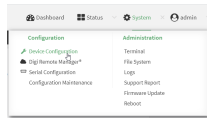
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

Remote Manager:

- a. Locate your device as described in [Use Digi Remote Manager to view and manage your device](#).
- b. Click the **Device ID**.
- c. Click **Settings**.
- d. Click to expand **Config**.

Local Web UI:

- a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



The **Configuration** window is displayed.

3. Click **Services > Location > Destination servers**.
4. For **Add destination server**, click **⌵**
5. (Optional) For **Label**, type a description of the location destination server.
6. For **Destination server**, enter the hostname or IP address of the remote host to which location messages will be sent.
7. For **Destination server port**, enter the UDP or TCP port on the remote host to which location messages will be sent.
8. For **Communication protocol**, select either **UDP** or **TCP**.
9. For **Forward interval multiplier**, select the number of **Location update intervals** to wait before forwarding location data to this server.
10. For **NMEA filters**, select the filters that represent the types of messages that will be forwarded. By default, all message types are forwarded.
 - To remove a filter:
 - a. Click the down arrow (⏏) next to the appropriate message type.
 - b. Click **Delete**.
 - To add a message type:
 - a. For **Add NMEA filter** or **Add TAIP filter**, click **⌵**
 - b. Select the filter type. Allowed values are:
 - **GGA**: Reports time, position, and fix related data.
 - **GLL**: Reports position data: position fix, time of position fix, and status.
 - **GSA**: Reports GPS DOP and active satellites.
 - **GSV**: Reports the number of SVs in view, PRN, elevation, azimuth, and SNR.
 - **RMC**: Reports position, velocity, and time.
 - **VTG**: Reports direction and speed over ground.
11. For **TAIP filters**, select the filters that represent the types of messages that will be forwarded. By default, all message types are forwarded.
 - To remove a filter:
 - a. Click the down arrow (⏏) next to the appropriate message type.
 - b. Click **Delete**.
 - To add a message type:
 - a. For **Add NMEA filter** or **Add TAIP filter**, click **⌵**
 - b. Select the filter type. Allowed values are:
 - **AL**: Reports altitude and vertical velocity.
 - **CP**: Compact position: reports time, latitude, and longitude.
 - **ID**: Reports the vehicle ID.

- **LN**: Long navigation: reports the latitude, longitude, and altitude, the horizontal and vertical speed, and heading.
 - **PV**: Position/velocity: reports the latitude, longitude, and heading.
12. For **Outgoing message type**, select either **NMEA** or **TAIP** for the type of message that the device will forward to a remote host.
(Optional) If **NMEA** is selected:
 - a. Select a **Talker ID**.
The talker ID is a two-character prefix in the NMEA message that identifies the source type. The talker ID set here will override the talker ID from all sources, and all forwarded sentences will use the configured ID. The default setting is **Default**, which means that the talker ID provided by the source will be used.
 - b. Determine the **Behavior when fix is invalid**:
 - **None**: No messages are sent.
 - **Empty**: Send messages with empty fields.
 - **Last fix**: Send messages with information from the last valid fix.
 13. (Optional) For **Prepend text**, enter text to prepend to the forwarded message. Two variables can be included in the prepended text:
 - **%s**: Includes the Digi XBee Hive Gateway device's serial number in the prepended text.
 - **%v**: Includes the vehicle ID in the prepended text.

For example, to include both the device's serial number and vehicle ID in the prepend message, you can enter the following in the **Prepend** field:

```
__|%s|__|%v|__
```

 14. Type a four-digit alphanumeric **Vehicle ID** that will be included with to location messages. If no vehicle ID is configured, this setting defaults to 0000.
 15. Click **Apply** to save the configuration and apply the change.

Command line

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Add a remote host to which location messages will be sent:

```
(config)> add service location forward end
(config service location forward 0)>
```

4. Set the hostname or IP address of the remote host to which location messages will be sent:

```
(config service location forward 0)> server host
(config service location forward 0)>
```

5. Set the communication protocol to either **udp** or **tcp**:

```
(config service location forward 0)> protocol protocol
(config service location forward 0)>
```

6. Set the TCP or UDP port on the remote host to which location messages will be sent:

```
(config service location forward 0)> server_port 8000
(config service location forward 0)>
```

7. Set the number of **Location update intervals** to wait before forwarding location data to this server.

```
(config service location forward 0)> interval_multiplier int
(config service location forward 0)>
```

8. Set the protocol type for the messages. Allowed values are **taip** or **nmea**; the default is **taip**:

```
(config service location forward 0)> type nmea
(config service location forward 0)>
```

(Optional) If the protocol type is set to **nmea**:

- a. Configure a **Talker ID**.

The talker ID is a two-character prefix in the NMEA message that identifies the source type. The talker ID set here will override the talker ID from all sources, and all forwarded sentences will use the configured ID.

- i. Use the **?** to determine available talker IDs:

```
(config service location forward 0)> talker_id ?
```

Talker ID: Setting a talker ID will override the talker ID from all remote sources, and all forwarded sentences from remote sources will use the configured ID.

Format:

Default

GA

GB

GI

GL

GN

GP

GQ

Default value: Default

Current value: Default

```
(config service location forward 0)>
```

- ii. Set the talker ID:

```
(config service location forward 0)> talker_id value
(config service location forward 0)>
```

The default setting is **Default**, which means that the talker ID provided by the source will be used.

- b. Determine the behavior when fix is invalid:

```
(config service location forward 0)> no_fix value
(config service location forward 0)>
```

where *value* is one of:

- **none**: No messages are sent.
- **empty**: Send messages with empty fields.
- **last_fix**: Send messages with information from the last valid fix.

The default is **empty**.

9. (Optional) Set the text to prepend to the forwarded message. Two variables can be included in the prepended text:

- **%s**: Includes the Digi XBee Hive Gateway device's serial number in the prepended text.
- **%v**: Includes the vehicle ID in the prepended text.

```
(config service location forward 0)> prepend __|%s__|%v__
(config service location forward 0)>
```

10. (Optional) Set the vehicle ID.

Allowed value is a four digit alphanumeric string (for example, 01A3 or 1234). If no vehicle ID is configured, this setting defaults to 0000.

```
(config service location forward 0)> vehicle-id 1234
(config service location forward 0)>
```

11. (Optional) Provide a description of the remote host:

```
(config service location forward 0)> label "Remote host 1"
(config service location forward 0)>
```

12. (Optional) Specify types of messages that will be forwarded. Allowed values vary depending on the message protocol type. By default, all message types are forwarded.

- If the message protocol type is NMEA:

Allowed values are:

- **gga**: Reports time, position, and fix related data.
- **gll**: Reports position data: position fix, time of position fix, and status.
- **gsa**: Reports GPS DOP and active satellites.
- **gsv**: Reports the number of SVs in view, PRN, elevation, azimuth, and SNR.
- **rmc**: Reports position, velocity, and time.
- **vtg**: Reports direction and speed over ground.

To remove a message type:

- a. Use the **show** command to determine the index number of the message type to be deleted:

```
(config service location forward 0)> show filter_nmea
0 gga
1 gll
2 gsa
3 gsv
4 rmc
5 vtg
(config service location forward 0)>
```

- b. Use the index number to delete the message type. For example, to delete the **gsa** (index number 2) message type:

```
(config service location forward 0)> del filter_nmea 2
(config service location forward 0)>
```

To add a message type:

- a. Change to the **filter_nmea** node:

```
(config service location forward 0)> filter_nmea
(config service location forward 0 filter_nmea)>
```

- b. Use the **add** command to add the message type. For example, to add the **gsa** message type:

```
(config service location forward 0 filter_nmea)> add gsa end
(config service location forward 0 filter_nmea)>
```

- If the message protocol type is TAIP:

Allowed values are:

- **al**: Reports altitude and vertical velocity.
- **cp**: Compact position: reports time, latitude, and longitude.
- **id**: Reports the vehicle ID.
- **ln**: Long navigation: reports the latitude, longitude, and altitude, the horizontal and vertical speed, and heading.
- **pv**: Position/velocity: reports the latitude, longitude, and heading.

To remove a message type:

- a. Use the **show** command to determine the index number of the message type to be deleted:

```
(config service location forward 0)> show filter_taip
0 al
1 cp
2 id
3 ln
```

```
4 pv
(config service location forward 0)>
```

- b. Use the index number to delete the message type. For example, to delete the **id** (index number 2) message type:

```
(config service location forward 0)> del filter_taip 2
(config service location forward 0)>
```

To add a message type:

- a. Change to the **filter_taip** node:

```
(config service location forward 0)> filter_taip
(config service location forward 0 filter_taip)>
```

- b. Use the **add** command to add the message type. For example, to add the **id** message type:

```
(config service location forward 0 filter_taip)> add id end
(config service location forward 0 filter_taip)>
```

13. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

14. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Configure geofencing

Geofencing is a mechanism to create a virtual perimeter that allows you configure your XBee Hive device to perform actions when entering or exiting the perimeter. For example, you can configure a device to factory default if its location service indicates that it has been moved outside of the geofence.

Multiple geofences can be defined for one device, allowing for a complex configuration in which different actions are taken depending on the physical location of the device.

Required configuration items

- Location services must be enabled.
- The geofence must be enabled.
- The boundary type of the geofence, either circular or polygonal.
 - If boundary type is circular, the latitude and longitude of the center point of the circle, and the radius.
 - If boundary type is polygonal, the latitude and longitude of the polygon's vertices (a vertex is the point at which two sides of a polygon meet). Three vertices will create a triangular polygon; four will create a square, etc. Complex polygons can be defined.
- Actions that will be taken when the device's location triggers a geofence event. You can define actions for two types of events:
 - Actions taken when the device enters the boundary of the geofence, or is inside the boundary when the device boots.
 - Actions taken when the device exits the boundary of the geofence, or is outside the boundary when the device boots.

For each event type:

- Determine if the action(s) associated with the event type should be performed when the device boots inside or outside of the geofence boundary.
- The number of update intervals that should take place before the action(s) are taken.

Multiple actions can be configured for each type of event. For each action:

- The type of action, either a factory erase or executing a custom script.
- If a custom script is used:
 - The script that will be executed.
 - Whether to log output and errors from the script.
 - The maximum memory that the script will have available.
 - Whether the script should be executed within a sandbox that will prevent the script from affecting the system itself.

Additional configuration items

- Update interval, which determines the amount of time that the geofence should wait between polling for updated location data.



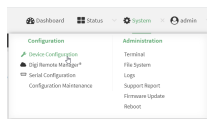
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

Remote Manager:

- a. Locate your device as described in [Use Digi Remote Manager to view and manage your device](#).
- b. Click the **Device ID**.
- c. Click **Settings**.
- d. Click to expand **Config**.

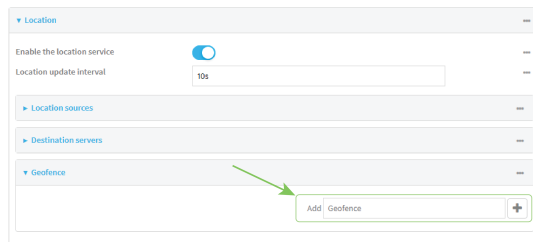
Local Web UI:

- a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



The **Configuration** window is displayed.

3. Click **Services > Location > Geofence**.
4. For **Add Geofence**, type a name for the geofence and click 



The geofence is enabled by default. To disable, toggle off **Enable**.

5. For **Update interval**, type the amount of time that the geofence should wait between polling for updated location data. The default is one minute.

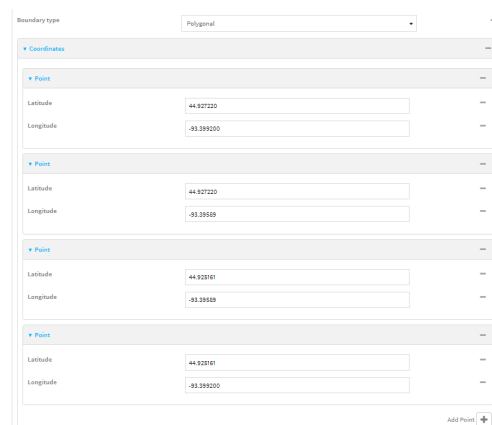
Allowed values are any number of weeks, days, hours, minutes, or seconds, and take the format **number{w|d|h|m|s}**.

For example, to set **Update interval** to ten minutes, enter **10m** or **600s**.

6. For **Boundary type**, select the type of boundary that the geofence will have.
 - If **Circular** is selected:
 - a. Click to expand **Center**.
 - b. Type the **Latitude** and **Longitude** of the center point of the circle. Allowed values are:
 - For **Latitude**, any integer between **-90** and **90**, with up to six decimal places.
 - For **Longitude**, any integer between **-180** and **180**, with up to six decimal places.

- c. For **Radius**, type the radius of the circle. Allowed values are an integer followed by **m** or **km**, for example, **100m** or **1km**.
- If **Polygonal** is selected:
 - a. Click to expand **Coordinates**.
 - b. Click  to add a point that represents a vertex of the polygon. A vertex is the point at which two sides of a polygon meet.
 - c. Type the **Latitude** and **Longitude** of one of the vertices of the polygon. Allowed values are:
 - For **Latitude**, any integer between **-90** and **90**, with up to six decimal places.
 - For **Longitude**, any integer between **-180** and **180**, with up to six decimal places.
 - d. Click  again to add an additional point, and continue adding points to create the desired polygon.

For example, to configure a square polygon around the Digi headquarters, configure a polygon with four points:

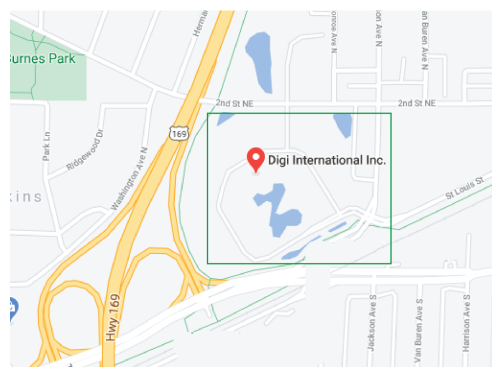


The screenshot shows a web interface for configuring a geofence. At the top, 'Boundary type' is set to 'Polygonal'. Below this, a section titled 'Coordinates' contains four 'Point' entries. Each point has input fields for 'Latitude' and 'Longitude'. The coordinates for the four points are as follows:

Point	Latitude	Longitude
1	44.927220	-93.399200
2	44.927220	-93.395800
3	44.928101	-93.395800
4	44.928101	-93.399200

An 'Add Point' button with a plus icon is located at the bottom right of the coordinates section.

This defines a square-shaped polygon equivalent to the following:



7. Define actions to be taken when the device's location triggers a geofence event:
 - To define actions that will be taken when the device enters the geofence, or is inside the geofence when it boots:

- a. Click to expand **On entry**.

- b. (Optional) Enable **Bootstrap action** to configure the device to perform the **On entry** actions if the device is inside the geofence when it boots.
- c. For **Number of intervals**, type or select the number of **Update Intervals** that must take place prior to performing the **On entry** actions.

For example, if the **Update interval** is **1m** (one minute) and the **Number of intervals** is **3**, the **On entry** actions will not be performed until the device has been inside the geofence for three minutes.

- d. Click to expand **Actions**.
- e. Click to create a new action.

- f. For Action type, select either:
- **Factory erase** to erase the device configuration when the action is triggered.
 - **Custom script** to execute a custom script when the action is triggered.

If **Custom script** is selected:

- Click to expand **Custom script**.
 - For **Commands**, type the script that will be executed when the action is triggered. If the script begins with **#!**, then the proceeding file path will be used to invoke the script interpreter. If not, then the default shell will be used.
 - Enable **Log script output** to log the output of the script to the **system log**.
 - Enable **Log script errors** to log errors from the script to the **system log**.
 - (Optional) For **Maximum memory**, type the maximum amount of system memory that will be available for the script and it spawned processes.
Allowed values are any integer followed by one of the following:
b|bytes|KB|k|MB|M|GB|G|TB|T.
For example. the allocate one megabyte of memory to the script and its spawned processes, type **1MB** or **1M**.
 - Sandbox** is enabled by default. This prevents the script from adversely affecting the system. If you disable **Sandbox**, the script may render the system unusable.
 - Repeat for any additional actions.
- To define actions that will be taken when the device exits the geofence, or is outside the geofence when it boots:

- a. Click to expand **On exit**.

- b. (Optional) Enable **Bootstrap action** to configure the device to perform the **On exit** actions if the device is inside the geofence when it boots.
- c. For **Number of intervals**, type or select the number of **Update Intervals** that must take place prior to performing the **On exit** actions.

For example, if the **Update interval** is **1m** (one minute) and the **Number of intervals** is **3**, the **On entry** actions will not be performed until the device has been inside the geofence for three minutes.

- d. Click to expand **Actions**.
- e. Click **+** to create a new action.

- f. For Action type, select either:
- **Factory erase** to erase the device configuration when the action is triggered.
 - **Custom script** to execute a custom script when the action is triggered.

If **Custom script** is selected:

- Click to expand **Custom script**.
 - For **Commands**, type the script that will be executed when the action is triggered. If the script begins with **#!**, then the proceeding file path will be used to invoke the script interpreter. If not, then the default shell will be used.
 - Enable **Log script output** to log the output of the script to the **system log**.
 - Enable **Log script errors** to log errors from the script to the **system log**.
 - (Optional) For **Maximum memory**, type the maximum amount of system memory that will be available for the script and it spawned processes.
Allowed values are any integer followed by one of the following:
b|bytes|KB|k|MB|M|GB|G|TB|T.
For example. the allocate one megabyte of memory to the script and its spawned processes, type **1MB** or **1M**.
 - Sandbox** is enabled by default. This prevents the script from adversely affecting the system. If you disable **Sandbox**, the script may render the system unusable.
 - Repeat for any additional actions.
8. Click **Apply** to save the configuration and apply the change.

Command line

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Add a geofence:

```
(config)> add service location geofence name
(config service location geofence name)>
```

where *name* is a name for the geofence. For example:

```
(config)> add service location geofence test_geofence
(config service location geofence test_geofence)>
```

The geofence is enabled by default. To disable:

```
(config service location geofence test_geofence)> enable false
(config service location geofence test_geofence)>
```

4. Set the amount of time that the geofence should wait between polling for updated location data:

```
(config service location geofence test_geofence)> update_interval value
(config service location geofence test_geofence)>
```

where *value* is any number of weeks, days, hours, minutes, or seconds, and takes the format ***number*{w|d|h|m|s}**.

For example, to set **update_interval** to ten minutes, enter either **10m** or **600s**:

```
(config service location geofence test_geofence)> update_interval 600s
(config service location geofence test_geofence)>
```

The default is **1m** (one minute).

5. Set the boundary type for the geofence:

```
(config service location geofence test_geofence)> boundary value
(config service location geofence test_geofence)>
```

where *value* is either **circular** or **polygonal**.

- If **boundary** is set to **circular** :

- a. Set the latitude and longitude of the center point of the circle:

```
(config service location geofence test_geofence)> center latitude int
(config service location geofence test_geofence)> center longitude int
(config service location geofence test_geofence)>
```

where *int* is:

- For **latitude**, any integer between **-90** and **90**, with up to six decimal places.
- For **longitude**, any integer between **-180** and **180**, with up to six decimal places.

b. Set the radius of the circle:

```
(config service location geofence test_geofence)> radius radius
(config service location geofence test_geofence)>
```

where *radius* is an integer followed by **m** or **km**, for example, **100m** or **1km**.

■ If **boundary** is set to **polygonal**:

a. Set the coordinates of one vertex of the polygon. A vertex is the point at which two sides of a polygon meet.

i. Add a vertex:

```
(config service location geofence test_geofence)> add coordinates end
(config service location geofence test_geofence coordinates 0)>
```

ii. Set the latitude and longitude of the vertex:

```
(config service location geofence test_geofence coordinates 0)> latitude int
(config service location geofence test_geofence coordinates 0)> longitude int
(config service location geofence test_geofence coordinates 0)>
```

where *int* is:

- For **latitude**, any integer between **-90** and **90**, with up to six decimal places.
- For **longitude**, any integer between **-180** and **180**, with up to six decimal places.

iii. Configure additional vortices:

```
(config service location geofence test_geofence coordinates 0)> ..
(config service location geofence test_geofence coordinates)> add end
(config service location geofence test_geofence coordinates 1)> latitude int
(config service location geofence test_geofence coordinates 1)> longitude int
(config service location geofence test_geofence coordinates 1)>
```

where *int* is:

- For **latitude**, any integer between **-90** and **90**, with up to six decimal places.
- For **longitude**, any integer between **-180** and **180**, with up to six decimal places.

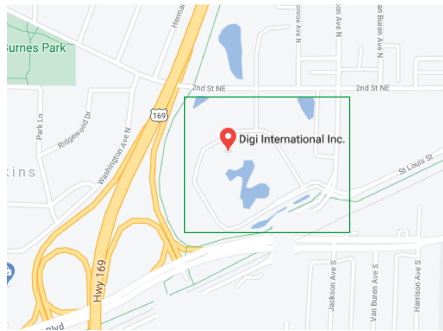
Repeat for each vortex of the polygon.

For example, to configure a square polygon around the Digi headquarters, configure a polygon with four points:

```
(config service location geofence test_geofence)> add coordinates end
(config service location geofence test_geofence coordinates 0)> latitude 44.927220
```

```
(config service location geofence test_geofence coordinates 0)> longitude -
93.399200
(config service location geofence test_geofence coordinates 0)> ..
(config service location geofence test_geofence coordinates)> add end
(config service location geofence test_geofence coordinates 1)> latitude 44.927220
(config service location geofence test_geofence coordinates 1)> longitude -
93.39589
(config service location geofence test_geofence coordinates 1)> ..
(config service location geofence test_geofence coordinates)> add end
(config service location geofence test_geofence coordinates 2)> latitude 44.925161
(config service location geofence test_geofence coordinates 2)> longitude -
93.39589
(config service location geofence test_geofence coordinates 2)> ..
(config service location geofence test_geofence coordinates)> add end
(config service location geofence test_geofence coordinates 3)> latitude 44.925161
(config service location geofence test_geofence coordinates 3)> longitude -
93.399200
(config service location geofence test_geofence coordinates 3)>
```

This defines a square-shaped polygon equivalent to the following:



6. Define actions to be taken when the device's location triggers a geofence event:
 - To define actions that will be taken when the device enters the geofence, or is inside the geofence when it boots:
 - a. (Optional) Configure the device to preform the actions if the device is inside the geofence when it boots:

```
(config)> service location geofence test_geofence on_entry bootup true
(config)>
```

- b. Set the number of **update_intervals** that must take place prior to performing the actions:

```
(config)> service location geofence test_geofence on_entry num_intervals int
(config)>
```

For example, if the update interval is **1m** (one minute) and the **num_intervals** is set to **3**, the actions will not be performed until the device has been inside the geofence for three minutes.

- c. Add an action:

- i. Type ... to return to the root of the configuration:

```
(config service location geofence test_geofence coordinates 3)> ...
(config)>
```

- ii. Add the action:

```
(config)> add service location geofence test_geofence on_entry action end
(config service location geofence test_geofence on_entry action 0)>
```

- d. Set the type of action:

```
(config service location geofence test_geofence on_entry action 0)> type value
(config service location geofence test_geofence on_entry action 0)>
```

where *value* is either:

- **factory_erase**—Erases the device configuration when the action is triggered.
- **script**—Executes a custom script when the action is triggered.

factory_erase or **script**.

If **type** is set to **script**:

- i. Type or paste the script, closed in quote marks:

```
(config service location geofence test_geofence on_entry action 0)> commands
"script"
(config service location geofence test_geofence on_entry action 0)>
```

If the script begins with **#!/**, then the proceeding file path will be used to invoke the script interpreter. If not, then the default shell will be used.

- ii. To log the output of the script to the [system log](#):

```
(config service location geofence test_geofence on_entry action 0)> syslog_stdout
true
(config service location geofence test_geofence on_entry action 0)>
```

- iii. To log the errors from the script to the [system log](#):

```
(config service location geofence test_geofence on_entry action 0)> syslog_stderr
true
(config service location geofence test_geofence on_entry action 0)>
```

- iv. (Optional) Set the maximum amount of system memory that will be available for the script and it spawned processes:

```
(config service location geofence test_geofence on_entry action 0)> max_memory
value
(config service location geofence test_geofence on_entry action 0)>
```

where *value* is any integer followed by one of the following:

b|bytes|KB|k|MB|M|GB|G|TB|T.

For example. the allocate one megabyte of memory to the script and its spawned processes:

```
(config service location geofence test_geofence on_entry action 0)> max_memory
1MB
(config service location geofence test_geofence on_entry action 0)>
```

- v. A sandbox is enabled by default to prevent the script from adversely affecting the system. To disable the sandbox:

```
(config service location geofence test_geofence on_entry action 0)> sandbox false
(config service location geofence test_geofence on_entry action 0)>
```

If you disable the sandbox, the script may render the system unusable.

- vi. Repeat for any additional actions.
- To define actions that will be taken when the device exits the geofence, or is outside the geofence when it boots:
 - a. (Optional) Configure the device to preform the actions if the device is outside the geofence when it boots:

```
(config)> service location geofence test_geofence on_exit startup true
(config)>
```

- b. Set the number of [update_intervals](#) that must take place prior to performing the actions:

```
(config)> service location geofence test_geofence on_exit num_intervals int
(config)>
```

For example, if the update interval is **1m** (one minute) and the **num_intervals** is set to **3**, the actions will not be performed until the device has been outside the geofence for three minutes.

- c. Add an action:
 - i. Type ... to return to the root of the configuration:

```
(config service location geofence test_geofence coordinates 3)> ...
(config)>
```

- ii. Add the action:

```
(config)> add service location geofence test_geofence on_exit action end
(config service location geofence test_geofence on_exit action 0)>
```

- d. Set the type of action:

```
(config service location geofence test_geofence on_exit action 0)> type value
(config service location geofence test_geofence on_exit action 0)>
```

where *value* is either:

- **factory_erase**—Erases the device configuration when the action is triggered.
- **script**—Executes a custom script when the action is triggered.

factory_erase or **script**.

If **type** is set to **script**:

- i. Type or paste the script, closed in quote marks:

```
(config service location geofence test_geofence on_exit action 0)> commands
"script"
(config service location geofence test_geofence on_exit action 0)>
```

If the script begins with **#!/**, then the proceeding file path will be used to invoke the script interpreter. If not, then the default shell will be used.

- ii. To log the output of the script to the [system log](#):

```
(config service location geofence test_geofence on_exit action 0)> syslog_stdout
true
(config service location geofence test_geofence on_exit action 0)>
```

- iii. To log the errors from the script to the [system log](#):

```
(config service location geofence test_geofence on_exit action 0)> syslog_stderr
true
(config service location geofence test_geofence on_exit action 0)>
```

- iv. (Optional) Set the maximum amount of system memory that will be available for the script and it spawned processes:

```
(config service location geofence test_geofence on_exit action 0)> max_memory
value
(config service location geofence test_geofence on_exit action 0)>
```

where *value* is any integer followed by one of the following:

b|bytes|KB|k|MB|M|GB|G|TB|T.

For example. the allocate one megabyte of memory to the script and its spawned processes:

```
(config service location geofence test_geofence on_exit action 0)> max_memory
1MB
(config service location geofence test_geofence on_exit action 0)>
```

- v. A sandbox is enabled by default to prevent the script from adversely affecting the system. To disable the sandbox:

```
(config service location geofence test_geofence on_exit action 0)> sandbox false
(config service location geofence test_geofence on_exit action 0)>
```

If you disable the sandbox, the script may render the system unusable.

- vi. Repeat for any additional actions.

7. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

8. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Show location information

You can view status and statistics about location information from either the WebUI or the command line.

Web

1. Log into the XBee Hive WebUI as a user with full Admin access rights.
2. On the main menu, click **Status**.
3. Under **Services**, click **Location**.

The device's current location is displayed, along with the status of any configured geofences.

Command line

Show location information

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. Use the **show location** command at the system prompt:

```
> show location
```

```
Location Status
```

```
-----
```

```
State      : enabled
Source     : 192.168.2.3
Latitude   : 44° 55' 14.809" N (44.92078)
Longitude  : 93° 24' 47.262" w (-93.413128)
Altitude   : 279 meters
Velocity   : 0 meters per second
Direction  : None
Quality    : Standard GNSS (2D/3D)
UTC Date and Time : Fri, Jan 12, 2024 12:10:00 03
No. of Satellites : 7
```

```
>
```

3. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Show geofence information

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. Use the [show location geofence](#) command at the system prompt:

```
> show location geofence

Geofence   Status State  Transitions  Last Transition
-----
test_geofence Up    Inside  0
```

```
>
```

3. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

System time synchronization

System time synchronization refers to the process of coordinating the system time of your XBee Hive device with an external, more accurate time source. By default, this synchronization occurs one time per day, but will also synchronize at startup, and in response to a change in the route. There are two configuration parameters that control system time synchronization: **ntpdate** and **system.time.resyn_interval**.

The **ntpdate** default configurations include the following:

- Time zone: **UTC**
- NTP server: the Digi NTP server, **time.digicloud.com**

The **system.time.resyn_interval** default configuration includes the following:

- Frequency of the synchronization: **1d** (one day). Set to **0** (zero) for no synchronization except at startup and route change.

No additional configuration is required for the synchronization if this default configuration is sufficient for your setup. However, you can change per-day synchronization, the default time zone, and the default NTP server, as well as adding additional NTP servers. If multiple NTP servers are added, time samples are obtained from each server. Selection algorithms are used to determine the most accurate time. See [Configure the system time synchronization](#) for details about changing the default configuration.

The XBee Hive device can also be configured to serve as an NTP server, providing NTP services to downstream devices. See [Network Time Protocol](#) for more information about NTP server support.

You can also set the local date and time manually, if there is no access to the configured NTP servers or modem time sources. See [Manually set the system date and time](#) for more information.

Configure the system time synchronization

To configure or change the system time synchronization:



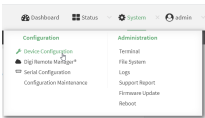
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

Remote Manager:

- a. Locate your device as described in [Use Digi Remote Manager to view and manage your device](#).
- b. Click the **Device ID**.
- c. Click **Settings**.
- d. Click to expand **Config**.

Local Web UI:

- a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



The **Configuration** window is displayed.

3. Click **System > Time**.
4. Modify the settings.



CAUTION! If you enable the NTP service, either disable the server configured in system time or make sure to match the server(s) configured in service ntp server. If you do not do one of these options, then the System time synchronization may fail, which could result in the following error message: ntpdate[2901]: the NTP socket is in use, exiting.

System time setting	UI Configuration
Timezone	Choose the time zone closest to where the device is located. The default time zone is UTC .
Resynchronization interval	Type the frequency of the daily update. The default is 1d (one day). Set to 0 (zero) for no synchronization.
Time sources	a. Click  to add a new time source. The time source is now enabled by default. b. In Type of time source, choose whether you want to use an NTP or Modem as the external source to which the device synchronizes. ■ If using an NTP, click  to add the Server hostname. The default is time.devicecloud.com. Note If multiple NTP servers are added, time samples are obtained from each server. Selection algorithms are used to determine the most accurate time. ■ If using a modem, specify the Modem and Modem time offset. The default offset is Local.

5. Click **Apply** to save the configuration and apply the change.

Command line

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Type **system time** to enter configuration mode for system time.

```
> config system time
(config system time)>
```

4. Add a new time source or modify the settings.



CAUTION! If you enable the NTP service, either disable the server configured in `system time` or make sure to match the server(s) configured in `service ntp server`. If you do not do one of these options, then the System time synchronization may fail, which could result in the following error message: `ntpdate[2901]: the NTP socket is in use, exiting.`

System time setting	UI Configuration
Timezone	(Optional) Set the timezone for the location of your XBee Hive device. The default is UTC. <pre>(config)> system time timezone <i>value</i> (config)></pre> Where <i>value</i> is the timezone using the format specified with the following command: <pre>(config)> system time timezone ?</pre> Timezone: The timezone for the location of this device. This is used to adjust the time for log messages. It also affects actions that occur at a specific time of day. Format: Africa/Abidjan Africa/Accra Africa/Addis_Ababa ... <pre>(config)></pre>
Resynchronization interval	Type the frequency of the daily update. The default is 1d (one day). Set to 0 (zero) for no synchronization. <pre>(config) system time resync_interval <i>value</i> (config) ></pre>

System time setting	UI Configuration
	Where <i>value</i> is {w d h m s}. For more information: (config)> system time resync_interval ? Format: number {w d h m s}... Optional: yes Default value: 1 d Current value: 1 d (config)>
Time sources	Add a new time source, either an NTP server or a modem. Note The default NTP server is time.devicecloud.com. ■ If adding one or more NTP servers: <pre>add service ntp server 0 time.server.com</pre> Note If multiple NTP servers are added, time samples are obtained from each server. Selection algorithms are used to determine the most accurate time. Note This list is synchronized with the list of servers included with NTP server configuration, and changes made to one will be reflected in the other. See Configure the device as an NTP server for more information about NTP server configuration. ■ If adding a modem, specify the mode and time offset: The default offset is Local. <pre>(config system time source)> add end (config system time source 1)> (config system time source 1)> type modem (config time source 1) > modem modem</pre> ■ To see the modem and its settings: <pre>(config system time source 1)> show enable true no label modem modem offset local type modem</pre>

5. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

6. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Test the connection to the NTP servers

The following procedure tests the configured NTP servers for connectivity. This test does not affect the device's current local date and time.

Command line

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. Test the configured NTP servers for connectivity:

```
> system time test
Testing NTP server time.devicecloud.com on UDP port 123...
server 52.2.40.158, stratum 2, offset -0.000216, delay 0.05800
server 35.164.164.69, stratum 2, offset -0.000991, delay 0.07188
24 Aug 22:01:20 ntpdate[28496]: adjust time server 52.2.40.158 offset -0.000216 sec
NTP test sync successful

Testing NTP server time.accns.com on UDP port 123...
server 128.136.167.120, stratum 3, offset -0.001671, delay 0.08455
24 Aug 22:01:20 ntpdate[28497]: adjust time server 128.136.167.120 offset -0.001671 sec
NTP test sync successful
>
```

3. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Manually synchronize with the NTP server

The following procedure perform a NTP query to the configured servers and set the local time to the first server that responds.

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. Synchronize the device's local date and time:

```
> system time sync
24 Aug 22:03:55 ntpdate[2520]: step time server 52.2.40.158 offset -0.000487 sec
NTP sync to time.devicecloud.com successful
>
```

3. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Manually set the system date and time

If your network restricts access to NTP servers, use this procedure to set the local date and time. This procedure is available at the Admin CLI only.

Command line

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. Set the device's local date and time:

```
> system time set value
>
```

where *value* is the date in year-month-day hour:minute:second format. The *value* must be surrounded by double quotes. For example:

```
> system time set "2024-01-12 12:10:00"
>
```

3. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Network Time Protocol

Network Time Protocol (NTP) enables devices connected on local and worldwide networks to synchronize their internal software and hardware clocks to the same time source. The XBee Hive device can be configured as an NTP server, allowing downstream hosts that are attached to the device's Local Area Networks to synchronize with the device.

When the device is configured as an NTP server, it also functions as an NTP client. The NTP client will be consistently synchronized with one or more upstream NTP servers, which means that NTP packets are transferred every few seconds. A minimum of one upstream NTP server is required. Additional NTP servers can be configured. If multiple servers are configured, a number of time samples are obtained from each of the servers and a subset of the NTP clock filter and selection algorithms are applied to select the best of these.

See [Configure the device as an NTP server](#) for information about configuring your device as an NTP server.

Configure the device as an NTP server

Required Configuration Items

- Enable the NTP service.
- At least one upstream NTP server for synchronization. The default setting is the Digi NTP server, time.devicecloud.com.

Additional Configuration Options

- Additional upstream NTP servers.
- Access control list to limit downstream access to the XBee Hive device's NTP service.
- The time zone setting, if the default setting of UTC is not appropriate.

To configure the XBee Hive device's NTP service:

Web

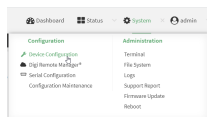
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

Remote Manager:

- a. Locate your device as described in [Use Digi Remote Manager to view and manage your device](#).
- b. Click the **Device ID**.
- c. Click **Settings**.
- d. Click to expand **Config**.

Local Web UI:

- a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



The **Configuration** window is displayed.

3. Click **Services > NTP**.
4. Enable the XBee Hive device's NTP service by clicking **Enable**.
5. (Optional) Configure the access control list to limit downstream access to the XBee Hive device's NTP service.
 - To limit access to specified IPv4 addresses and networks:
 - a. Click **IPv4 Addresses**.
 - b. For **Add Address**, click .
 - c. For **Address**, enter the IPv4 address or network that can access the device's NTP service. Allowed values are:

- A single IP address or host name.
 - A network designation in CIDR notation, for example, 192.168.1.0/24.
 - **any**: No limit to IPv4 addresses that can access the NTP service.
- d. Click  again to list additional IP addresses or networks.
- To limit access to specified IPv6 addresses and networks:
 - a. Click **IPv6 Addresses**.
 - b. For **Add Address**, click .
 - c. For **Address**, enter the IPv6 address or network that can access the device's NTP service. Allowed values are:
 - A single IP address or host name.
 - A network designation in CIDR notation, for example, 2001:db8::/48.
 - **any**: No limit to IPv6 addresses that can access the NTP service.
 - d. Click  again to list additional IP addresses or networks.
 - To limit access to hosts connected through a specified interface on the device:
 - a. Click **Interfaces**.
 - b. For **Add Interface**, click .
 - c. For **Interface**, select the appropriate interface from the dropdown.
 - d. Click  again to allow access through additional interfaces.
 - To limit access based on firewall zones:
 - a. Click **Zones**. By default, there are three firewall zones already configured: Internal, Edge, and IPsec.
 - b. For **Add Zone**, click .
 - c. For **Zone**, select the appropriate firewall zone from the dropdown.
See [Firewall configuration](#) for information about firewall zones.
 - d. Click  again to allow access through additional firewall zones.

Note By default, the access control list for the NTP service is empty, which means that all downstream hosts connected to the XBee Hive device can use the NTP service.

6. Enable **Fall back to local clock** to allow the device's local system clock to be used as backup time source.
7. (Optional) Add upstream NTP servers that the device will use to synchronize its time. The default setting is **time.devicecloud.com**.
 - To change the default value of the NTP server:
 - a. Click **NTP servers**.
 - b. For **Server**, type a new server name.
 - To add an NTP server:
 - a. Click **NTP servers**.
 - b. For **Add Server**, click .
 - c. For **Server**, enter the hostname of the upstream NTP server that the device will use to synchronize its time.

- d. Click **Yes** to add additional NTP servers. If multiple servers are included, servers are tried in the order listed until one succeeds.

Note This list is synchronized with the list of servers included with NTP client configuration, and changes made to one will be reflected in the other. See [Configure the system time synchronization](#) for more information about NTP client configuration.

8. (Optional) Configure the system time zone. The default is **UTC**.
 - a. Click **System > Time**
 - b. Select the **Timezone** for the location of your XBee Hive device.
9. Click **Apply** to save the configuration and apply the change.

Command line

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Enable the ntp service:

```
(config)> service ntp enable true
(config)>
```

4. (Optional) Add an upstream NTP server that the device will use to synchronize its time to the appropriate location in the list of NTP servers. The default setting is **time.devicecloud.com**.

- To delete the default NTP server, **time.devicecloud.com**:

```
(config)> del service ntp server 0
(config)>
```

- To add the NTP server to the beginning of the list, use the index value of **0** to indicate that it should be added as the first server:

```
(config)> add service ntp server 0 time.server.com
(config)>
```

- To add the NTP server to the end of the list, use the index keyword **end**:

```
(config)> add service ntp server end time.server.com
(config)>
```

- To add the NTP server in another location in the list, use an index value to indicate the appropriate position. For example:

```
(config)> add service ntp server 1 time.server.com
(config)>
```

Note This list is synchronized with the list of servers included with NTP client configuration, and changes made to one will be reflected in the other. See [Configure the system time synchronization](#) for more information about NTP client configuration.

5. Allow the device's local system clock to be used as backup time source:

```
(config)> service ntp local true
(config)>
```

6. (Optional) Configure the access control list to limit downstream access to the XBee Hive device's NTP service.

- To limit access to specified IPv4 addresses and networks:

```
(config)> add service ntp acl address end value
(config)>
```

Where *value* can be:

- A single IP address or host name.
- A network designation in CIDR notation, for example, 192.168.1.0/24.
- **any**: No limit to IPv4 addresses that can access the NTP server agent.

Repeat this step to list additional IP addresses or networks.

- To limit access to specified IPv6 addresses and networks:

```
(config)> add service ntp acl address6 end value
(config)>
```

Where *value* can be:

- A single IP address or host name.
- A network designation in CIDR notation, for example, 2001:db8::/48.
- **any**: No limit to IPv6 addresses that can access the NTP server agent.

Repeat this step to list additional IP addresses or networks.

- To limit access to hosts connected through a specified interface on the XBee Hive device:

```
(config)> add service ntp acl interface end value
(config)>
```

Where *value* is an interface defined on your device.

Display a list of available interfaces:

Use ... **network interface ?** to display interface information:

Repeat this step to list additional interfaces.

- To limit access based on firewall zones:

```
(config)> add service ntp acl zone end value
(config)>
```

Where *value* is a firewall zone defined on your device, or the **any** keyword.

Display a list of available firewall zones:

Type ... **firewall zone ?** at the config prompt:

```
(config)> ... firewall zone ?
```

Zones: A list of groups of network interfaces that can be referred to by packet filtering rules and access control lists.

Additional Configuration

```
any
dynamic_routes
edge
external
internal
ipsec
loopback
setup
```

```
(config)>
```

Repeat this step to include additional firewall zones.

Note By default, the access control list for the NTP service is empty, which means that all downstream hosts connected to the XBee Hive device can use the NTP service.

7. (Optional) Set the timezone for the location of your XBee Hive device. The default is **UTC**.

```
(config)> system time timezone value
(config)>
```

Where *value* is the timezone using the format specified with the following command:

```
(config)> system time timezone ?
```

Timezone: The timezone for the location of this device. This is used to adjust the time for log messages. It also affects actions that occur at a specific time of day.

Format:

```
Africa/Abidjan
Africa/Accra
Africa/Addis_Ababa
...
```

```
(config)>
```

8. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

9. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Show status and statistics of the NTP server

You can display status and statistics for active NTP servers



1. Log into the XBee Hive WebUI as a user with full Admin access rights.
2. On the main menu, click **Status**.
3. Under **Services**, click **NTP**.
The NTP server status page is displayed.

Command line

Show NTP information

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. Use the **show ntp** command at the system prompt:

```
> show ntp
```

```
NTP Status Status
```

```
-----
```

```
Status    : Up
```

```
Sync Status : Up
```

```
Remote      Refid      ST T When Poll Reach Delay  Offset Jitter
```

```
-----
```

```
*ec2-52-2-40-158 129.6.15.32  2  u 191  1024 377  33.570 +1.561 0.991
```

```
128.136.167.120 128.227.205.3 3  u 153  1024 1   43.583 -1.895 0.382
```

```
>
```

3. Type **exit** to exit the Admin CLI.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Configure a multicast route

Multicast routing allows a device to transmit data to a single multicast address, which is then distributed to a group of devices that are configured to be members of that group.

To configure a multicast route:



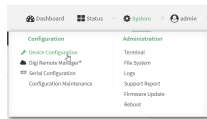
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

Remote Manager:

- a. Locate your device as described in [Use Digi Remote Manager to view and manage your device](#).
- b. Click the **Device ID**.
- c. Click **Settings**.
- d. Click to expand **Config**.

Local Web UI:

- a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



The **Configuration** window is displayed.

3. Click **Services > Multicast**.
4. For **Add Multicast route**, type a name for the route and click .
5. The new route is enabled by default. To disable, toggle off **Enable**.
6. Type the **Source address** for the route. This must be a multicast IP address between 224.0.0.1 and 239.255.255.255.
7. Select a **Source interface** where multicast packets will arrive.
8. To add one or more destination interface that the XBee Hive device will send multicast packets to:
 - a. Click to expand **Destination interfaces**.
 - b. Click .
 - c. For **Destination interface**, select the interface.
 - d. Repeat for additional destination interfaces.
9. Click **Apply** to save the configuration and apply the change.

Command line

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```


3. Add the multicast route. For example, to add a route named **test**:

```
(config)> add service multicast test
(config service multicast test)>
```

4. The multicast route is enabled by default. If it has been disabled, enable the route:

```
(config service multicast test)> enable true
(config service multicast test)>
```

5. Set the source address for the route. This must be a multicast IP address between 224.0.0.1 and 239.255.255.255.

```
(config service multicast test)> dst ip-address
(config service multicast test)>
```

6. Set the source interface for the route where multicast packets will arrive:

- a. Use the **?** to determine available interfaces:
- b. Set the interface. For example:

```
(config service multicast test)> src_interface /network/interface/eth1
(config service multicast test)>
```

7. Set a destination interface that the XBee Hive device will send multicast packets to:

- a. Use the **?** to determine available interfaces:
- b. Set the interface. For example:

```
(config service multicast test)> add interface end /network/interface/eth1
(config service multicast test)>
```

- c. Repeat for each additional destination interface.

8. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

9. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Enable service discovery (mDNS)

Multicast DNS (mDNS) is a protocol that resolves host names in small networks that do not have a DNS server. You can enable the XBee Hive device to use mDNS.

Note This feature is enabled by default.

Web

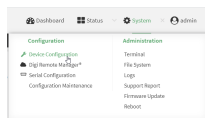
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

Remote Manager:

- a. Locate your device as described in [Use Digi Remote Manager to view and manage your device](#).
- b. Click the **Device ID**.
- c. Click **Settings**.
- d. Click to expand **Config**.

Local Web UI:

- a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



The **Configuration** window is displayed.

3. Click **Services > Service Discovery (mDNS)**.
4. The mDNS service is enabled by default. To disable, click to toggle off **Enable**.
5. Click **Access control list** to configure access control:
 - To limit access to specified IPv4 addresses and networks:
 - a. Click **IPv4 Addresses**.
 - b. For **Add Address**, click .
 - c. For **Address**, enter the IPv4 address or network that can access the device's mDNS service. Allowed values are:
 - A single IP address or host name.
 - A network designation in CIDR notation, for example, 192.168.1.0/24.
 - **any**: No limit to IPv4 addresses that can access the mDNS service.
 - d. Click  again to list additional IP addresses or networks.
 - To limit access to specified IPv6 addresses and networks:
 - a. Click **IPv6 Addresses**.
 - b. For **Add Address**, click .

- c. For **Address**, enter the IPv6 address or network that can access the device's mDNS service. Allowed values are:
 - A single IP address or host name.
 - A network designation in CIDR notation, for example, 2001:db8::/48.
 - **any**: No limit to IPv6 addresses that can access the mDNS service.
 - d. Click  again to list additional IP addresses or networks.
 - To limit access to hosts connected through a specified interface on the device:
 - a. Click **Interfaces**.
 - b. For **Add Interface**, click .
 - c. For **Interface**, select the appropriate interface from the dropdown.
 - d. Click  again to allow access through additional interfaces.
 - To limit access based on firewall zones:
 - a. Click **Zones**. By default, there are three firewall zones already configured: Internal, Edge, and IPsec.
 - b. For **Add Zone**, click .
 - c. For **Zone**, select the appropriate firewall zone from the dropdown.
See [Firewall configuration](#) for information about firewall zones.
 - d. Click  again to allow access through additional firewall zones.
6. Click **Apply** to save the configuration and apply the change.

Command line

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. The mDNS service is enabled by default. To disable:

```
(config)> service mdns enable false
(config)>
```

4. Configure access control:

- To limit access to specified IPv4 addresses and networks:

```
(config)> add service mdns acl address end value
(config)>
```

Where *value* can be:

- A single IP address or host name.
- A network designation in CIDR notation, for example, 192.168.1.0/24.
- **any**: No limit to IPv4 addresses that can access the mDNS service.

Repeat this step to list additional IP addresses or networks.

- To limit access to specified IPv6 addresses and networks:

```
(config)> add service mdns acl address6 end value
(config)>
```

Where *value* can be:

- A single IP address or host name.
- A network designation in CIDR notation, for example, 2001:db8::/48.
- **any**: No limit to IPv6 addresses that can access the mDNS service.

Repeat this step to list additional IP addresses or networks.

- To limit access to hosts connected through a specified interface on the XBee Hive device:

```
(config)> add service mdns acl interface end value
(config)>
```

Where *value* is an interface defined on your device.

Display a list of available interfaces:

Use ... **network interface ?** to display interface information:

Repeat this step to list additional interfaces.

- To limit access based on firewall zones:

```
(config)> add service mdns acl zone end value
(config)>
```

Where *value* is a firewall zone defined on your device, or the **any** keyword.

Display a list of available firewall zones:

Type ... **firewall zone ?** at the config prompt:

```
(config)> ... firewall zone ?
```

Zones: A list of groups of network interfaces that can be referred to by packet filtering rules and access control lists.

Additional Configuration

```
any
dynamic_routes
edge
external
internal
ipsec
loopback
setup
```

```
(config)>
```

Repeat this step to include additional firewall zones.

5. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

6. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Use the MQTT broker service

MQTT is a lightweight publish/subscribe messaging protocol for the Internet of Things (IoT) applications, designed to connect devices using a small footprint and minimum network bandwidth. Your XBee Hive device includes an MQTT broker service that serves as an intermediary between MQTT clients. The broker receives and distributes client messages.

Required configuration items

- Enable the MQTT broker.
- MQTT client usernames and passwords.
 - Topic access control for each client.
- Encryption type.
- How to control client access to topics on the MQTT broker.

Additional configuration items

- The port used by the MQTT broker.
- Access control list to limit downstream access to the XBee Hive device's MQTT broker.
- Include debug messages in the system log.
- Whether to allow anonymous clients.
- Whether to allow clients that have no client ID to connect.
- Whether replace the client's ID with its username.

Web

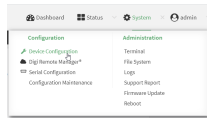
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

Remote Manager:

- a. Locate your device as described in [Use Digi Remote Manager to view and manage your device](#).
- b. Click the **Device ID**.
- c. Click **Settings**.
- d. Click to expand **Config**.

Local Web UI:

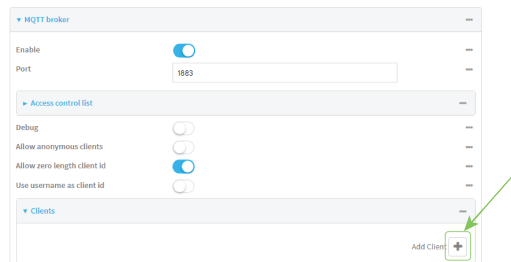
- a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



The **Configuration** window is displayed.

3. Click **Services > MQTT broker**.
4. Click **Enable**.
5. (Optional) For **Port**, type the port number for the MQTT broker to listen for incoming connections. The default is **1883**.
6. (Optional) Click to expand **Access control list** to restrict access to the MQTT broker:
 - To limit access to specified IPv4 addresses and networks:
 - a. Click **IPv4 Addresses**.
 - b. For **Add Address**, click .
 - c. For **Address**, enter the IPv4 address or network that can access the device's iperf service. Allowed values are:
 - A single IP address or host name.
 - A network designation in CIDR notation, for example, 192.168.1.0/24.
 - **any**: No limit to IPv4 addresses that can access the iperf service.
 - d. Click  again to list additional IP addresses or networks.
 - To limit access to specified IPv6 addresses and networks:
 - a. Click **IPv6 Addresses**.
 - b. For **Add Address**, click .
 - c. For **Address**, enter the IPv6 address or network that can access the device's iperf service. Allowed values are:
 - A single IP address or host name.
 - A network designation in CIDR notation, for example, 2001:db8::/48.
 - **any**: No limit to IPv6 addresses that can access the iperf service.
 - d. Click  again to list additional IP addresses or networks.
 - To limit access to hosts connected through a specified interface on the device:
 - a. Click **Interfaces**.
 - b. For **Add Interface**, click .
 - c. For **Interface**, select the appropriate interface from the dropdown.
 - d. Click  again to allow access through additional interfaces.

- To limit access based on firewall zones:
 - a. Click **Zones**. By default, there are three firewall zones already configured: Internal, Edge, and IPsec.
 - b. For **Add Zone**, click 
 - c. For **Zone**, select the appropriate firewall zone from the dropdown.
See [Firewall configuration](#) for information about firewall zones.
 - d. Click  again to allow access through additional firewall zones.
- 7. Click to toggle on **Debug** to write MQTT debug messages to the system log.
- 8. Click to toggle on **Allow anonymous clients** to allow connections from clients that do not provide a username.
- 9. By default, the MQTT broker will allow clients without client IDs to connect, and will generate a client ID for them. To disable, click to toggle off **Allow zero length client id**.
- 10. Click to toggle on **Use username as client id**. When enabled, the broker will replace the client ID with the username, which will prevent one client from disconnecting another by using the same client ID.
- 11. Add a client:
 - a. Click to expand **Clients**.
 - b. Click  to add a client.



- c. Type the **Username** and **Password** for the client.
 - d. Add a topic to control this client's access to:
 - i. Click to expand **Topic access control list**.
 - ii. Click  to add a topic.
 - iii. For **Topic**, type the topic. The signal level wildcard, **+**, and multi-level wildcard, **#**, are supported.
 - iv. For **Access**, select the level of access that the client will have:
 - **Read**
 - **Write**
 - **Read/write**
 - **Deny**
 - v. Click  again to add additional topics.
 - e. Click  again to add additional clients.
12. Click to expand **Encryption**.
13. For **Type**, select either **None** or **PSK**.

- If **PSK** is selected:
 - a. Click to enable **Use PSK identity as username** to use the PSK identity sent by the client as its username.
 - b. (Optional) For **Identifier**, type a string that identifies the listener and is sent to the clients.
 - c. Click to expand **Pre-shared keys**.
 - d. Click  to add a pre-shared key.
 - e. For **Identity**, type the identity sent to the client.
 - f. For **Key**, type or paste the pre-shared key in hexadecimal format that is associated with the client identity.
 - g. Click  again to add additional pre-shared keys.
- 14. Click to expand **Topic access control list**.
 The topic access control lists controls what topics clients can access. If no topics are included, then clients have access to all topics. If any topics are listed, access is restricted to only the listed topics.
 - To restrict access for anonymous clients to particular topics:
 - a. Click to expand **Anonymous**.
 - b. Click  to add a topic.
 - c. For **Topic**, type the topic. The signal level wildcard, **+**, and multi-level wildcard, **#**, are supported.
 - d. For **Access**, select the level of access that the client will have:
 - **Read**
 - **Write**
 - **Read/write**
 - **Deny**
 - e. Click  again to add additional topics.
 - To restrict access to topics based on pattern substitution:
 - a. Click to expand **Pattern**.
 - b. Click  to add a topic.
 - c. For **Topic**, type the topic. The variables **%c** and **%u** can be used as substitutes for the client ID or username. If a variable is used, it can be the only text for that level of the hierarchy..
 - d. For **Access**, select the level of access that the client will have:
 - **Read**
 - **Write**
 - **Read/write**
 - **Deny**
 - e. Click  again to add additional topics.
- 15. Click **Apply** to save the configuration and apply the change.

Command line

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Enable the MQTT broker:

```
(config)> service mqtt enable true
(config)>
```

4. (Optional) Set the port number for the MQTT broker to listen for incoming connections:

```
(config)> service mqtt port int
(config)>
```

The default is **1883**.

5. (Optional) Set the access control list to restrict access to the MQTT broker:
 - To limit access to specified IPv4 addresses and networks:

```
(config)> add service mqtt acl address end value
(config)>
```

Where *value* can be:

- A single IP address or host name.
- A network designation in CIDR notation, for example, 192.168.1.0/24.
- **any**: No limit to IPv4 addresses that can access the iperf service.

Repeat this step to list additional IP addresses or networks.

- To limit access to specified IPv6 addresses and networks:

```
(config)> add service mqtt acl address6 end value
(config)>
```

Where *value* can be:

- A single IP address or host name.
- A network designation in CIDR notation, for example, 2001:db8::/48.
- **any**: No limit to IPv6 addresses that can access the iperf service.

Repeat this step to list additional IP addresses or networks.

- To limit access to hosts connected through a specified interface on the XBee Hive device:

```
(config)> add service mqtt acl interface end value
(config)>
```

Where *value* is an interface defined on your device.

Display a list of available interfaces:

Use ... **network interface ?** to display interface information:

Repeat this step to list additional interfaces.

- To limit access based on firewall zones:

```
(config)> add service mqtt acl zone end value
(config)>
```

Where *value* is a firewall zone defined on your device, or the **any** keyword.

Display a list of available firewall zones:

Type ... **firewall zone ?** at the config prompt:

```
(config)> ... firewall zone ?
```

Zones: A list of groups of network interfaces that can be referred to by packet filtering rules and access control lists.

Additional Configuration

```
any
dynamic_routes
edge
external
internal
ipsec
loopback
setup
```

```
(config)>
```

Repeat this step to include additional firewall zones.

6. Enable the system to write MQTT debug messages to the system log:

```
(config)> service mqtt debug true
(config)>
```

7. Enable connections from clients that do not provide a username:

```
(config)> service mqtt allow_anonymous true
(config)>
```

8. By default, the MQTT broker will allow clients without client IDs to connect, and will generate a client ID for them. To disable:

```
(config)> service mqtt allow_zero_length_client_id false
(config)>
```

9. Enable the broker to replace the client ID with the username, which will prevent one client from disconnecting another by using the same client ID:

```
(config)> service mqtt use_username_as_client_id true
(config)>
```

10. Add and configure clients that are allowed to connect to the broker:

a. Add a client:

```
(config)> add service mqtt client end
(config service mqtt client 0)>
```

b. Set the username and password for the client:

```
(config service mqtt client 0)> username value
(config service mqtt client 0)> password value
(config service mqtt client 0)>
```

c. Add a topic to control this client's access to:

i. Add a topic:

```
(config service mqtt client 0)> add topic_acl end
(config service mqtt client 0 topic_acl 0)>
```

ii. Set the topic:

```
(config service mqtt client 0 topic_acl 0)> topic value
(config service mqtt client 0 topic_acl 0)>
```

where *value* is one of:

- The topic.
- The signal level wildcard, **+**.
- The multi-level wildcard, **#**.

iii. Set the access type to apply to the topic:

```
(config service mqtt client 0 topic_acl 0)> access value
(config service mqtt client 0 topic_acl 0)>
```

where *value* is one of:

- **deny**
- **read**
- **readwrite**
- **write**

The default is **readwrite**.

iv. Add additional topics:

```
(config service mqtt client 0 topic_acl 0)> add ... topic_acl end
(config service mqtt client 0 topic_acl 1)>
```

v. Repeat the above steps to set the topic and access type.

11. Set the encryption:

- a. Return to the root of the configuration:

```
(config service mqtt client 0 topic_acl 1)> ...
(config)>
```

- b. Set the encryption type:

```
(config)> service mqtt encryption type value
(config)>
```

where *value* is either:

- **none**
- **psk**

If **psk** is used:

- a. (Optional) Set a string that identifies the listener and is sent to the clients:

```
(config)> service mqtt encryption identifier string
(config)>
```

- b. Enable the PSK identity sent by the client to be used as its username:

```
(config)> service mqtt encryption use_identity_as_username true
(config)>
```

- c. Set the pre-shared keys:

- i. Add a pre-shared key:

```
(config)> add service mqtt encryption psk end
(config service mqtt encryption psk 0)>
```

- ii. Set the identity sent to the client:

```
(config service mqtt encryption psk 0)> identity value
(config service mqtt encryption psk 0)>
```

- iii. Set the pre-shared key:

```
(config service mqtt encryption psk 0)> key value
(config service mqtt encryption psk 0)>
```

where *value* is the pre-shared key in hexadecimal format that is associated with the client identity.

- iv. Add additional keys:

```
(config service mqtt encryption psk 0)> add .. end
(config service mqtt encryption psk 1)>
```

Repeat the above steps to set the identity and the pre-shared key.

12. The topic access control lists controls what topics clients can access. If no topics are included, then clients have access to all topics. If any topics are listed, access is restricted to only the listed topics.

- To restrict access for anonymous clients to particular topics:

- a. Return to the service mqtt node of the schema:

```
(config service mqtt encryption psk 1)> ... service mqtt
(config service mqtt)>
```

- b. Add a topic:

```
(config service mqtt)> add topic_acl anonymous end
(config service mqtt topic_acl anonymous 0)>
```

- c. Set the topic:

```
(config service mqtt topic_acl anonymous 0)> topic value
(config service mqtt topic_acl anonymous 0)>
```

where *value* is one of:

- The topic.
- The signal level wildcard, **+**.
- The multi-level wildcard, **#**.

- d. Set the access type to apply to the topic:

```
(config service mqtt topic_acl anonymous 0)> access value
(config service mqtt topic_acl anonymous 0)>
```

where *value* is one of:

- **deny**
- **read**
- **readwrite**
- **write**

The default is **readwrite**.

- e. Add additional topics:

```
(config service mqtt topic_acl anonymous 0)> add ... anonymous end
(config service mqtt topic_acl anonymous 1)>
```

- f. Repeat the above steps to set the topic and access type.

- To restrict access to topics based on pattern substitution:

- a. Return to the service mqtt node of the schema:

```
(config service mqtt encryption psk 1)> ... service mqtt
(config service mqtt)>
```

- b. Add a topic:

```
(config service mqtt)> add topic_acl pattern end
(config service mqtt topic_acl pattern 0)>
```

- c. Set the topic:

```
(config service mqtt topic_acl pattern 0)> topic value
(config service mqtt topic_acl pattern 0)>
```

where *value* is one of:

- The topic.
- The variable **%c** as a substitute for the client ID.
- The variable **%u** as a substitute for the username.

If a variable is used, it can be the only text for that level of the hierarchy.

- d. Set the access type to apply to the topic:

```
(config service mqtt topic_acl pattern 0)> access value
(config service mqtt topic_acl pattern 0)>
```

where *value* is one of:

- **deny**
- **read**
- **readwrite**
- **write**

The default is **readwrite**.

- e. Add additional topics:

```
(config service mqtt topic_acl pattern 0)> add ... pattern end
(config service mqtt topic_acl pattern 1)>
```

- f. Repeat the above steps to set the topic and access type.

13. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

14. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Show MQTT broker information

You can view status and statistics about the MQTT broker from either the WebUI or the command line.

Web

1. Log into the XBee Hive WebUI as a user with full Admin access rights.
2. On the main menu, click **Status**.
3. Under **Services**, click **MQTT Broker**.

Command line

Show MQTT broker information

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. Use the [show mqtt](#) command at the system prompt:

```
> show location
```

MQTT Broker Status

```
-----  
Enabled      : true  
Status       : up  
Version      : mosquitto version 2.0.14  
Uptime       : (202s)
```

Totals

```
-----  
Bytes sent    : 158400  
Bytes received : 4500  
Messages sent : 0  
Messages received : 0
```

Clients

```
-----  
Total         : 1  
Maximum       : 5  
Connected     : 1  
Disconnected  : 0  
Expired       : 0
```

Subscriptions

```
-----  
Total         : 1  
Shared        : 1
```

Message Store

```
-----  
Bytes         : 151  
Messages      : 35  
Retained messages : 40
```

PUBLISH Messages

```
-----  
Bytes sent    : 0  
Bytes received : 0  
Messages sent : 0  
Messages received : 0  
Messages dropped : 0
```

>

3. Use the [show mqtt](#) command to return additional information, including averages over one, five, and fifteen minutes.
4. Type **exit** to exit the Admin CLI.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Use the iPerf service

Your XBee Hive device includes an iPerf3 server that you can use to test the performance of your network.

iPerf3 is a command-line tool that measures the maximum network throughput an interface can handle. This is useful when diagnosing network speed issues, to determine, for example, whether a cellular connection is providing expected throughput.

The XBee Hive implementation of iPerf3 supports testing with both TCP and UDP.

Note Using iPerf clients that are at a version earlier than iPerf3 to connect to the XBee Hive device's iPerf3 server may result in unpredictable results. As a result, Digi recommends using an iPerf client at version 3 or newer to connect to the XBee Hive device's iPerf3 server.

Required configuration items

- Enable the iPerf server on the XBee Hive device.
- An iPerf3 client installed on a remote host. iPerf3 software can be downloaded at <https://iperf.fr/iperf-download.php>.

Additional configuration items

- The port that the XBee Hive device's iPerf server will use to listen for incoming connections.
- The access control list for the iPerf server.

When the iPerf server is enabled, the XBee Hive device will automatically configure its firewall rules to allow incoming connections on the configured listening port. You can restrict access by configuring the access control list for the iPerf server.

To enable the iPerf3 server:

Web

1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

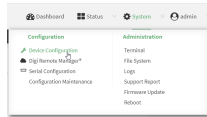
Remote Manager:

- a. Locate your device as described in [Use Digi Remote Manager to view and manage your device](#).

- b. Click the **Device ID**.
- c. Click **Settings**.
- d. Click to expand **Config**.

Local Web UI:

- a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



The **Configuration** window is displayed.

3. Click **Services > iPerf**.
4. Click **Enable**.
5. (Optional) For **iPerf Server Port**, type the appropriate port number for the iPerf server listening port.
6. (Optional) Click to expand **Access control list** to restrict access to the iPerf server:
 - To limit access to specified IPv4 addresses and networks:
 - a. Click **IPv4 Addresses**.
 - b. For **Add Address**, click **+**
 - c. For **Address**, enter the IPv4 address or network that can access the device's iperf service. Allowed values are:
 - A single IP address or host name.
 - A network designation in CIDR notation, for example, 192.168.1.0/24.
 - **any**: No limit to IPv4 addresses that can access the iperf service.
 - d. Click **+** again to list additional IP addresses or networks.
 - To limit access to specified IPv6 addresses and networks:
 - a. Click **IPv6 Addresses**.
 - b. For **Add Address**, click **+**
 - c. For **Address**, enter the IPv6 address or network that can access the device's iperf service. Allowed values are:
 - A single IP address or host name.
 - A network designation in CIDR notation, for example, 2001:db8::/48.
 - **any**: No limit to IPv6 addresses that can access the iperf service.
 - d. Click **+** again to list additional IP addresses or networks.
 - To limit access to hosts connected through a specified interface on the device:
 - a. Click **Interfaces**.
 - b. For **Add Interface**, click **+**
 - c. For **Interface**, select the appropriate interface from the dropdown.
 - d. Click **+** again to allow access through additional interfaces.

- To limit access based on firewall zones:
 - a. Click **Zones**. By default, there are three firewall zones already configured: Internal, Edge, and IPsec.
 - b. For **Add Zone**, click 
 - c. For **Zone**, select the appropriate firewall zone from the dropdown.
See [Firewall configuration](#) for information about firewall zones.
 - d. Click  again to allow access through additional firewall zones.
- 7. Click **Apply** to save the configuration and apply the change.

Command line

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Enable the iPerf server:

```
(config)> service iperf enable true
(config)>
```

4. (Optional) Set the port number for the iPerf server listening port. The default is 5201.

```
(config)> service iperf port port_number
(config)>
```

5. (Optional) Set the access control list to restrict access to the iPerf server:

- To limit access to specified IPv4 addresses and networks:

```
(config)> add service iperf acl address end value
(config)>
```

Where *value* can be:

- A single IP address or host name.
- A network designation in CIDR notation, for example, 192.168.1.0/24.
- **any**: No limit to IPv4 addresses that can access the service-type.

Repeat this step to list additional IP addresses or networks.

- To limit access to specified IPv6 addresses and networks:

```
(config)> add service iperf acl address6 end value
(config)>
```

Where *value* can be:

- A single IP address or host name.
- A network designation in CIDR notation, for example, 2001:db8::/48.
- **any**: No limit to IPv6 addresses that can access the service-type.

Repeat this step to list additional IP addresses or networks.

- To limit access to hosts connected through a specified interface on the XBee Hive device:

```
(config)> add service iperf acl interface end value
(config)>
```

Where *value* is an interface defined on your device.

Display a list of available interfaces:

Use ... **network interface ?** to display interface information:

Repeat this step to list additional interfaces.

- To limit access based on firewall zones:

```
(config)> add service iperf acl zone end value
(config)>
```

Where *value* is a firewall zone defined on your device, or the **any** keyword.

Display a list of available firewall zones:

Type ... **firewall zone ?** at the config prompt:

```
(config)> ... firewall zone ?
```

Zones: A list of groups of network interfaces that can be referred to by packet filtering rules and access control lists.

Additional Configuration

```
any
dynamic_routes
edge
external
internal
ipsec
loopback
setup
```

```
(config)>
```

Repeat this step to include additional firewall zones.

6. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

7. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Example performance test using iPerf3

On a remote host with iPerf3 installed, enter the following command:

```
$ iperf3 -c device_ip
```

where *device_ip* is the IP address of the XBee Hive device. For example:

```
$ iperf3 -c 192.168.2.1
Connecting to host 192.168.2.1, port 5201
[ 4] local 192.168.3.100 port 54934 connected to 192.168.1.1 port 5201
[ ID] Interval      Transfer  Bandwidth  Retr Cwnd
[ 4] 0.00-1.00  sec  26.7 MBytes  224 Mbits/sec  8  2.68 MBytes
[ 4] 1.00-2.00  sec  28.4 MBytes  238 Mbits/sec  29  1.39 MBytes
[ 4] 2.00-3.00  sec  29.8 MBytes  250 Mbits/sec  0  1.46 MBytes
[ 4] 3.00-4.00  sec  31.2 MBytes  262 Mbits/sec  0  1.52 MBytes
[ 4] 4.00-5.00  sec  32.1 MBytes  269 Mbits/sec  0  1.56 MBytes
[ 4] 5.00-6.00  sec  32.5 MBytes  273 Mbits/sec  0  1.58 MBytes
[ 4] 6.00-7.00  sec  33.9 MBytes  284 Mbits/sec  0  1.60 MBytes
[ 4] 7.00-8.00  sec  33.7 MBytes  282 Mbits/sec  0  1.60 MBytes
[ 4] 8.00-9.00  sec  33.5 MBytes  281 Mbits/sec  0  1.60 MBytes
[ 4] 9.00-10.00 sec  33.2 MBytes  279 Mbits/sec  0  1.60 MBytes
-----
[ ID] Interval      Transfer  Bandwidth  Retr
[ 4] 0.00-10.00  sec  315 MBytes  264 Mbits/sec  37
[ 4] 0.00-10.00  sec  313 MBytes  262 Mbits/sec
                                sender
                                receiver

iperf Done.
$
```

Configure the ping responder service

Your XBee Hive device's ping responder service replies to ICMP and ICMPv6 echo requests. The service is enabled by default. You can disable the service, or you can configure the service to use an access control list to limit the service to specified IP address, interfaces, and/or zones.

To enable the iPerf3 server:

Web

1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

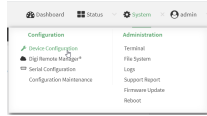
Remote Manager:

- a. Locate your device as described in [Use Digi Remote Manager to view and manage your device](#).
- b. Click the **Device ID**.
- c. Click **Settings**.

- d. Click to expand **Config**.

Local Web UI:

- a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



The **Configuration** window is displayed.

3. Click **Services > Ping responder**.

The ping responder service is enabled by default. Click **Enable** to disable all ping responses.

4. Click to expand **Access control list** to restrict ping responses to specified IP address, interfaces, and/or zones:
 - To limit access to specified IPv4 addresses and networks:
 - a. Click **IPv4 Addresses**.
 - b. For **Add Address**, click .
 - c. For **Address**, enter the IPv4 address or network that can access the device's ping responder. Allowed values are:
 - A single IP address or host name.
 - A network designation in CIDR notation, for example, 192.168.1.0/24.
 - **any**: No limit to IPv4 addresses that can access the ping responder.
 - d. Click  again to list additional IP addresses or networks.
 - To limit access to specified IPv6 addresses and networks:
 - a. Click **IPv6 Addresses**.
 - b. For **Add Address**, click .
 - c. For **Address**, enter the IPv6 address or network that can access the device's ping responder. Allowed values are:
 - A single IP address or host name.
 - A network designation in CIDR notation, for example, 2001:db8::/48.
 - **any**: No limit to IPv6 addresses that can access the ping responder.
 - d. Click  again to list additional IP addresses or networks.
 - To limit access to hosts connected through a specified interface on the device:
 - a. Click **Interfaces**.
 - b. For **Add Interface**, click .
 - c. For **Interface**, select the appropriate interface from the dropdown.
 - d. Click  again to allow access through additional interfaces.
 - To limit access based on firewall zones:
 - a. Click **Zones**. By default, there are three firewall zones already configured: Internal, Edge, and IPsec.
 - b. For **Add Zone**, click .

- c. For **Zone**, select the appropriate firewall zone from the dropdown.
See [Firewall configuration](#) for information about firewall zones.
 - d. Click **Yes** again to allow access through additional firewall zones.
5. Click **Apply** to save the configuration and apply the change.

Command line

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Enable the iPerf server:

```
(config)> service iperf enable true
(config)>
```

4. (Optional) Set the port number for the iPerf server listening port. The default is 5201.

```
(config)> service iperf port port_number
(config)>
```

5. (Optional) Set the access control list to restrict access to the iPerf server:

- To limit access to specified IPv4 addresses and networks:

```
(config)> add service iperf acl address end value
(config)>
```

Where *value* can be:

- A single IP address or host name.
- A network designation in CIDR notation, for example, 192.168.1.0/24.
- **any**: No limit to IPv4 addresses that can access the service-type.

Repeat this step to list additional IP addresses or networks.

- To limit access to specified IPv6 addresses and networks:

```
(config)> add service iperf acl address6 end value
(config)>
```

Where *value* can be:

- A single IP address or host name.
- A network designation in CIDR notation, for example, 2001:db8::/48.
- **any**: No limit to IPv6 addresses that can access the service-type.

Repeat this step to list additional IP addresses or networks.

- To limit access to hosts connected through a specified interface on the XBee Hive device:

```
(config)> add service iperf acl interface end value
(config)>
```

Where *value* is an interface defined on your device.

Display a list of available interfaces:

Use ... **network interface ?** to display interface information:

Repeat this step to list additional interfaces.

- To limit access based on firewall zones:

```
(config)> add service iperf acl zone end value
(config)>
```

Where *value* is a firewall zone defined on your device, or the **any** keyword.

Display a list of available firewall zones:

Type ... **firewall zone ?** at the config prompt:

```
(config)> ... firewall zone ?
```

Zones: A list of groups of network interfaces that can be referred to by packet filtering rules and access control lists.

Additional Configuration

```
-----
any
dynamic_routes
edge
external
internal
ipsec
loopback
setup
```

```
(config)>
```

Repeat this step to include additional firewall zones.

6. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

7. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Example performance test using iPerf3

On a remote host with Iperf3 installed, enter the following command:

```
$ iperf3 -c device_ip
```

where *device_ip* is the IP address of the XBee Hive device. For example:

```
$ iperf3 -c 192.168.2.1
Connecting to host 192.168.2.1, port 5201
[ 4] local 192.168.3.100 port 54934 connected to 192.168.1.1 port 5201
[ ID] Interval      Transfer  Bandwidth  Retr Cwnd
[ 4] 0.00-1.00 sec 26.7 MBytes 224 Mbits/sec 8 2.68 MBytes
[ 4] 1.00-2.00 sec 28.4 MBytes 238 Mbits/sec 29 1.39 MBytes
[ 4] 2.00-3.00 sec 29.8 MBytes 250 Mbits/sec 0 1.46 MBytes
[ 4] 3.00-4.00 sec 31.2 MBytes 262 Mbits/sec 0 1.52 MBytes
[ 4] 4.00-5.00 sec 32.1 MBytes 269 Mbits/sec 0 1.56 MBytes
[ 4] 5.00-6.00 sec 32.5 MBytes 273 Mbits/sec 0 1.58 MBytes
[ 4] 6.00-7.00 sec 33.9 MBytes 284 Mbits/sec 0 1.60 MBytes
[ 4] 7.00-8.00 sec 33.7 MBytes 282 Mbits/sec 0 1.60 MBytes
[ 4] 8.00-9.00 sec 33.5 MBytes 281 Mbits/sec 0 1.60 MBytes
[ 4] 9.00-10.00 sec 33.2 MBytes 279 Mbits/sec 0 1.60 MBytes
-----
[ ID] Interval      Transfer  Bandwidth  Retr
[ 4] 0.00-10.00 sec 315 MBytes 264 Mbits/sec 37      sender
[ 4] 0.00-10.00 sec 313 MBytes 262 Mbits/sec      receiver

iperf Done.
$
```

Applications

The XBee Hive supports Python 3.13 and provides you with the ability to run Python applications on the device interactively or from a file. You can also specify Python applications and other scripts to be run each time the device system restarts, at specific intervals, or at a specified time.

This chapter contains the following topics:

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Releasing the LEDs to system control	722
Set up the XBee Hive to automatically run your applications	730
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Develop Python applications

The XBee Hive features a standard Python 3.13 distribution. Python is a dynamic, object-oriented language for developing software applications, from simple programs to complex embedded applications. Digi offers the Digi IoT PyCharm Plugin to help you while writing, building, and testing your application. It also provides examples to use as the base for programming your XBee Hive. See [Create and test a Python application](#).

In addition to the standard Python library, the XBee Hive includes a set of extensions to access its configuration and interfaces. See [Python modules](#).

The XBee Hive provides you with the ability to:

- Run Python applications on the device interactively or from a file.
- Specify Python applications and other scripts to be run each time the device system restarts, at specific intervals, or at a specified time. See [Configure scripts to run automatically](#).
- Use pip to install Python packages.

Note Although pip is provided to help facilitate the installation of Python packages, there are limitations in Python package support due to package dependencies, storage limitations, and other issues.

This section contains the following topics:

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User LED	718
XBee LED	718
Wi-Fi LED	719
WWAN LEDs	720
Ethernet (RJ45 Plug)	721

Set up the XBee Hive for Python development

1. Access the XBee Hive local web interface
 - a. Use an Ethernet cable to connect the XBee Hive to your local laptop or PC.
The factory Set up address is `<serialnumber>.local`, where the serial number is listed on the label packaged with your device.
 - b. Log into the XBee Hive WebUI as a user with full admin access rights.
The default user name is **admin** and the default password is the unique password printed on the label packaged with your device.
2. Go to the Configuration window
 - a. On the menu, click **System**.
 - b. Under **Configuration**, click **Device Configuration**. The Configuration window displays.
3. Enable shell access
 - a. Click **Authentication > Groups > admin**.
 - b. Click the **Interactive shell access** option.
 - c. If this option is not displayed, see [Disable shell access](#).
4. Click **Apply** to save the configuration and apply the changes.
The **Apply** button is located at the top of the WebUI page. You may need to scroll to the top of the page to locate it.

Create and test a Python application

To develop a Python application for the XBee Hive:

1. [Set up the XBee Hive for Python development](#).
2. Create and test your application with:
 - [PyCharm](#), along with Digi XBee PyCharm Plugin. You can create, build, and remotely launch your application in the XBee Hive.
 - Your preferred editor and [manually transfer the application, install dependencies, and launch](#) in the XBee Hive.

Develop an application in PyCharm

The Digi IoT PyCharm Plugin allows you to write, build and run Python applications for Digi devices in a quick and easy way. See the [Digi XBee PyCharm IDE Plugin User Guide](#) for details.

This is what you can do with it:

- Create Python projects from scratch or import one of the available examples.
- Get help while you write your code thanks to the syntax highlight, quick documentation, and code completion features.
- Build and upload Python applications to your Digi device with just one click.
- Add libraries that facilitate the usage of external peripherals or non-standard APIs.
- Communicate with your Digi device through the integrated SSH console to see the application output or execute quick tests.

Manually install and launch an application

To create, build, and launch your application:

1. Write your Python application code. Code can include:
 - Any Python 3.13 standard feature.
 - Access to the XBee Hive configuration and hardware with the [Python modules](#).
 - Third-party modules included in the XBee Hive, for example:
 - pySerial 3.5
 - PyModbus 3.7
 - Eclipse Paho MQTT Python Client
 - Any other third-party module implemented in Python.
2. Generate a wheel (whl) package or a zip package.
 - a. If generating a wheel package, see <https://packaging.python.org/tutorials/packaging-projects/>.
 - b. If generating a zip package, the zip must contain a folder with the name of your application and optionally a **requirements.txt** file.
 Example:
 MyDemoFolder
 |---- main.py
 |---- requirements.txt
3. Upload your package to **/tmp**, for instance to **/tmp/MyDemoFolder.zip**.
 See [Upload and download files](#).
4. Install the package. See [pyinstall](#).
 Example:
 > pyinstall package /tmp/MyDemoFolder.zip
5. Install the application. The application is installed in **/etc/config/scripts** directory.
6. Launch your application:
 - [Run your application at the shell prompt](#).
 - [Configure your application to run automatically](#).

PyCharm FAQ: My XBee Hive is not listed in Digi Device Selector

If an XBee Hive does not appear on the list of the Digi Device Selector:

- Ensure that your device has the mDNS service enabled and is on the same network as the computer. See [Set up the XBee Hive for Python development](#).
- Or click the link **Click here to add it manually** to specify the IP address, port, username, and password. To determine the XBee Hive IP address, see [Get the XBee Hive IP](#).

Example: Configure a custom port to listen for incoming socket connections

The following example Python script configures a custom port, port 9999, to accept incoming socket connections.

You will also need to add a custom firewall rule to accept the incoming traffic on this port.

Example script

```
import socket
import socketserver

class MyTCPHandler(socketserver.BaseRequestHandler):
    """
    The request handler class for our server.

    It is instantiated once per connection to the server, and must
    override the handle() method to implement communication to the
    client.
    """

    def handle(self):
        # self.request is the TCP socket connected to the client
        self.data = self.request.recv(1024).strip()
        print("{} wrote:".format(self.client_address[0]))
        print(self.data)
        # just send back the same data, but upper-cased
        self.request.sendall(self.data.upper())

if __name__ == "__main__":
    HOST, PORT = "", 9999

    # Create the server, binding to localhost on port 9999
    with socketserver.TCPServer((HOST, PORT), MyTCPHandler) as server:
        # Activate the server; this will keep running until you
        # interrupt the program with Ctrl-C
        print("Waiting for data...")
        server.serve_forever()
```

Create a custom firewall rule



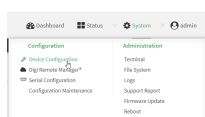
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

Remote Manager:

- a. Locate your device as described in [Use Digi Remote Manager to view and manage your device](#).
- b. Click the **Device ID**.
- c. Click **Settings**.
- d. Click to expand **Config**.

Local Web UI:

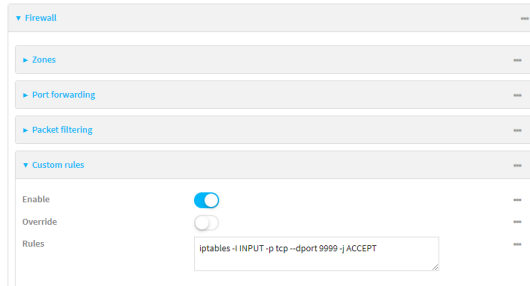
- a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



The **Configuration** window is displayed.

3. Click **Firewall > Custom rules**.
4. **Enable** the custom rules.
5. For **Rules**, type the following:

```
iptables -I INPUT -p tcp --dport 9999 -j ACCEPT
```



6. Click **Apply** to save the configuration and apply the change.

Command line

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Enable custom firewall rules:

```
(config)> firewall custom enable true(config)>
```

4. Set the shell command that will execute the custom firewall rules script:

```
(config)> firewall custom rules "iptables -I INPUT -p tcp --dport 9999 -j ACCEPT"
(config)>
```

5. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

6. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Python modules

The XBee Hive supports Python 3.13 and provides you with the ability to run Python applications on the device interactively or from a file. It also offers extensions to manage your XBee Hive:

- The **digidevice** module provides platform-specific extensions that allow you to interact with the device's configuration and interfaces.
The following submodules are included with the **digidevice** module:
 - XBee: **digidevice.xbee**
 - LEDs: **digidevice.led**
 - SMS: **digidevice.sms**
 - Digi Remote Manager:
 - **digidevice.datapoint**
 - **digidevice.device_request**
 - **digidevice.name**
 - Device configuration: **digidevice.config**
 - Command line interface: **digidevice.cli**
 - Access runtime database: **digidevice.runt**
 - Set the maintenance window: **digidevice.maintenance**
 - Application Monitor API: **digidevice.appmonitor**
- The [XBee Python Library](#) is also integrated so you can work with the local and remote XBee devices in your network.
- Use the Python **serial** module—[pySerial](#)—to access the serial ports.
- [PyModbus](#), a full Modbus protocol implementation.
- [Eclipse Paho MQTT Python client](#) enables applications to connect to an [MQTT](#) broker to publish messages, and to subscribe to topics and receive published messages.

Note Module-related documentation is in the [Digidevice module](#) section.

Digidevice module

The Python **digidevice** module provides platform-specific extensions that allow you to interact with the device's configuration and interfaces. The following submodules are included with the **digidevice** module:

This section contains the following topics:

- [Use digidevice.cli to execute CLI commands](#)
- [Use digidevice.datapoint to upload custom datapoints to Digi Remote Manager](#)
- [Use digidevice.config for device configuration](#)
- [Use Python to respond to Digi Remote Manager SCI requests](#)
- [Use digidevice runtime to access the runtime database](#)
- [Use Python to upload the device name to Digi Remote Manager](#)
- [Use Python to set the maintenance window](#)
- [Power LED](#)
- [Use Python to send and receive SMS messages](#)

XBee API

The **digidevice.xbee** Python module offers the **get_device** function for accessing the internal XBee device of your XBee Hive.

```
def get_device(timeout: int = -1) -> XBeeDevice
```

This function returns a representation of the XBee device in the XBee Hive. This object class is defined in the XBee Python Library, and depends on the protocol your XBee is using:

- **XBeeDevice**: generic XBee device.
- **ZigBeeDevice**: ZigBee protocol-specific XBee device.
- **DigiMeshDevice**: DigiMesh protocol-specific XBee device.
- **Raw802Device**: 802.15.4 protocol-specific XBee device.

Example: Get local XBee instance

```
from digidevice import xbee

local_xbee = xbee.get_device()
```

Once the local XBee of the XBee Hive is retrieved, you can work with it using the XBee Python Library API that is integrated into the gateway firmware:

- Retrieve and discover the XBee nodes in your network.
- Send and receive data to or from other XBee devices in the network.
- Read and set the IO lines of remote nodes.
- And so forth

Note See the [Digi XBee Python Library](#) project online for additional documentation.

Use digidevice.cli to execute CLI commands

Use the **digidevice.cli** Python module to issue CLI commands from Python to retrieve status and statistical information about the device.

For example, to display the system status and statistics by using an interactive Python session, use the **show system** command with the **cli** module:

1. Select a device in Remote Manager that is configured to allow shell access to the admin user, and click **Actions > Open Console**. Alternatively, log into the XBee Hive local command line as a user with shell access.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **shell** to access the device shell.
2. At the shell prompt, use the **python** command with no parameters to enter an interactive Python session:

```
# python
Python 3.10.1 (main, Mar 30 2023, 23:47:13) [GCC 11.2.0] on linux
Type "help", "copyright", "credits" or "license" for more information.
>>>
```

3. Import the **cli** submodule:

```
>>> from digidevice import cli
>>>
```

4. Execute a CLI command using the `cli.execute(command)` function. For example, to print the system status and statistics to stdout using the **show system** command:

```
>>> response = cli.execute("show system")
>>>
>>> print(response)
```

Model : Digi XBee Hive
Serial Number : XBee Hivxxxxxxxxxyyyxx
SKU : XBee Hive
Hostname : XBee Hive
MAC Address : DF:DD:E2:AE:21:18

Hardware Version : 50001947-01 1P
Firmware Version : 25.8
Alt. Firmware Version : 25.8
Alt. Firmware Build Date : Fri, Jan 12, 2024 12:10:00
Bootloader Version : 19.7.23.0-15f936e0ed

Current Time : Thu, Jan 11, 2024 12:10:00 +0000
CPU : 1.4%
Uptime : 6 days, 6 hours, 21 minutes, 57 seconds (541317s)
Temperature : 40C
Location :
Contact :

```
>>>
```

5. Use **Ctrl-D** to exit the Python session. You can also exit the session using `exit()` or `quit()`.

Help for using Python to execute XBee Hive CLI commands

Get help executing a CLI command from Python by accessing help for **cli.execute**:

1. Select a device in Remote Manager that is configured to allow shell access to the admin user, and click **Actions > Open Console**. Alternatively, log into the XBee Hive local command line as a user with shell access.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **shell** to access the device shell.

2. At the shell prompt, use the **python** command with no parameters to enter an interactive Python session:

```
# python
Python 3.10.1 (main, Mar 30 2023, 23:47:13) [GCC 11.2.0] on linux
Type "help", "copyright", "credits" or "license" for more information.
>>>
```

3. Import the **cli** submodule:

```
>>> from digidevice import cli
>>>
```

4. Use the help command with **cli.execute**:

```
>>> help(cli.execute)
Help on function execute in module digidevice.cli:

execute(command, timeout=5)
Execute a CLI command with the timeout specified returning the results.
...
```

5. Use **Ctrl-D** to exit the Python session. You can also exit the session using **exit()** or **quit()**.

Use digidevice.datapoint to upload custom datapoints to Digi Remote Manager

Use the **datapoint** Python module to upload custom datapoints to Digi Remote Manager.

The following characteristics can be defined for a datapoint:

- Stream ID
- Value
- (Optional) Data type
 - integer
 - long
 - float
 - double
 - string
 - binary
- Units (optional)
- Timestamp (optional)
- Location (optional)

- Tuple of latitude, longitude and altitude
- Description (optional)
- Quality (optional)
 - An integer describing the quality of the data point

For example, to use an interactive Python session to upload datapoints related to velocity, temperature, and the state of the emergency door:

1. Select a device in Remote Manager that is configured to allow shell access to the admin user, and click **Actions > Open Console**. Alternatively, log into the XBee Hive local command line as a user with shell access.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **shell** to access the device shell.

2. At the shell prompt, use the **python** command with no parameters to enter an interactive Python session:

```
# python
Python 3.10.1 (main, Mar 30 2023, 23:47:13) [GCC 11.2.0] on linux
Type "help", "copyright", "credits" or "license" for more information.
>>>
```

3. Import the **datapoint** submodule and other necessary modules:

```
>>> from digidevice import datapoint
>>> import time
>>>
```

4. Upload the datapoints to Remote Manager:

```
>>> datapoint.upload("Velocity", 69, units="mph")
>>> datapoint.upload("Temperature", 24, geo_location=(54.409469, -1.718836, 129))
>>> datapoint.upload("Emergency_Door", "closed", timestamp=time.time())
```

5. Use **Ctrl-D** to exit the Python session. You can also exit the session using **exit()** or **quit()**.

You can also upload multiple datapoints:

1. Select a device in Remote Manager that is configured to allow shell access to the admin user, and click **Actions > Open Console**. Alternatively, log into the XBee Hive local command line as a user with shell access.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **shell** to access the device shell.

2. At the shell prompt, use the **python** command with no parameters to enter an interactive Python session:

```
# python
Python 3.10.1 (main, Mar 30 2023, 23:47:13) [GCC 11.2.0] on linux
Type "help", "copyright", "credits" or "license" for more information.
>>>
```

3. Import the **datapoint** submodule and other necessary modules:

```
>>> from digidevice import datapoint
>>> import time
>>>
```

4. Create datapoint objects:

```
>>> p1 = datapoint.DataPoint("Velocity", 69, units="mph")
>>> p2 = datapoint.DataPoint("Temperature", 24, geo_location=(54.409469, -1.718836, 129))
>>> p3 = datapoint.DataPoint("Emergency_Door", "closed", timestamp=time.time())
>>>
```

5. Upload the datapoints to Remote Manager:

```
>>> datapoint.upload_multiple([p1, p2, p3])
>>>
```

6. Use **Ctrl-D** to exit the Python session. You can also exit the session using **exit()** or **quit()**.

Once the datapoints have been uploaded to Remote Manager, they can be viewed via Remote Manager or accessed using Web Services calls. See the [Digi Remote Manager Programmers Guide](#) for more information on web services and datapoints.

Help for using Python to upload custom datapoints to Remote Manager

Get help for uploading datapoints to your Digi Remote Manager account by accessing help for **datapoint.upload** and **datapoint.upload_multiple**:

1. Select a device in Remote Manager that is configured to allow shell access to the admin user, and click **Actions > Open Console**. Alternatively, log into the XBee Hive local command line as a user with shell access.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **shell** to access the device shell.

2. At the shell prompt, use the **python** command with no parameters to enter an interactive Python session:

```
# python
Python 3.10.1 (main, Mar 30 2023, 23:47:13) [GCC 11.2.0] on linux
Type "help", "copyright", "credits" or "license" for more information.
>>>
```

3. Import the **datapoint** submodule and other necessary modules:

```
>>> from digidevice import datapoint
>>>
```

4. Use the help command with **datapoint.upload**:

```
>>> help(datapoint.upload)
Help on function upload in module digidevice.datapoint:

upload(stream_id:str, data, *, description:str=None, timestamp:float=None, units:str=None,
geo_location:Tuple[float, float, float]=None, quality:int=None,
```

```
data_type:digidevice.datapoint.DataType=None, timeout:float=None)
...
```

5. Use the help command with **datapoint.upload_multiple**:

```
>>> help(datapoint.upload_multiple)
Help on function upload_multiple in module digidevice.datapoint:

upload_multiple(datapoints:List[digidevice.datapoint.DataPoint], timeout:float=None)
...
```

6. Use **Ctrl-D** to exit the Python session. You can also exit the session using **exit()** or **quit()**.

Use digidevice.config for device configuration

Use the **config** Python module to access and modify the device configuration.

Read the device configuration

1. Select a device in Remote Manager that is configured to allow shell access to the admin user, and click **Actions > Open Console**. Alternatively, log into the XBee Hive local command line as a user with shell access.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **shell** to access the device shell.
2. At the shell prompt, use the **python** command with no parameters to enter an interactive Python session:

```
# python
Python 3.10.1 (main, Mar 30 2023, 23:47:13) [GCC 11.2.0] on linux
Type "help", "copyright", "credits" or "license" for more information.
>>>
```

3. Import the **config** submodule:

```
>>> from digidevice import config
>>>
```

4. Use **config.load()** and the **get()** method to return the device's configuration:
 - a. Return the entire configuration:

```
>>> from pprint import pprint # use pprint vs. print to make the output easier to read
>>> cfg = config.load()
>>> pprint(cfg.dump().splitlines())
```

This returns the device configuration:

```
...
network.interface.lan1.device=/network/bridge/lan1
network.interface.lan1.enable=true
network.interface.lan1.ipv4.address=192.168.2.1/24
network.interface.lan1.ipv4.connection_monitor.attempts=3
...
```

- b. Print a list of available interfaces:

```
>>> cfg = config.load()
>>> interfaces = cfg.get("network.interface")
>>> print(interfaces.keys())
```

This returns the following:

```
['setupip', 'setuplinklocal', 'lan1', 'loopback', 'wan1', 'wwan1', 'wwan2']
```

- c. Print the IPv4 address of the LAN interface:

```
>>> cfg = config.load()
>>> interfaces = cfg.get("network.interfaces")
>>> print(interfaces.get("lan.ipv4.address"))
```

Which returns:

```
192.168.2.1/24
```

Modify the device configuration

Use the **set()** and **commit()** methods to modify the device configuration:

1. Select a device in Remote Manager that is configured to allow shell access to the admin user, and click **Actions > Open Console**. Alternatively, log into the XBee Hive local command line as a user with shell access.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **shell** to access the device shell.
2. At the shell prompt, use the **python** command with no parameters to enter an interactive Python session:

```
# python
Python 3.10.1 (main, Mar 30 2023, 23:47:13) [GCC 11.2.0] on linux
Type "help", "copyright", "credits" or "license" for more information.
>>>
```

3. Import the **config** submodule:

```
>>> from digidevice import config
>>>
```

4. Use **config.load(writable=True)** to enable write mode for the configuration:

```
>>> cfg = config.load(writable=True)
>>>
```

5. Use the **set()** method to make changes to the configuration:

```
>>> cfg.set("system.name", "New-Name")
>>>
```

6. Use the **commit()** method to save the changes:

```
>>> cfg.commit()
True
>>>
```

7. Use the **get()** method to verify the change:

```
>>> print(cfg.get("system.name"))
New-Name
>>>
```

Help for using Python to read and modify device configuration

Get help for reading and modifying the device configuration by accessing help for **digidevice.config**:

1. Select a device in Remote Manager that is configured to allow shell access to the admin user, and click **Actions > Open Console**. Alternatively, log into the XBee Hive local command line as a user with shell access.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **shell** to access the device shell.
2. At the shell prompt, use the **python** command with no parameters to enter an interactive Python session:

```
# python
Python 3.10.1 (main, Mar 30 2023, 23:47:13) [GCC 11.2.0] on linux
Type "help", "copyright", "credits" or "license" for more information.
>>>
```

3. Import the **config** submodule:

```
>>> from digidevice import config
>>>
```

4. Use the help command with **config**:

```
>>> help(config)
Help on module acl.config in acl:

NAME
acl.config - Python interface to ACL configuration (libconfig).
...
```

5. Use **Ctrl-D** to exit the Python session. You can also exit the session using **exit()** or **quit()**.

Use Python to respond to Digi Remote Manager SCI requests

The **device_request** Python module allows you to interact with Digi Remote Manager by using Remote Manager's Server Command Interface (SCI), a web service that allows users to access information and perform commands that relate to their devices.

Use Remote Manager's SCI interface to create SCI requests that are sent to your XBee Hive device, and use the **device_request** module to send responses to those requests to Remote Manager.

See the [Digi Remote Manager Programmers Guide](#) for more information on SCI.

Task one: Use the `device_request` module on your XBee Hive device to create a response

1. Select a device in Remote Manager that is configured to allow shell access to the admin user, and click **Actions > Open Console**. Alternatively, log into the XBee Hive local command line as a user with shell access.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **shell** to access the device shell.

2. At the shell prompt, use the **python** command with no parameters to enter an interactive Python session:

```
# python
Python 3.10.1 (main, Mar 30 2023, 23:47:13) [GCC 11.2.0] on linux
Type "help", "copyright", "credits" or "license" for more information.
>>>
```

3. Import the **device_request** module:

```
>>> from digidevice import device_request
>>>
```

4. Create a function to handle the request from Remote Manager:

```
>>> def handler(target, request):
    print ("received request %s for target %s" % (request, target))
    return "OK"
>>>
```

5. Register a callback function that will be called when the device receives a SCI request from Remote Manager:

```
>>> device_request.register("myTarget", handler)
>>>
```

Note Leave the interactive Python session active while completing task two, below. Once you have completed task two, exit the interactive session by using **Ctrl-D**. You can also exit the session using **exit()** or **quit()**.

Task two: Create and send an SCI request from Digi Remote Manager

The second step in using the **device_request** module is to create an SCI request that Remote Manager will forward to the device. For example, you can create in SCI request a the Remote Manager API explorer:

1. In Remote Manager, click **Documentation > API Explorer**.
2. Select the device to use as the SCI target:
 - a. Click **SCI Targets**.
 - b. Click **Add Targets**.
 - c. Enter or select the device ID of the device.
 - d. Click **Add**.
 - e. Click **OK**.

3. Click **Examples > SCI > Data Service > Send Request**.

Code similar to the following will be displayed in the HTTP message body text box:

```
<sci_request version="1.0">
  <data_service>
    <targets>
      <device id="00000000-00000000-0000FFFF-A83CF6A3"/>
    </targets>
    <requests>
      <device_request target_name="myTarget">
        my payload string
      </device_request>
    </requests>
  </data_service>
</sci_request>
```

Note The value of the **target_name** parameter in the **device_request** element must correspond to the **target** parameter of the **device_request.register** function in the Python script. In this example, the two are the same.

4. Click **Send**.

Once that the request has been sent to the device, the handler on the device is executed.

- On the device, you will receive the following output:

```
>>> received request
      my payload string
      for target myTarget
>>>
```

- In Remote Manager, you will receive a response similar to the following:

```
<sci_reply version="1.0">
  <data_service>
    <device id="00000000-00000000-0000FFFF-A83CF6A3"/>
    <requests>
      <device_request target_name="myTarget" status="0">OK</device_request>
    </requests>
  </device>
</data_service>
</sci_request>
```

Example: Use **digidevice.cli** with **digidevice.device_request**

In this example, we will use the **digidevice.cli** module in conjunction with the **digidevice.device_request** module to return information about multiple devices to Remote Manager.

1. Create a Python application, called **showsystem.py**, that uses the **digidevice.cli** module to create a response containing information about device and the **device_request** module to respond with this information to a request from Remote Manager:

```
from digidevice import device_request
from digidevice import cli
```

```
import time

def handler(target, request):
    return cli.execute("show system verbose")

def status_cb(error_code, error_description):
    if error_code != 0:
        print("error handling showSystem device request: %s" % error_description)

device_request.register("showSystem", handler, status_callback = status_cb)

# Do not let the process finish so that it handles device requests
while True:
    time.sleep(10)
```

2. Upload the showsystem.py application to the /etc/config/scripts directory on two or more Digi devices. In this example, we will upload it to two devices, and use the same request in Remote Manager to query both devices.

See [Configure scripts to run automatically](#) for information about uploading Python applications to your device. You can also create the script on the device by using the **vi** command when logged in with shell access.

3. For both devices:
 - a. Configure the device to automatically run the showsystem.py application on reboot, and to restart the application if it crashes. This can be done from either the WebUI or the command line:

Web

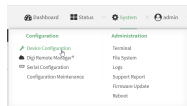
- i. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
- ii. Access the device configuration:

Remote Manager:

- i. Locate your device as described in [Use Digi Remote Manager to view and manage your device](#).
- ii. Click the **Device ID**.
- iii. Click **Settings**.
- iv. Click to expand **Config**.

Local Web UI:

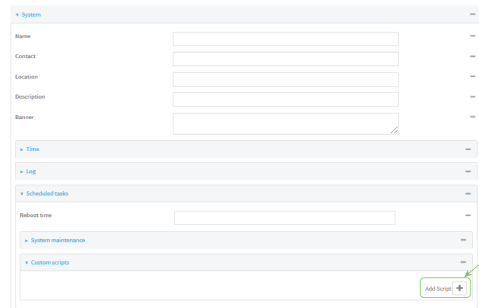
- i. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



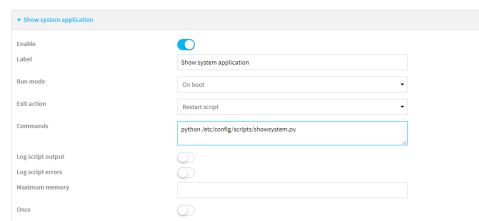
The **Configuration** window is displayed.

- iii. Click **System > Scheduled tasks > Custom scripts**.

- iv. Click  to add a custom script.



- v. For **Label**, type **Show system application**.
vi. For **Run mode**, select **On boot**.
vii. For **Exit action**, select **Restart script**.
viii. For **Commands**, type `python /etc/config/scripts/showsystem.py`.



- ix. Click **Apply** to save the configuration and apply the change.

Command line

- i. Select the device in Remote Manager and click **Actions > Open Console**, or log into the Xbee Hive local command line as a user with full Admin access rights. Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
- ii. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

- iii. Add an application entry:

```
(config)> add system schedule script end
(config system schedule script 0)>
```

Scheduled scripts are enabled by default. To disable:

```
(config system schedule script 0)> enable false
(config system schedule script 0)>
```

- iv. Provide a label for the script:

```
(config system schedule script 0)> label "Show system application"
```

- v. Configure the application to run automatically when the device reboots:

```
(config system schedule script 0)> when boot
(config system schedule script 0)>
```

- vi. Configure the application to restart if it crashes:

```
(config system schedule script 0)> exit_action restart
(config system schedule script 0)>
```

- vii. Set the command that will execute the application:

```
(config system schedule script 0)> commands "python /etc/config/scripts/showsystem.py"
(config system schedule script 0)>
```

- viii. Save the configuration and apply the change:

```
(config)> save
Configuration saved.
>
```

- b. Run the showsystem.py application. You can run the application by either rebooting the device, or by running it from the shell prompt.

- To reboot the device:

- i. From the WebUI:

- i. From the main menu, click **System**.

- ii. Click **Reboot**.

- i. From the command line, at the Admin CLI prompt, type:

```
> reboot
```

- To run the application from the shell prompt:

- i. Select a device in Remote Manager that is configured to allow shell access to the admin user, and click **Actions** > **Open Console**. Alternatively, log into the XBee Hive local command line as a user with shell access.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **shell** to access the device shell.

- ii. Type the following at the shell prompt:

```
# python /etc/config/scripts/showsystem.py &
#
```

- iii. Exit the shell:

```
# exit
```

4. In Remote Manager, click **Documentation > API Explorer**.
5. Select the devices to use as the SCI target:
 - a. Click **SCI Targets**.
 - b. Click **Add Targets**.
 - c. Enter or select the device ID of one of the devices.
 - d. Click **Add**.
 - e. Enter or select the device ID of the second device and click **Add**.
 - f. Click **OK**.
6. Click **Examples > SCI > Data Service > Send Request**.

Code similar to the following will be displayed in the HTTP message body text box:

```
<sci_request version="1.0">
  <data_service>
    <targets>
      <device id="00000000-00000000-0000FFFF-A83CF6A3"/>
      <device id="00000000-00000000-0000FFFF-485740BC"/>
    </targets>
    <requests>
      <device_request target_name="myTarget">
        my payload string
      </device_request>
    </requests>
  </data_service>
</sci_request>
```

7. For the **device_request** element, replace the value of **target_name** with **showSystem**. This matches the **target** parameter of the **device_request.register** function in the **showsystem.py** application.

```
<device_request target_name="showSystem">
```

8. Click **Send**.

You should receive a response similar to the following:

```
<sci_reply version="1.0">
  <data_service>
    <device id="00000000-00000000-0000FFFF-A83CF6A3"/>
    <requests>
      <device_request target_name="showSystem" status="0">Model          : Digi XBee Hive
        Serial Number      : XBee Hive-000068
        Hostname           : XBee Hive
        MAC                : 00:40:D0:13:35:36

        Hardware Version   : 50001959-01 A
        Firmware Version   : 25.8
        Bootloader Version : 1
        Firmware Build Date : Fri, Jan 12, 2024 12:10:00
        Schema Version     : 461

        Timezone           : UTC
        Current Time       : Thu, Jan 11, 2024 12:10:00
```

```

CPU          : 1.1
Uptime       : 1 day, 21 hours, 49 minutes, 47 seconds (164987s)
Temperature  : 39C

Contact      : Jane Smith

Disk
----
Load Average   : 0.10, 0.05, 0.00
RAM Usage      : 85.176MB/250.484MB(34%)
Disk /etc/config Usage : 0.068MB/13.416MB(1%)
Disk /opt Usage : 47.724MB/5309.752MB(1%)
Disk /overlay Usage : MB/MB(%)
Disk /tmp Usage : 0.004MB/40.96MB(0%)
Disk /var Usage : 0.820MB/32.768MB(3%)</device_request>
</requests>
</device>
<device id="00000000-00000000-0000FFFF-485740BC"/>
<requests>
  <device_request target_name="showSystem" status="0">Model          : Digi XBee Hive
    Serial Number      : XBee Hive-000023
    Hostname           : XBee Hive
    MAC                : 00:40:D0:26:79:1C

    Hardware Version   : 50001959-01 A
    Firmware Version   : 25.8
    Bootloader Version : 1
    Firmware Build Date : Fri, Jan 12, 2024 12:10:00
    Schema Version     : 461

    Timezone           : UTC
    Current Time       : Thu, Jan 11, 2024 12:10:00
    CPU                : 1.1
    Uptime             : 4 day, 13 hours, 43 minutes, 22 seconds (395002s)
    Temperature        : 37C

    Contact            : Omar Ahmad
    Disk
    ----
    Load Average     : 0.10, 0.05, 0.00
    RAM Usage          : 85.176MB/250.484MB(34%)
    Disk /etc/config Usage : 0.068MB/13.416MB(1%)
    Disk /opt Usage    : 47.724MB/5309.752MB(1%)
    Disk /overlay Usage : MB/MB(%)
    Disk /tmp Usage    : 0.004MB/40.96MB(0%)
    Disk /var Usage    : 0.820MB/32.768MB(3%)</device_request>
  </requests>
</device>
</data_service>
</sci_request>

```

Help for using Python to respond to Digi Remote Manager SCI requests

Get help for respond to Digi Remote Manager Server Command Interface (SCI) requests by accessing help for **digidevice.device_request**:

1. Select a device in Remote Manager that is configured to allow shell access to the admin user, and click **Actions > Open Console**. Alternatively, log into the XBee Hive local command line as a user with shell access.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **shell** to access the device shell.

2. At the shell prompt, use the **python** command with no parameters to enter an interactive Python session:

```
# python
Python 3.10.1 (main, Mar 30 2023, 23:47:13) [GCC 11.2.0] on linux
Type "help", "copyright", "credits" or "license" for more information.
>>>
```

3. Import the **device_request** submodule:

```
>>> from digidevice import device_request
>>>
```

4. Use the help command with **device_request**:

```
>>> help(device_request)
Help on module digidevice.device_request in digidevice:

NAME
digidevice.device_request - APIs for registering device request handlers
...
```

You can also use the help command with available **device_request** functions:

- Use the help command with **device_request.register**:

```
>>> help(device_request.register)
Help on function register in module digidevice.device_request:

register(target:str, response_callback:Callable[[str, str], str], status_callback:Callable[[int, str],
NoneType]=None, xml_encoding:str='UTF-8')
...
```

- Use the help command with **device_request.unregister**:

```
>>> help(device_request.unregister)
Help on function unregister in module digidevice.device_request:

unregister(target:str) -> bool
...
```

5. Use **Ctrl-D** to exit the Python session. You can also exit the session using **exit()** or **quit()**.

Use digidevice runtime to access the runtime database

Use the **run** submodule to access and modify the device runtime database.

Read from the runtime database

Use the **keys()** and **get()** methods to read the device configuration:

1. Select a device in Remote Manager that is configured to allow shell access to the admin user, and click **Actions > Open Console**. Alternatively, log into the XBee Hive local command line as a user with shell access.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **shell** to access the device shell.

2. At the shell prompt, use the **python** command with no parameters to enter an interactive Python session:

```
# python
Python 3.10.1 (main, Mar 30 2023, 23:47:13) [GCC 11.2.0] on linux
Type "help", "copyright", "credits" or "license" for more information.
>>>
```

3. Import the **runt** submodule:

```
>>> from digidevice import runt
>>>
```

4. Use the **start()** method to open the runtime database:

```
>>> runt.start()
>>>
```

5. Use the **keys()** method to display available keys in the runtime database, and use the **get()** method to print information from the runtime database:

- a. Print available keys:

```
>>> print(runt.keys(""))
```

This returns available keys:

```
['advanced', 'drm', 'firmware', 'location', 'manufacture', 'metrics', 'mm', 'network', 'pam', 'serial', 'system']
```

- b. Print available keys for the system key:

```
>>> print(runt.keys("system"))
```

This will return the following:

```
['boot_count', 'chassis', 'cpu_temp', 'cpu_usage', 'disk', 'load_avg', 'local_time', 'mac', 'mcu', 'model', 'ram', 'serial', 'uptime']
```

- c. Use the **get()** method to print the device's MAC address:

```
>>> print(runt.get("system.mac"))
```

This will return the MAC address of the device.

6. Use the **stop()** method to close the runtime database:
7. Use **Ctrl-D** to exit the Python session. You can also exit the session using **exit()** or **quit()**.

Modify the runtime database

Use the **set()** method to modify the runtime database:

1. Select a device in Remote Manager that is configured to allow shell access to the admin user, and click **Actions > Open Console**. Alternatively, log into the XBee Hive local

command line as a user with shell access.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **shell** to access the device shell.

2. At the shell prompt, use the **python** command with no parameters to enter an interactive Python session:

```
# python
Python 3.10.1 (main, Mar 30 2023, 23:47:13) [GCC 11.2.0] on linux
Type "help", "copyright", "credits" or "license" for more information.
>>>
```

3. Import the **runt** submodule:

```
>>> from digidevice import runt
>>>
```

4. Use **start()** method to open the runtime database:

```
>>> runt.start()
>>>
```

5. Use the **set()** method to make changes to the runtime database:

```
>>> runt.set("my-variable", "my-value")
>>>
```

6. Use the **get()** method to verify the change:

```
>>> print(runt.get("my-variable"))
my-variable
>>>
```

7. Close the runtime database:

```
>>> runt.stop()
>>>
```

8. Use **Ctrl-D** to exit the Python session. You can also exit the session using **exit()** or **quit()**.

Help for using Python to access the runtime database

Get help for reading and modifying the device runtime database by accessing help for **digidevice.runt**:

1. Select a device in Remote Manager that is configured to allow shell access to the admin user, and click **Actions > Open Console**. Alternatively, log into the XBee Hive local command line as a user with shell access.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **shell** to access the device shell.
2. At the shell prompt, use the **python** command with no parameters to enter an interactive Python session:

```
# python
Python 3.10.1 (main, Mar 30 2023, 23:47:13) [GCC 11.2.0] on linux
Type "help", "copyright", "credits" or "license" for more information.
>>>
```

3. Import the **runt** submodule:

```
>>> from digidevice import runt
>>>
```

4. Use the help command with **runt**:

```
>>> help(runt)
```

Help on module acl.runt in digidevice:

NAME

acl.runt - Python interface to ACL runtime database (runt).

...

5. Use **Ctrl-D** to exit the Python session. You can also exit the session using **exit()** or **quit()**.

Use Python to upload the device name to Digi Remote Manager

The **name** submodule can be used to upload a custom name for your device to Digi Remote Manager.

When you use the **name** submodule to upload a custom device name to Remote Manager, the following issues apply:

- If the name is being used by to another device in your Remote Manager account, the name will be removed from the previous device and added to the new device.
- If Remote Manager is configured to apply a profile to a device based on the device name, changing the name of the device may cause Remote Manager to automatically push a profile onto the device.

Together, these two features allow you to swap one device for another by using the **name** submodule to change the device name, while guaranteeing that the new device will have the same configuration as the previous one.

Note Because causing a profile to be automatically pushed from Remote Manager may change the behavior of the device, including overwriting existing usernames and passwords, the **name** submodule should be used with caution. As a result, support for this functionality is disabled by default on Remote Manager.

Enable support on Digi Remote Manager for uploading custom device names

1. In Remote Manager, click **API Explorer**.
2. For the HTTP method, select **PUT**.
3. For **Enter and API or select an example**, type **/ws/v1/settings/inventory/AllowDeviceToSetOwnNameEnabled**.

4. In the HTTP message body text box, type the following:

```
{
  "name" : "AllowDeviceToSetOwnNameEnabled",
  "value" : "true"
}
```

5. Click **Send**.

Upload a custom name

1. Select a device in Remote Manager that is configured to allow shell access to the admin user, and click **Actions > Open Console**. Alternatively, log into the XBee Hive local command line as a user with shell access.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **shell** to access the device shell.

2. At the shell prompt, use the **python** command with no parameters to enter an interactive Python session:

```
# python
Python 3.10.1 (main, Mar 30 2023, 23:47:13) [GCC 11.2.0] on linux
Type "help", "copyright", "credits" or "license" for more information.
>>>
```

3. Import the **name** submodule:

```
>>> from digidevice import name
```

4. Upload the name to Remote Manager:

```
>>> name.upload("my_name")
```

5. Use **Ctrl-D** to exit the Python session. You can also exit the session using **exit()** or **quit()**.

Help for uploading the device name to Digi Remote Manager

Get help for uploading the device name to Digi Remote Manager by accessing help for **digidevice.name**:

1. Select a device in Remote Manager that is configured to allow shell access to the admin user, and click **Actions > Open Console**. Alternatively, log into the XBee Hive local command line as a user with shell access.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **shell** to access the device shell.

2. At the shell prompt, use the **python** command with no parameters to enter an interactive Python session:

```
# python
Python 3.10.1 (main, Mar 30 2023, 23:47:13) [GCC 11.2.0] on linux
Type "help", "copyright", "credits" or "license" for more information.
>>>
```

3. Import the **name** submodule:

```
>>> from digidevice import name
>>>
```

4. Use the help command with **name**:

```
>>> help(name)
```

Help on module digidevice.name in digidevice:

```
NAME
digidevice.name - API for uploading name from the device
...
```

5. Use **Ctrl-D** to exit the Python session. You can also exit the session using **exit()** or **quit()**.

Use Python to set the maintenance window

The **maintenance** Python module allows you to set the service state of a device. When the module sets the device to out of service, this can be used as trigger to begin maintenance activity. See [Schedule system maintenance tasks](#) for more details.

1. Select a device in Remote Manager that is configured to allow shell access to the admin user, and click **Actions > Open Console**. Alternatively, log into the XBee Hive local command line as a user with shell access.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **shell** to access the device shell.
2. At the shell prompt, use the **python** command with no parameters to enter an interactive Python session:

```
# python
Python 3.10.1 (main, Mar 30 2023, 23:47:13) [GCC 11.2.0] on linux
Type "help", "copyright", "credits" or "license" for more information.
>>>
```

3. Import the **maintenance** module:

```
>>> from digidevice import maintenance
>>>
```

4. To determine the current service state of the device:

```
>>> maintenance.state()
'IN_SERVICE'
>>>
```

5. To set the device to out of service:

```
>>> maintenance.out_of_service()
>>> maintenance.state()
'OUT_OF_SERVICE'
>>>
```

6. To set the device to in service:

```
>>> maintenance.in_service()
>>> maintenance.state()
'IN_SERVICE'
>>>
```

Note Leave the interactive Python session active while completing task two, below. Once you have completed task two, exit the interactive session by using **Ctrl-D**. You can also exit the session using **exit()** or **quit()**.

Help for the digidevice maintenance module

Get help for the **digidevice** maintenance module:

1. Select a device in Remote Manager that is configured to allow shell access to the admin user, and click **Actions > Open Console**. Alternatively, log into the XBee Hive local command line as a user with shell access.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **shell** to access the device shell.
2. At the shell prompt, use the **python** command with no parameters to enter an interactive Python session:

```
# python
Python 3.10.1 (main, Mar 30 2023, 23:47:13) [GCC 11.2.0] on linux
Type "help", "copyright", "credits" or "license" for more information.
>>>
```

3. Import the **maintenance** submodule:

```
>>> from digidevice import maintenance
>>>
```

4. Use the help command with **maintenance** :

```
>>> help(maintenance )
Help on module digidevice.maintenance in digidevice:

NAME
    digidevice.maintenance

DESCRIPTION
    API for setting the device's service state. The service state is stored
    in runt.

...
```

5. Use **Ctrl-D** to exit the Python session. You can also exit the session using **exit()** or **quit()**.

The digidevice led submodule

Use the **led** submodule to redefine the purpose of any front-panel LED on the Digi XBee Hive Gateway device. With this submodule, you can:

- Gain control of the LED with the `led.acquire()` function.
- Define the state of the LED with the `led.set()` function.
- Use the `use()` function to create a function that acquires, sets, and releases an LED.
- Optionally release control of the LED with the `led.release()` function.

See [The `use\(led\)` function](#) for instructions on using these methods.

Available LEDs

Power LED

LED	Attribute name	Process time	Color	Meaning
Power	Led.POWER	During boot	Red	Initial power-on state, error during boot, powering off, or after shutdown.
			Blue	Booting in progress.
			Green	Boot has completed.
		After boot	Solid green	Normal operation.
			Solid red	A fatal error occurred.

User LED

The User LED behavior is defined by the user's application.

XBee LED

The XBee LED when managed by the XBee network manager

Color	Meaning
Off	XBee interface is disabled.
Solid red	XBee interface enabled but service not running.
Solid green	XBee interface and service running.
Solid blue	XBee active discovery is ongoing.
Flashing green	Network discovery requested.

Color	Meaning
	
Flashing red/yellow (or orange) 	Updating local XBee.
Flashing yellow 	Updating a remote XBee.
Flashing red 	Local XBee recovery in progress.

The XBee LED is managed directly by the XBee

Refer to the XBee reference manual for additional blinking patterns related to specific protocols.

Wi-Fi LED

With Access Point (AP) enabled

Color	Meaning
Solid amber	AP is active.
Solid blue	AP active, client connected.
Flashing green/amber 	AP active, client searching for a network
Solid red	Radio error.

With AP disabled

Color	Meaning
Off	Wi-Fi is disabled.
Flashing green 	Client searching for a network.
Solid green	Client connected to a network.
Solid red	Radio error.

WWAN LEDs***Network LED***

Color	Meaning
Off	Cellular is disabled.
Red	Network registration denied.
Solid blue	SIM missing.
Flashing blue 	Searching for a network.
Flashing green 	Registered with no internet.
Solid green	Connected to the network.

Ethernet (RJ45 Plug)

Left LED (on top of port connector)

Color	Meaning
Off	No Ethernet link detected.
Flashing amber 	Indicates Ethernet traffic.

Right LED (on top of port connector)

Color	Meaning
Off	No Ethernet link detected.
Solid green	10/100 Mbps link detected.

Available LED states

State	Attribute name
Solid on	State.ON
Off	State.OFF
Slow flash	State.FLASH_SLOW
Fast flash	State.FLASH_FAST

Use Python to set the state of LEDs

The following example uses an interactive Python session to set the state of all LEDs to flashing:

1. At the shell prompt, use the **python** command with no parameters to enter an interactive Python session:

```
# python
Python 3.10.1 (main, Mar 30 2023, 23:47:13) [GCC 11.2.0] on linux
Type "help", "copyright", "credits" or "license" for more information.
>>>
```

2. Import the **led** submodule:

```
>>> from digidevice import led
```

3. Import the **Led** and **State** objects from the **led** submodule:

```
>>> from digidevice.led import Led, State
```

4. Use `led.acquire()` to gain control of the all LEDs:

```
>>> led.acquire(Led.ALL)
```

5. Use `led.set()` to set the state of the LEDs:

```
>>> led.set(Led.ALL, State.FLASH_FAST)
>>> led.set(Led.ALL, State.FLASH_SLOW)
```

6. (Optional) Use `led.release()` to release the LEDs to system control:

```
>>> led.release(Led.ALL)
```

7. Use **Ctrl-D** to exit the Python session. You can also exit the session using `exit()` or `quit()`.

The use(led) function

The `use(led)` function can be used to acquire control of LEDs and then release them back to system control.

To create a function that acquires control of the power LED, sets it to a state of fast flashing, and then releases control when the function has completed, use the following code in a python application:

```
with use(Led.POWER) as pwr:
    pwr(State.FLASH_FAST)
```

Releasing the LEDs to system control

During a Python interactive session, or from within a Python script, you can release control of the LED from Python to system control using the `led.release()` method.

If the Python script or session terminates prior to releasing control to the system, the LEDs will continue to have the state that Python set to them, until the device is rebooted. See [Configure scripts to run automatically](#) for information about configuring the device so that the LED state is controlled by the Python script even after reboot.

If any system processes attempt to take control of the LED while Python is in control of it, the state information from the system process is recorded but the LED state is not updated until Python releases control of the LED. When the LED is returned to system control, the state of the LED will reflect the correct, recorded state information.

Setting the state of multi-colored LEDs.

Use Python to send and receive SMS messages

You can create Python scripts that send and receive SMS message in tandem with the Digi Remote Manager by using the `digidevice.sms` module. To use a script to send or receive SMS messages, you must also enable the ability to schedule SMS scripting.

Enable the ability to schedule SMS scripting



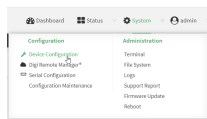
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

Remote Manager:

- a. Locate your device as described in [Use Digi Remote Manager to view and manage your device](#).
- b. Click the **Device ID**.
- c. Click **Settings**.
- d. Click to expand **Config**.

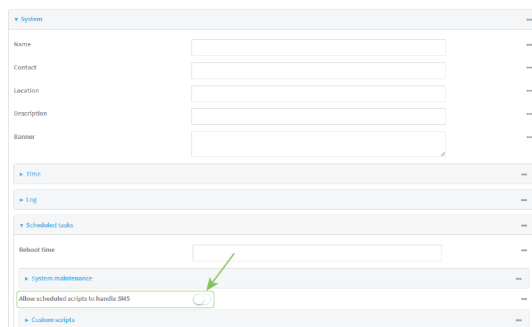
Local Web UI:

- a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



The **Configuration** window is displayed.

3. Click **System** > **Scheduled tasks**.
4. Click to enable **Allow scheduled scripts to handle SMS**.



5. Click **Apply** to save the configuration and apply the change.

Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the XBees local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. At the config prompt, type:

```
(config)> system schedule sms_script_handling true
(config)>
```

4. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

5. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

See [Configure scripts to run automatically](#) for more information about scheduling scripts.

Example digidevice.sms script

The following example script receives an SMS message and sends a response:

```
#!/usr/bin/python3.10.1

import os
import threading
import sys
from digidevice.sms import Callback, send
COND = threading.Condition()

def sms_test_callback(sms, info):
    print(f"SMS message from {info['content.number']} received")
    print(sms)
    print(info)
    COND.acquire()
    COND.notify()
    COND.release()

def send_sms(destination, msg):
    print("sending SMS message", msg)
    if len(destination) == 10:
        destination = "+1" + destination
    send(destination, msg)

if __name__ == '__main__':
    if len(sys.argv) > 1:
        dest = sys.argv[1]
    else:
        dest = '+15005550006'
    my_callback = Callback(sms_test_callback, metadata=True)
    send_sms(dest, 'Hello World!')
    print("Please send an SMS message now.")
    print("Execution halted until a message is received or 60 seconds have passed.")
    # acquire the semaphore and wait until a callback occurs
    COND.acquire()
    try:
        COND.wait(60.0)
    except Exception as err:
```

```

    print("exception occured while waiting")
    print(err)
    COND.release()
    my_callback.unregister_callback()

```

Example script using digidevice.sms to send CLI commands

The following example script listens for an incoming SMS message from a specific phone number (2223334444) and then executes the SMS message as a CLI command. If the CLI command being run has output, it will send that output as a response SMS message. If the CLI command being run has no output but ran successfully, the script will instead send an OK response SMS message. Errors in running the CLI will have those error messages sent as a SMS response.

```

#!/usr/bin/python

# Take an incoming SMS message from a specified phone number and run it as
# a CLI command. Send a reponse SMS to the sender before running the command

import os
import threading
import sys
from digidevice import cli
from digidevice.sms import Callback, send
COND = threading.Condition()
allowed_incoming_phone_number = '2223334444'

def sms_test_callback(sms, info):
    if info['content.number'] == allowed_incoming_phone_number:
        print(f"SMS message from {info['content.number']} received")
        print(sms)
        print(info)
        #if sms == "Reboot":
        # send_sms(dest, 'Reboot message received, rebooting device...')
        # response = cli.execute("reboot")
        # print (response)
        send_sms(dest, 'Message received (' + sms + '). Performing as CLI command...')
        response = cli.execute(sms)
        if not response:
            response = 'OK'
        send_sms(dest, 'CLI results: ' + response)
        print (response)
    COND.acquire()
    COND.notify()
    COND.release()

def send_sms(destination, msg):
    print("sending SMS message", msg)
    if len(destination) == 10:
        destination = "+1" + destination
    send(destination, msg)

if __name__ == '__main__':
    if len(sys.argv) > 1:
        dest = sys.argv[1]
    else:
        dest = allowed_incoming_phone_number
    my_callback = Callback(sms_test_callback, metadata=True)
    #send_sms(dest, 'Ready to receive incoming SMS message')
    print("Waiting up to 60 seconds for incoming SMS message")

```

```
# acquire the semaphore and wait until a callback occurs
COND.acquire()
try:
    COND.wait(60.0)
except Exception as err:
    print("exception occurred while waiting")
    print(err)
COND.release()
my_callback.unregister_callback()
os.system('rm -f /var/run/sms/scripts/*') # remove all stored SMS messages, since we've processed them
print("SMS script finished. Please re-run if you want to check for more incoming SMS messages")
os._exit(0)
```

Use Python to access serial ports

You can use the Python **serial** module to access serial ports on your XBee Hive device that are configured to be in Application mode. For example, you can configure USB ports to function serial ports and interact programmatically with those ports. See [Configure Application mode for a serial port](#) for information about configuring a serial port in Application mode, and see [Add a USB serial port](#) for information about configuring USB ports on the device to function as serial ports.

To use Python to access serial ports:

1. Select a device in Remote Manager that is configured to allow shell access to the admin user, and click **Actions > Open Console**. Alternatively, log into the XBee Hive local command line as a user with shell access.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **shell** to access the device shell.

2. Determine the path to the serial port:

```
# ls /dev/serial/
by-id by-path by-usb port1 USB_port1 USB_port2
#
```

3. At the shell prompt, use the **python** command with no parameters to enter an interactive Python session:

```
# python
Python 3.10.1 (main, Mar 30 2023, 23:47:13) [GCC 11.2.0] on linux
Type "help", "copyright", "credits" or "license" for more information.
>>>
```

4. Import the **serial** module:

```
>>> import serial
>>>
```

5. You can now perform operations on the serial port. For example, to write a message to the serial port:

```
>>> s = serial.Serial("/dev/serial/USB_port1", 115200)
>>> s.write(b"Hello from USB serial port")
26
>>>
```

6. Use **Ctrl-D** to exit the Python session. You can also exit the session using **exit()** or **quit()**.

Use the Paho MQTT python library

Your XBee Hive device includes support for the Paho MQTT python library. MQTT is a lightweight messaging protocol used to communicate with various applications including cloud-based applications such as Amazon Web Services and Microsoft Azure. The following is example code that reads CPU and RAM usage on the device, updates the device firmware, then publishes information about DHCP clients and system information to the MQTT server at 192.168.1.100. The MQTT server IP is configurable.

```

"""
MQTT client example:
- Reporting some device metrics from runt
- Reporting DHCP clients
- Firmware update feature (simple implementation, read TODO in cmd_fwupdate)
"""

import sys
import time
import paho.mqtt.client as mqtt
import json
from acl import runt, config
from http import HTTPStatus
import urllib.request
import tempfile
import os
from digidevice import cli

POLL_TIME = 60

def cmd_reboot(params):
    print("Rebooting unit...")
    try:
        cli.execute("reboot", 10)
    except:
        print("Failed to run 'reboot' command")
        return HTTPStatus.INTERNAL_SERVER_ERROR

return HTTPStatus.OK

def cmd_fwupdate(params):
    try:
        fw_uri = params["uri"]
    except:
        print("Firmware file URI not passed")
        return HTTPStatus.BAD_REQUEST

    print("Request to update firmware with URI: {}".format(fw_uri))

    try:
        fd, fname = tempfile.mkstemp()
        os.close(fd)
    except:
        print("Failed to download FW file from URI {}".format(fw_uri))
        return HTTPStatus.NOT_FOUND

```

```

    try:
        ret = cli.execute("system firmware update file " + fname, 60)
    except:
        print("Failed to run firmware update command")
        return HTTPStatus.INTERNAL_SERVER_ERROR

    if not "Firmware update completed" in ret:
        print("Failed to update firmware")
        return HTTPStatus.INTERNAL_SERVER_ERROR
    finally:
        os.remove(fname)

    print("Firmware update finished")

    return HTTPStatus.OK

CMD_HANDLERS = {
    "reboot": cmd_reboot,
    "fw-update": cmd_fwupdate
}

def send_cmd_reply(client, cmd_path, cid, cmd, status):
    if not status or not cid:
        return

    if cmd_path.startswith(PREFIX_CMD):
        path = cmd_path[len(PREFIX_CMD):]
    else:
        print("Invalid command path ({}), cannot send reply".format(cmd_path))
        return

    reply = {
        "cmd": cmd,
        "status": status
    }

    client.publish(PREFIX_RSP + path + "/" + cid, json.dumps(reply, separators=(',', ':')))

def on_connect(client, userdata, flags, rc):
    print("Connected to MQTT server")
    client.subscribe(PREFIX_CMD + "/system")

def on_message(client, userdata, msg):
    """ Supporting only a single topic for now, no need for filters
    Expects the following message format:
    {
        "cid": "<client-id>",
        "cmd": "<command>",
        "params": {
            <optional_parameters>
        }
    }

    Supported commands:
    - "fw-update"
      params:
        - "uri": "<firmware_file_URL>"
    - "reboot"

```

```

    params:
    """

    try:
        m = json.loads(msg.payload)
        cid = m["cid"]
        cmd = m["cmd"]
        try:
            payload = m["params"]
        except:
            payload = None
    except:
        print("Invalid command format: {}".format(msg.payload))
        if not cid:
            # Return if client-ID not passed
            return None
        send_cmd_reply(client, msg.topic, cid, cmd, HTTPStatus.BAD_REQUEST)

    try:
        status = CMD_HANDLERS[cmd](payload)
    except:
        print("Invalid command: {}".format(cmd))
        status = HTTPStatus.NOT_IMPLEMENTED

    send_cmd_reply(client, msg.topic, cid, cmd, status)

def publish_dhcp_leases():
    leases = []
    try:
        with open('/etc/config/dhcp.leases', 'r') as f:
            for line in f:
                elems = line.split()
                if len(elems) != 5:
                    continue
                leases.append({"mac": elems[1], "ip": elems[2], "host": elems[3]})
    except:
        print("Failed to open DHCP leases file")

def publish_system():
    avg1, avg5, avg15 = runt.get("system.load_avg").split(' ')
    ram_used = runt.get("system.ram.per")
    disk_opt = runt.get("system.disk.opt.per")
    disk_config = runt.get("system.disk.etc.config.per")

    msg = json.dumps({
        "load_avg": {
            "1min": avg1,
            "5min": avg5,
            "15min": avg15
        },
        "disk_usage": {
            "/opt": disk_opt,
            "/etc/config": disk_config,
            "ram": ram_used
        }
    })

```

```

client.publish(PREFIX_EVENT + "/system", json.dumps(msg))

runt.start()
serial = runt.get("system.serial")

PREFIX = "router/" + serial
PREFIX_EVENT = "event/" + PREFIX
PREFIX_CMD = "cmd/" + PREFIX
PREFIX_RSP = "rsp/" + PREFIX

client = mqtt.Client()
client.on_connect = on_connect
client.on_message = on_message

try:
    client.connect("192.168.1.100", 1883, 60)
    client.loop_start()
except:
    print("Failed to connect to MQTT server")
    sys.exit(1)

while True:
    publish_dhcp_leases()
    publish_system()
    time.sleep(POLL_TIME)

```

Set up the XBee Hive to automatically run your applications

This section contains the following topics:

- [Configure scripts to run automatically](#)
- [Show script information](#)
- [Stop a script that is currently running](#)

Configure scripts to run automatically

You can configure a script or a python application to run automatically when the system restarts, at specific intervals, or at a specified time. By default, scripts execute in a "sandbox," which restricts access to the file system and available commands that can be used by the script.

Required configuration items

- Upload or create the script. The script must be uploaded to /etc/config/scripts or a subdirectory.
- Enable the script.
- Select whether the script should run:
 - When the device boots.
 - At a specified time.
 - At a specified interval.
 - During system maintenance.

Additional configuration items

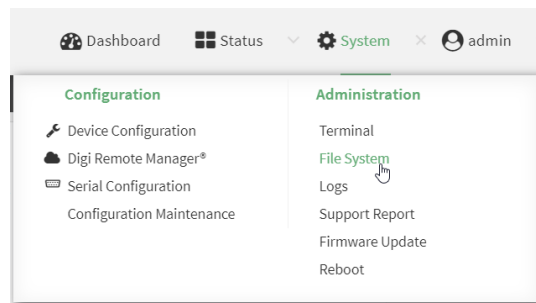
- If the script is a Python application, include the full path to the script.
- A label used to identify the script.
- The action to take if the script finishes. The actions that can be taken are:
 - None.
 - Restart the script.
 - Reboot the device.
- Whether to write the script output and errors to the system log.
- If the script is set to run at a specified interval, whether another instance of the script should be run at the specified interval if the previous instance is still running.
- The memory available to be used by the script .
- Whether the script should run one time only.

Task one: Upload the application



Log into the XBee Hive WebUI as a user with full Admin access rights.

1. On the menu, click **System**. Under **Administration**, click **File System**.



The **File System** page appears.



2. Highlight the **etc** directory and click  to open the directory. Navigate to **/etc/config/scripts**.

Manage files in the local file system of this device.

Name	Size	Last modified
analizer	4.0K	2022-10-14 14:33:57+0000
hotspot	4.0K	2022-10-14 14:33:57+0000
scripts	4.0K	2025-09-10 14:22:13+0000
serial	4.0K	2022-10-14 14:33:48+0000
ubridge	4.0K	2022-10-14 14:33:57+0000

> default device configuration

Upload new default device configuration to /opt/custom-default-config.bin

3. Click  (upload).
4. Browse to the location of the script on your local machine. Select the file and click **Open** to upload the file.

The uploaded file is uploaded to the `/etc/config/scripts` directory.

Command line

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, use the **scp** command to upload the Python application script to the XBee Hive device:

```
> scp host hostname-or-ip user username remote remote-path local local-path to local
```

where:

- *hostname-or-ip* is the hostname or IP address of the remote host.
- *username* is the name of the user on the remote host.
- *remote-path* is the path and filename of the file on the remote host that will be copied to the XBee Hive device.
- *local-path* is the location on the XBee Hive device where the copied file will be placed.

For example:

To upload a script from a remote host with an IP address of 192.168.4.1 to the `/etc/config/scripts` directory on the XBee Hive device, issue the following command:

```
> scp host 192.168.4.1 user admin remote /home/admin/bin/test.py local /etc/config/scripts/ to local
admin@192.168.4.1's password: adminpwd
test.py          100% 36MB 11.1MB/s   00:03
>
```

3. Type **exit** to exit the Admin CLI.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Note You can also create scripts by using the **vi** command when logged in with shell access.

Task two: Configure the application to run automatically

Note This feature does not provide syntax or error checking. Certain commands can render the device inoperable. Use with care.

Web

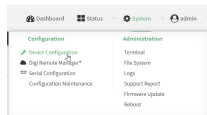
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

Remote Manager:

- a. Locate your device as described in [Use Digi Remote Manager to view and manage your device](#).
- b. Click the **Device ID**.
- c. Click **Settings**.
- d. Click to expand **Config**.

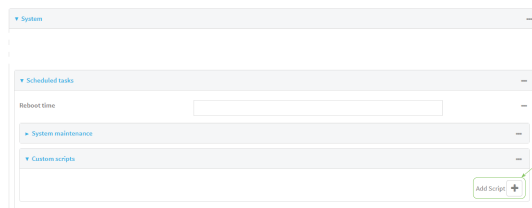
Local Web UI:

- a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

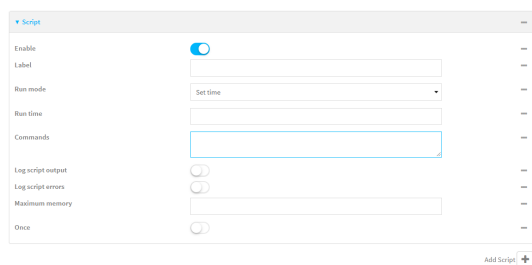


The **Configuration** window is displayed.

3. Click **System > Scheduled tasks > Custom scripts**.
4. For **Add Script**, click 



The script configuration window is displayed.



Custom scripts are enabled by default. To disable, toggle off **Enable** to toggle off.

5. (Optional) For **Label**, provide a label for the script.
6. For **Run mode**, select the mode that will be used to run the script. Available options are:
 - **On boot**: The script will run once each time the device boots.
 - If **On boot** is selected, select the action that will be taken when the script completes in **Exit action**. Available options are:
 - **None**: Action taken when the script exits.
 - **Restart script**: Runs the script repeatedly.
 - **Reboot**: The device will reboot when the script completes.
 - **Interval**: The script will start running at the specified interval, within 30 seconds after the configuration change is saved.
 - If **Interval** is selected, in **Interval**, type the interval.
 Allowed values are any number of weeks, days, hours, minutes, or seconds, and take the format *number{w|d|h|m|s}*.
 For example, to set **Interval** to ten minutes, enter **10m** or **600s**.
 - Click to enable **Run single** to run only a single instance of the script at a time.
 If **Run single** is not enabled, a new instance of the script will be started at every interval, regardless of whether the script is still running from a previous interval.
 - **Set time**: Runs the script at a specified time of the day.
 - If **Set Time** is selected, specify the time that the script should run in **Run time**, using the format *HH:MM*.
 - **During system maintenance**: The script will run during the system maintenance time window.
7. For **Commands**, type the commands that will execute the script.
 - If a Python script is being used, include the full path to the Python script. For example:

```
python /etc/config/scripts/test.py
```

 - If the script begins with **#!**, then the script will be invoked in the location specified by the path for the script command. Otherwise, the default shell will be used (equivalent to **#!/bin/sh**).
8. Script logging options:
 - a. Click to enable **Log script output** to log the script's output to the system log.
 - b. Click to enable **Log script errors** to log script errors to the system log.

If neither option is selected, only the script's exit code is written to the system log.
9. For **Maximum memory**, enter the maximum amount of memory available to be used by the script and its subprocesses, using the format *number{b|bytes|KB|k|MB|MB|M|GB|G|TB|T}*.
10. **Sandbox** is enabled by default, which restricts access to the file system and available commands that can be used by the script. This option protects the script from accidentally destroying the system it is running on.

11. Click to enable **Once** to configure the script to run only once at the specified time.
If **Once** is enabled, rebooting the device will cause the script to not run again. The only way to re-run the script is to:
 - Remove the script from the device and add it again.
 - Make a change to the script.
 - Uncheck **Once**.
12. Click **Apply** to save the configuration and apply the change.

Command line

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Add a script:

```
(config)> add system schedule script end
(config system schedule script 0)>
```

Scheduled scripts are enabled by default. To disable:

```
(config system schedule script 0)> enable false
(config system schedule script 0)>
```

4. (Optional) Provide a label for the script.

```
(config system schedule script 0)> label value
(config system schedule script 0)>
```

where *value* is any string. if spaces are used, enclose *value* within double quotes.

5. Set the mode that will be used to run the script:

```
(config system schedule script 0)> when mode
(config system schedule script 0)>
```

where *mode* is one of the following:

- **boot**: The script will run once each time the device boots.
 - If **boot** is selected, set the action that will be taken when the script completes:

```
(config system schedule script 0)> exit_action action
(config system schedule script 0)>
```

where *action* is one of the following:

- **none**: Action taken when the script exits.
- **restart**: Runs the script repeatedly.
- **reboot**: The device will reboot when the script completes.
- **interval**: The script will start running at the specified interval, within 30 seconds after the configuration change is saved. If **interval** is selected:

- Set the interval:

```
(config system schedule script 0)> on_interval value
(config system schedule script 0)>
```

where *value* is any number of weeks, days, hours, minutes, or seconds, and takes the format **number{w|d|h|m|s}**.

For example, to set **on_interval** to ten minutes, enter either **10m** or **600s**:

```
(config system schedule script 0)> on_interval 600s
(config system schedule script 0)>
```

- (Optional) Configure the script to run only a single instance at a time:

```
(config system schedule script 0)> once true
(config system schedule script 0)>
```

If **once** is set to **false**, a new instance of the script will be started at every interval, regardless of whether the script is still running from a previous interval.

- **set_time**: Runs the script at a specified time of the day.
 - If **set_time** is set, set the time that the script should run, using the format *HH:MM*:

```
(config system schedule script 0)> run_time HH:MM
(config system schedule script 0)>
```

- **maintenance_time**: The script will run during the system maintenance time window.

6. Set the commands that will execute the script:

```
(config system schedule script 0)> commands filename
(config system schedule script 0)>
```

where *filename* is the path and filename of the script, and any related command line information.

- If a Python script is being used, include the full path to the Python script and enclose in quotation marks. For example:

```
(config system schedule script 0)> commands python "/etc/config/scripts/test.py"
(config system schedule script 0)>
```

- If the script begins with **#!/**, then the script will be invoked in the location specified by the path for the script command. Otherwise, the default shell will be used (equivalent to **#!/bin/sh**).

7. Script logging options:

- To log the script's output to the system log:

```
(config system schedule script 0)> syslog_stdout true
(config system schedule script 0)>
```

- To log script errors to the system log:

```
(config system schedule script 0)> syslog_stderr true
(config system schedule script 0)>
```

If **syslog_stdout** and **syslog_stderr** are not enabled, only the script's exit code is written to the system log.

8. Set the maximum amount of memory available to be used by the script and its subprocesses:

```
(config system schedule script 0)> max_memory value
(config system schedule script 0)>
```

where *value* uses the syntax **number{b|bytes|KB|k|MB|MB|M|GB|G|TB|T}**.

9. To run the script only once at the specified time:

```
(config system schedule script 0)> once true
(config system schedule script 0)>
```

If **once** is enabled, rebooting the device will cause the script to run again. The only way to re-run the script is to:

- Remove the script from the device and add it again.
- Make a change to the script.
- Disable **once**.

10. **Sandbox** is enabled by default. This option protects the script from accidentally destroying the system it is running on.

```
(config system schedule script 0)> sandbox true
(config system schedule script 0)>
```

11. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

12. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Show script information

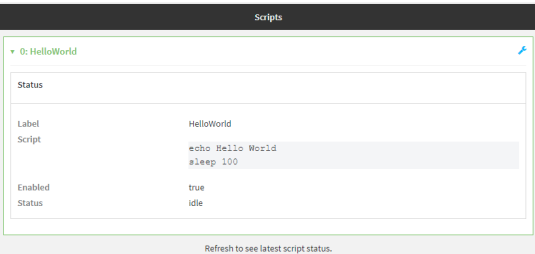
You can view status and statistics about location information from either the WebUI or the command line.

 Web

Log into the XBee Hive WebUI as a user with full Admin access rights.

- 1. At the **Status** page, click **Scripts**.

The **Scripts** page displays:



Command line

- 1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
- 2. Use the **show scripts** command at the system prompt:

```
> show scripts

Index  Label    Enabled  Status  Run time
-----
0      script1  true     active
1      script2  true     idle    01:00
>
```

- 3. Type **exit** to exit the Admin CLI.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Stop a script that is currently running

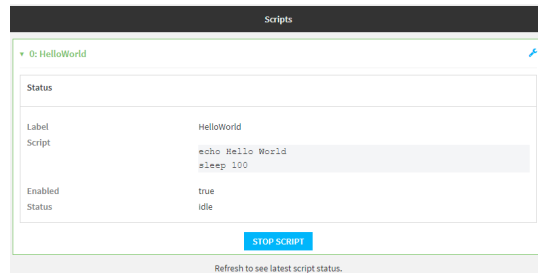
You can stop a script that is currently running.

 Web

Log into the XBee Hive WebUI as a user with full Admin access rights.

- 1. At the **Status** page, click **Scripts**.

The **Scripts** page displays:



- For scripts that are currently running, click **Stop Script** to stop the script.

Command line

- Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
- Determine the name of scripts that are currently running:

```
> show scripts
```

```
Index  Label    Enabled  Status  Run time
-----
0      script1  true    active
1      script2  true    idle    01:00
>
```

Scripts that are currently running have the status of **active**.

- Stop the appropriate script:

```
)> system script stop script1
>
```

- Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

- Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Start an interactive Python session

Use the **python** command without specifying any parameters to start an interactive Python session. The Python session operates interactively using REPL (Read Evaluate Print Loop) to allow you to write Python code on the command line.

Note The Python interactive session is not available from the Admin CLI. You must access the device shell in order to run Python applications from the command line. See [Authentication groups](#) for information about configuring authentication groups that include shell access.

1. Select a device in Remote Manager that is configured to allow shell access to the admin user, and click **Actions > Open Console**. Alternatively, log into the XBee Hive local command line as a user with shell access.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **shell** to access the device shell.

2. At the shell prompt, use the **python** command with no parameters to enter an interactive Python session:

```
# python
Python 3.10.1 (main, Mar 30 2023, 23:47:13) [GCC 11.2.0] on linux
Type "help", "copyright", "credits" or "license" for more information.
>>>
```

3. Type Python commands at the Python prompt. For example, to view help for the digidevice module, type:

```
>>> help("digidevice")
Help on package digidevice:

NAME
    digidevice - Digi device python extensions

DESCRIPTION
    This module includes various extensions that allow Python
    to interact with additional features offered by the device.
...

```

4. Use **Ctrl-D** to exit the Python session. You can also exit the session using **exit()** or **quit()**.

Run a Python application at the shell prompt

Python applications can be run from a file at the shell prompt. The Python application will run until it completes, displaying output and prompting for additional user input if needed. To interrupt the application, enter **CTRL-C**.

Note Python applications cannot be run from the Admin CLI. You must access the device shell in order to run Python applications from the command line. See [Authentication groups](#) for information about configuring authentication groups that include shell access.

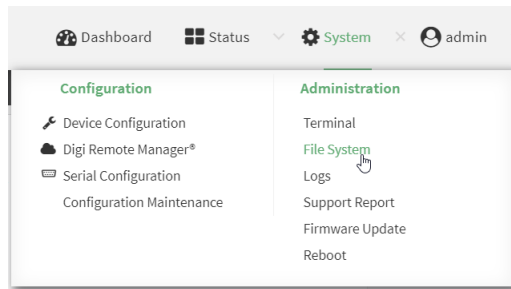
1. Upload the Python application to the XBee Hive device:



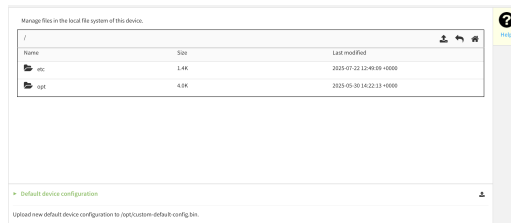
Web

Log into the XBee Hive WebUI as a user with full Admin access rights.

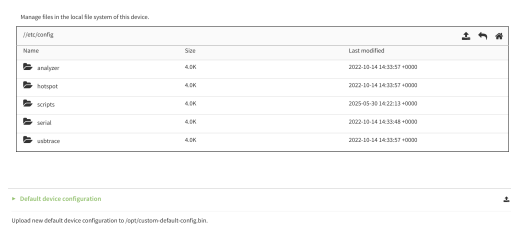
- a. On the menu, click **System**. Under **Administration**, click **File System**.



The **File System** page appears.



- b. Highlight the **etc** directory and click  to open the directory. Navigate to **/etc/config/scripts**.



- c. Click  (upload).
- d. Browse to the location of the script on your local machine. Select the file and click **Open** to upload the file.

The uploaded file is uploaded to the **/etc/config/scripts** directory.

Command line

- a. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

- b. At the command line, use the **scp** command to upload the Python application script to the XBee Hive device:

```
> scp host hostname-or-ip user username remote remote-path local local-path to local
```

where:

- *hostname-or-ip* is the hostname or IP address of the remote host.
- *username* is the name of the user on the remote host.
- *remote-path* is the path and filename of the file on the remote host that will be copied to the XBee Hive device.
- *local-path* is the location on the XBee Hive device where the copied file will be placed.

For example:

To upload a script from a remote host with an IP address of 192.168.4.1 to the /etc/config/scripts directory on the XBee Hive device, issue the following command:

```
> scp host 192.168.4.1 user admin remote /home/admin/bin/test.py local /etc/config/scripts/ to
local
admin@192.168.4.1's password: adminpwd
test.py          100% 36MB 11.1MB/s   00:03
>
```

- c. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Note You can also create scripts by using the **vi** command when logged in with shell access.

2. Select a device in Remote Manager that is configured to allow shell access to the admin user, and click **Actions > Open Console**. Alternatively, log into the XBee Hive local command line as a user with shell access.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **shell** to access the device shell.

3. Use the **python** command to run the Python application. In the following example, the Python application, **test.py**, takes 3 parameters: **120**, **ports** and **storage**:

```
# python /etc/config/scripts/test.py 120 ports storage
```

Configure scripts to run manually

You can configure an scripts to be manually run.

Required configuration items

- Upload or create the script.
- Enable the script.
- Set the script to run manually.

Additional configuration items

- A label used to identify the script.
- The arguments for the script.
- Whether to write the script output and errors to the system log.

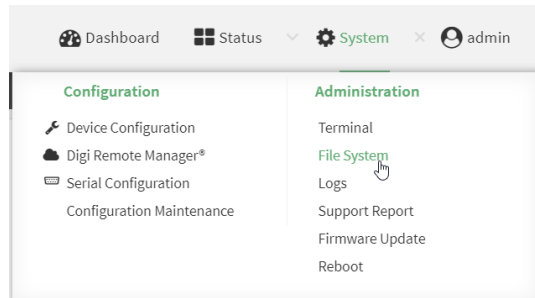
- The memory available to be used by the script.
- Whether the script should run one time only.

Task one: Upload the application

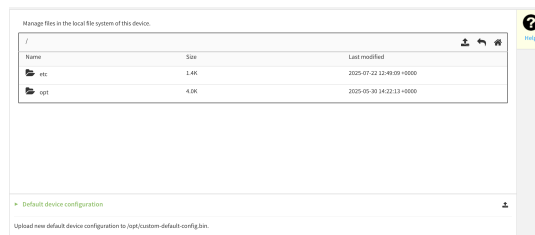
Web

Log into the XBee Hive WebUI as a user with full Admin access rights.

1. On the menu, click **System**. Under **Administration**, click **File System**.



The **File System** page appears.



2. Highlight the **etc** directory and click to open the directory. Navigate to **/etc/config/scripts**.



3. Click (upload).
4. Browse to the location of the script on your local machine. Select the file and click **Open** to upload the file.

The uploaded file is uploaded to the **/etc/config/scripts** directory.

Command line

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, use the **scp** command to upload the Python application script to the XBee Hive device:

```
> scp host hostname-or-ip user username remote remote-path local local-path to local
```

where:

- *hostname-or-ip* is the hostname or IP address of the remote host.
- *username* is the name of the user on the remote host.
- *remote-path* is the path and filename of the file on the remote host that will be copied to the XBee Hive device.
- *local-path* is the location on the XBee Hive device where the copied file will be placed.

For example:

To upload a script from a remote host with an IP address of 192.168.4.1 to the `/etc/config/scripts` directory on the XBee Hive device, issue the following command:

```
> scp host 192.168.4.1 user admin remote /home/admin/bin/test.py local /etc/config/scripts/ to local
admin@192.168.4.1's password: adminpwd
test.py          100% 36MB 11.1MB/s 00:03
>
```

3. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Note You can also create scripts by using the **vi** command when logged in with shell access.

Task two: Configure the application to run automatically

Note This feature does not provide syntax or error checking. Certain commands can render the device inoperable. Use with care.

Web

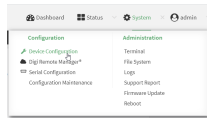
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

Remote Manager:

- a. Locate your device as described in [Use Digi Remote Manager to view and manage your device](#).
- b. Click the **Device ID**.
- c. Click **Settings**.
- d. Click to expand **Config**.

Local Web UI:

- a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

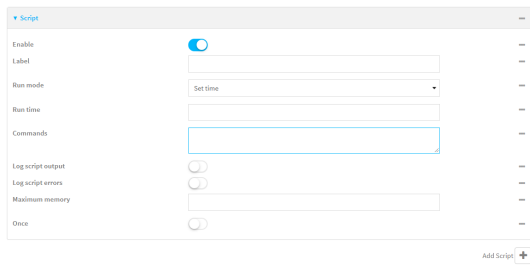


The **Configuration** window is displayed.

3. Click **System > Scheduled tasks > Custom scripts**.
4. For **Add Script**, click .



The script configuration window is displayed.



Custom scripts are enabled by default. To disable, toggle off **Enable** to toggle off.

5. (Optional) For **Label**, provide a label for the script.
6. For **Run mode**, select **Manual**.
7. For **Commands**, type the commands that will execute the script.
 - If a Python script is being used, include the full path to the Python script. For example:


```
python /etc/config/scripts/test.py
```
 - If the script begins with **#!/**, then the script will be invoked in the location specified by the path for the script command. Otherwise, the default shell will be used (equivalent to **#!/bin/sh**).
8. Script logging options:
 - a. Click to enable **Log script output** to log the script's output to the system log.
 - b. Click to enable **Log script errors** to log script errors to the system log.

If neither option is selected, only the script's exit code is written to the system log.
9. For **Maximum memory**, enter the maximum amount of memory available to be used by the script and its subprocesses, using the format *number*{**b**|**bytes**|**KB**|**k**|**MB**|**M**|**GB**|**G**|**TB**|**T**}.

10. **Sandbox** is enabled by default, which restricts access to the file system and available commands that can be used by the script. This option protects the script from accidentally destroying the system it is running on.
11. Click to enable **Once** to configure the script to run only once at the specified time.
If **Once** is enabled, rebooting the device will cause the script to not run again. The only way to re-run the script is to:
 - Remove the script from the device and add it again.
 - Make a change to the script.
 - Uncheck **Once**.
12. Click **Apply** to save the configuration and apply the change.

Command line

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Add a script:

```
(config)> add system schedule script end
(config system schedule script 0)>
```

Scheduled scripts are enabled by default. To disable:

```
(config system schedule script 0)> enable false
(config system schedule script 0)>
```

4. (Optional) Provide a label for the script.

```
(config system schedule script 0)> label value
(config system schedule script 0)>
```

where *value* is any string. if spaces are used, enclose *value* within double quotes.

5. Set the run mode to manual:

```
(config system schedule script 0)> when manual
(config system schedule script 0)>
```

6. Set the commands that will execute the script:

```
(config system schedule script 0)> commands filename
(config system schedule script 0)>
```

where *filename* is the path and filename of the script, and any related command line information.

- If a Python script is being used, include the full path to the Python script and enclose in quotation marks. For example:

```
(config system schedule script 0)> commands python "/etc/config/scripts/test.py"
(config system schedule script 0)>
```

- If the script begins with **#!/**, then the script will be invoked in the location specified by the path for the script command. Otherwise, the default shell will be used (equivalent to **#!/bin/sh**).

7. Script logging options:

- To log the script's output to the system log:

```
(config system schedule script 0)> syslog_stdout true
(config system schedule script 0)>
```

- To log script errors to the system log:

```
(config system schedule script 0)> syslog_stderr true
(config system schedule script 0)>
```

If **syslog_stdout** and **syslog_stderr** are not enabled, only the script's exit code is written to the system log.

8. Set the maximum amount of memory available to be used by the script and its subprocesses:

```
(config system schedule script 0)> max_memory value
(config system schedule script 0)>
```

where *value* uses the syntax **number{b|bytes|KB|k|MB|MB|M|GB|G|TB|T}**.

9. To run the script only once at the specified time:

```
(config system schedule script 0)> once true
(config system schedule script 0)>
```

If **once** is enabled, rebooting the device will cause the script to run again. The only way to re-run the script is to:

- Remove the script from the device and add it again.
- Make a change to the script.
- Disable **once**.

10. **Sandbox** is enabled by default. This option protects the script from accidentally destroying the system it is running on.

```
(config system schedule script 0)> sandbox true
(config system schedule script 0)>
```

11. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

12. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Start a manual script

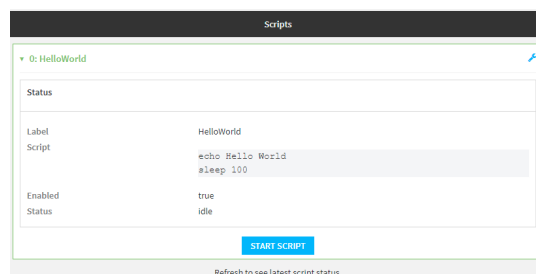
You can start a script that is enabled and configured to have a run mode of **Manual**.

Web

Log into the XBee Hive WebUI as a user with full Admin access rights.

1. At the **Status** page, click **Scripts**.

The **Scripts** page displays:



2. For scripts that are enabled and configured to have a run mode of **Manual**, click **Start Script** to start the script.

Command line

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. Determine the name of scripts that are currently running:

```
> show scripts
```

```

Index  Label    Enabled  Status  Run time
-----
0      script1  true    active
1      script2  true    idle    01:00
>
```

3. Start the script:

```
)> system script start script1
>
```

4. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

5. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Python versions and corresponding DAL OS firmware versions

The table lists the Python versions where changes were made to the programming language and the corresponding DAL OS version to which those changes align.

Python version history	DAL OS version history
Python 3.13	DAL OS 24.12.153.120

To see the Python change log, go to <https://docs.python.org/3/whatsnew/changelog.html#>.

User authentication

This chapter contains the following topics:

XBee Hive user authentication	751
User authentication methods	752
Authentication groups	758
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Remote Authentication Dial-In User Service (RADIUS)	789
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Disable shell access	804
Set the idle timeout for XBee Hive users	806
Example user configuration	808

XBee Hive user authentication

User authentication on the XBee Hive has the following features and default configuration:

Feature	Description	Default configuration
Idle timeout	Determines how long a user session can be idle before the system automatically disconnects. See Set the idle timeout for XBee Hive users .	10 minutes
Allow shell	If disabled, prevents all authentication prohibits access to the shell prompt for all authentication groups. This does not prevent access to the Admin CLI. See Disable shell access. Note If shell access is disabled, re-enabling it will erase the device's configuration and perform a factory reset.	Enabled
Methods	Determines how users are authenticated for access: Local users TACACS+ LDAP RADIUS	local users
Groups	Associates access permissions for a group. You can modify the released groups and create additional groups as needed for your site. A user can be assigned to more than one group. See Authentication groups.	admin: Provides the logged-in user with administrative and shell access. serial: Provides the logged-in user with access to serial ports.
Users	Defines local users for the XBee Hive. See Local users.	admin: Belongs to both the admin and serial groups.
TACACS+	Configures support for TACACS+ (Terminal Access Controller Access-Control System Plus) servers and users. See Terminal Access Controller Access-Control System Plus (TACACS+)	Not configured
RADIUS	Configures support for RADIUS (Remote Authentication Dial-In User Service) servers and users.	Not configured

Feature	Description	Default configuration
	See Remote Authentication Dial-In User Service (RADIUS)	
LDAP	Configures support for LDAP (Lightweight Directory Access Protocol) servers and users. See LDAP .	■ Not configured
Serial	Configures authentication for serial TCP and autoconnect services.	■ Not configured

User authentication methods

Authentication methods determine how users of the XBee Hive device are authenticated. Available authentication methods are:

- **Local users:** User are authenticated on the local device.
- **RADIUS:** Users authenticated by using a remote RADIUS server for authentication.
See [Remote Authentication Dial-In User Service \(RADIUS\)](#) for information about configuring RADIUS authentication.
- **TACACS+:** Users authenticated by using a remote TACACS+ server for authentication.
See [Terminal Access Controller Access-Control System Plus \(TACACS+\)](#) for information about configuring TACACS+ authentication.
- **LDAP:** Users authenticated by using a remote LDAP server for authentication.
See [LDAP](#) for information about configuring LDAP authentication.

Add a new authentication method

Required configuration items

- The types of authentication method to be used:

To add an authentication method:

Web

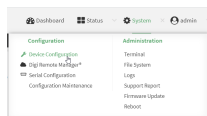
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

Remote Manager:

- a. Locate your device as described in [Use Digi Remote Manager to view and manage your device](#).
- b. Click the **Device ID**.
- c. Click **Settings**.
- d. Click to expand **Config**.

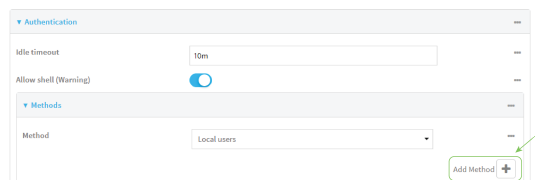
Local Web UI:

- a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

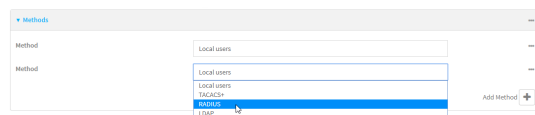


The **Configuration** window is displayed.

3. Click **Authentication > Methods**.
4. For **Add Method**, click .



5. Select the appropriate authentication type for the new method from the **Method** drop-down.



Note Authentication methods are attempted in the order they are listed until the first successful authentication result is returned. See [Rearrange the position of authentication methods](#) for information about how to reorder the authentication methods.

6. Repeat these steps to add additional methods.
7. Click **Apply** to save the configuration and apply the change.

Command line

Authentication methods are attempted in the order they are listed until the first successful authentication result is returned. This procedure describes how to add methods to various places in the list.

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Add the new authentication method to the appropriate location in the list:
 - To determine the current list of authentication methods:
 - a. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
 - b. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

- c. Use the **show auth method** command to display the current authentication methods configuration:

```
(config)> show auth method
0 local
(config)>
```

- To add the new authentication method to the beginning of the list, use the index value of **0** to indicate that it should be added as the first method:

```
(config)> add auth method 0 auth_type
(config)>
```

where *auth_type* is one of **local**, **radius**, **tacacs+**, or **ldap**.

- To add the new authentication method to the end of the list, use the index keyword **end**:

```
(config)> add auth method end auth_type
(config)>
```

where *auth_type* is one of **local**, **radius**, **tacacs+**, or **ldap**.

- To add the new authentication in another location in the list, use an index value to indicate the appropriate position. For example:

```
(config)> add auth method 1 auth_type
(config)>
```

where *auth_type* is one of **local**, **radius**, **tacacs+**, or **ldap**.

- You can also use the **move** command to rearrange existing methods. See [Rearrange the position of authentication methods](#) for information about how to reorder the authentication methods.

4. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

5. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Delete an authentication method

Web

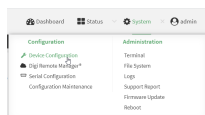
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

Remote Manager:

- a. Locate your device as described in [Use Digi Remote Manager to view and manage your device](#).
- b. Click the **Device ID**.
- c. Click **Settings**.
- d. Click to expand **Config**.

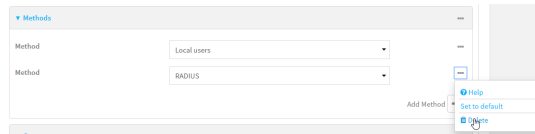
Local Web UI:

- a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



The **Configuration** window is displayed.

3. Click **Authentication > Methods**.
4. Click the menu icon (...) next to the method and select **Delete**.



5. Click **Apply** to save the configuration and apply the change.

Command line

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Use the **show auth method** command to determine the index number of the authentication method to be deleted:

```
(config)> show auth method
0 local
1 radius
2 tacacs+
(config)>
```

4. Delete the appropriate authentication method:

```
(config)> del auth method n
```

Where *n* is index number of the authentication method to be deleted. For example, to delete the TACACS+ authentication method as displayed by the example **show** command, above:

```
(config)> del auth method 2
```

5. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

6. Type **exit** to exit the Admin CLI.

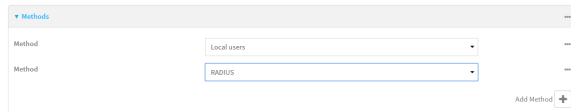
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Rearrange the position of authentication methods

Web

Authentication methods are reordered by changing the method type in the **Method** drop-down for each authentication method to match the appropriate order.

For example, the following configuration has **Local users** as the first method, and **RADIUS** as the second.



To reorder these so that **RADIUS** is first and **Local users** is second:

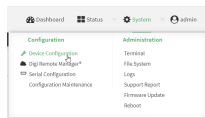
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

Remote Manager:

- a. Locate your device as described in [Use Digi Remote Manager to view and manage your device](#).
- b. Click the **Device ID**.
- c. Click **Settings**.
- d. Click to expand **Config**.

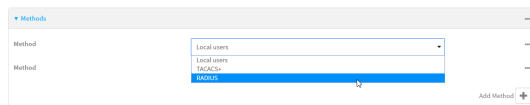
Local Web UI:

- a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

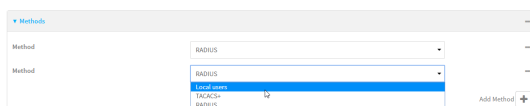


The **Configuration** window is displayed.

3. Click to expand the first **Method**.
4. In the **Method** drop-down, select **RADIUS**.



5. Click to expand the second **Method**.
6. In the **Method** drop-down, select **Local users**.



7. Click **Apply** to save the configuration and apply the change.

Command line

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Use the **show** command to display current configuration:

```
(config)> show auth method
0 local
1 radius
(config)>
```

4. Use the **move** command to rearrange the methods:

```
(config)> move auth method 1 0
(config)>
```

5. Use the **show** command again to verify the change:

```
(config)> show auth method
0 radius
1 local
(config)>
```

6. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

7. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Authentication groups

Authentication groups are used to assign access rights to XBee Hive users. Three types of access rights can be assigned:

- **Admin access:** Users with Admin access can be configured to have either:
 - The ability to manage the XBee Hive device by using the WebUI or the Admin CLI.
 - Read-only access to the WebUI and Admin CLI.
- **Shell access:** Users with Shell access have the ability to access the shell when logging into the XBee Hive via ssh, telnet, or the serial console.
Shell access is not available if the **Allow shell** parameter has been disabled. See [Disable shell access](#) for more information about the **Allow shell** parameter.

Note When Primary Responder mode is enabled, Telnet is not available. For more information about Primary Responder mode, see [Differences between standard firmware operation and Primary Responder mode](#).

- **Serial access:** Users with Serial access have the ability to log into the XBee Hive device by using the serial console.

Preconfigured authentication groups

The XBee Hive device has two preconfigured authentication groups:

- The **admin** group is configured by default to have full **Admin access**.
- The **serial** group is configured by default to have **Serial access**.

The preconfigured authentication groups cannot be deleted, but the access rights defined for the group are configurable.

This section contains the following topics:

Change the access rights for a predefined group	760
Add an authentication group	762
Delete an authentication group	766

Change the access rights for a predefined group

By default, two authentication groups are predefined: **admin** and **serial**. To change the access rights of the predefined groups:

Web

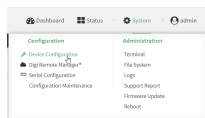
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

Remote Manager:

- a. Locate your device as described in [Use Digi Remote Manager to view and manage your device](#).
- b. Click the **Device ID**.
- c. Click **Settings**.
- d. Click to expand **Config**.

Local Web UI:

- a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



The **Configuration** window is displayed.

3. Click **Authentication > Groups**.
4. Click the authentication group to be changed, either **admin** or **serial**, to expand its configuration node.
5. Click the box next to the following options, as appropriate, to enable or disable access rights for each:

■ Admin access

For groups assigned Admin access, you can also determine whether the **Access level** should be **Full access** or **Read-only access**.

- **Full access** provides users of this group with the ability to manage the Xbee Hive device by using the WebUI or the Admin CLI.
- **Read-only access** provides users of this group with read-only access to the WebUI and Admin CLI.

The default is **Full access**.

■ Serial access

■ Interactive shell access

Shell access is not available if the **Allow shell** parameter has been disabled. See [Disable shell access](#) for more information about the **Allow shell** parameter.

The screenshot shows the 'Authentication' section of the Xbee Hive WebUI. Under the 'Groups' tab, the 'admin' group is expanded. The 'Admin access' toggle is turned on, and the 'Access level' dropdown is set to 'Full access'. Other options like 'Serial access', 'OpenVPN access', 'Captive portal access', 'Interactive shell access', 'Nagios access', 'Bluetooth scanner access', and 'Wi-Fi scanner access' are shown with their respective toggle states.

6. Click **Apply** to save the configuration and apply the change.

Command line

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Enable or disable access rights for the group. For example:

- Admin access:

- To set the access level for Admin access of the **admin** group:

```
(config)> auth group admin acl admin level value
(config)>
```

where *value* is either:

- **full**: provides users of this group with the ability to manage the Xbee Hive device by using the WebUI or the Admin CLI.
- **read-only**: provides users of this group with read-only access to the WebUI and Admin CLI.

The default is **full**.

- To disable Admin access for the **admin** group:

```
(config)> auth group admin acl admin enable false
(config)>
```

- Shell access:

- To enable Shell access for the **serial** group:

```
(config)> auth group serial acl shell enable true
(config)>
```

Shell access is not available if the **Allow shell** parameter has been disabled. See [Disable shell access](#) for more information about the **Allow shell** parameter.

- Serial access:

- To enable Serial access for the **admin** group:

```
(config)> auth group admin acl serial enable true
(config)>
```

4. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

5. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Add an authentication group

Required configuration items

- The access rights to be assigned to users that are assigned to this group.

Additional configuration items

- Access rights to OpenVPN tunnels, and the tunnels to which they have access.
- Access rights to captive portals, and the portals to which they have access.
- Access rights to query the device for Nagios monitoring.

To add an authentication group:



Web

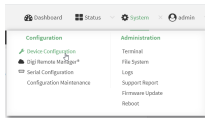
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

Remote Manager:

- a. Locate your device as described in [Use Digi Remote Manager to view and manage your device](#).
- b. Click the **Device ID**.
- c. Click **Settings**.
- d. Click to expand **Config**.

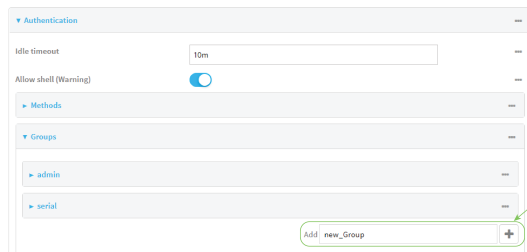
Local Web UI:

- a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

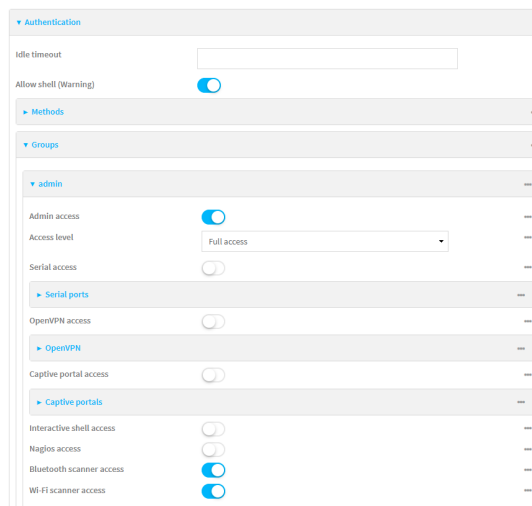


The **Configuration** window is displayed.

3. Click **Authentication > Groups**.
4. For **Add**, type a name for the group and click **+**



The group configuration window is displayed.



5. Click the following options, as appropriate, to enable or disable access rights for each:

- **Admin access**

For groups assigned Admin access, you can also determine whether the **Access level** should be **Full access** or **Read-only access**.

where *value* is either:

- **Full access full**: provides users of this group with the ability to manage the XBee Hive device by using the WebUI or the Admin CLI.
- **Read-only access read-only**: provides users of this group with read-only access to the WebUI and Admin CLI.

The default is **Full access full**.

■ Serial access

6. (Optional) Configure the serial ports to which users of this group have access:
 - a. Click **Serial ports** to expand the **Serial ports** node.
 - b. For **Add Port**, click 
 - c. In the **Port** dropdown, select a port.
 - d. Click  again to add additional serial ports.
7. (Optional) Configure OpenVPN access. See for further information.
8. (Optional) Configure captive portal access:
 - a. Enable captive portal access rights for users of this group by checking the box next to **Captive portal access**.
 - b. Click **Captive portals** to expand the **Captive portal** node.
 - c. For **Add Captive portal**, click 
 - d. In the **Captive portal** dropdown, select a captive portal to which users of this group will have access.
 - e. Click  again to add additional captive portals.
9. **Interactive shell access**
 Shell access is not available if the **Allow shell** parameter has been disabled. See [Disable shell access](#) for more information about the **Allow shell** parameter.
10. (Optional) Enable users that belong to this group to query the device for Nagios monitoring by checking the box next to **Nagios access**.
11. (Optional) Enable users that belong to this group to access the Wi-Fi scanning service by checking the box next to **Wi-Fi scanner access**.
12. Click **Apply** to save the configuration and apply the change.

Command line

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
 Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Use the **add auth group** command to add a new authentication. For example, to add a group named **test**:

```
(config)> add auth group test
(config auth group test)>
```

4. Enable access rights for the group:

■ Admin access:

```
(config auth group test)> acl admin enable true
(config)>
```

■ Set the access level for Admin access:

```
(config)> auth group admin acl admin level value
(config)>
```

where *value* is either:

- **full**: provides users of this group with the ability to manage the XBee Hive device by using the WebUI or the Admin CLI.
- **read-only**: provides users of this group with read-only access to the WebUI and Admin CLI.

The default is **full**.

■ Shell access:

```
(config auth group test)> acl shell enable true
(config)>
```

Shell access is not available if the **Allow shell** parameter has been disabled. See [Disable shell access](#) for more information about the **Allow shell** parameter.

■ Serial access:

```
(config auth group test)> acl serial enable true
(config)>
```

5. (Optional) Configure captive portal access:

a. Return to the config prompt by typing three periods (...):

```
(config auth group test)> ...
(config)>
```

b. Enable captive portal access rights for users of this group:

```
(config)> auth group test acl portal enable true
(config)>
```

c. Add a captive portal to which users of this group will have access:

i. Determine available portals:

```
(config)> show firewall portal
portal1
  auth none
  enable true
  http redirect
  no interface
  no message
```

```

no redirect_url
no terms
timeout 24h
no title
(config)>

```

- ii. Add a captive portal:

```

(config)> add auth group test acl portal portals end portal1
(config)>

```

6. (Optional) Configure Nagios monitoring:

```

(config)> auth group test acl nagios enable true
(config)>

```

7. (Optional) Enable users that belong to this group to access the Wi-Fi scanning service:

```

(config)> auth group group test acl wifi_scanner enable true
(config)>

```

8. Save the configuration and apply the change.

```

(config)> save
Configuration saved.
>

```

9. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Delete an authentication group

By default, the XBee Hive device has two preconfigured authentication groups: **admin** and **serial**. These groups cannot be deleted.

To delete an authentication group that you have created:

Web

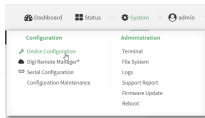
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

Remote Manager:

- a. Locate your device as described in [Use Digi Remote Manager to view and manage your device](#).
- b. Click the **Device ID**.
- c. Click **Settings**.
- d. Click to expand **Config**.

Local Web UI:

- a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



The **Configuration** window is displayed.

3. Click **Authentication > Groups**.
4. Click the menu icon (...) next to the group to be deleted and select **Delete**.



5. Click **Apply** to save the configuration and apply the change.

Command line

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. At the config prompt, type:

```
(config)> del auth group groupname
```

4. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

5. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Local users

Local users are authenticated on the device without using an external authentication mechanism such as TACACS+ or RADIUS. Local user authentication is enabled by default, with one preconfigured default user.

Default user

At manufacturing time, each XBee Hive device comes with a default user configured as follows:

- Username: **admin**.
- Password: The default password is displayed on the label on the bottom of the device.

Note The default password is a unique password for the device, and is the most critical security feature for the device. If you reset the device to factory defaults, you must log in using the default user and password, and you should immediately [change the password](#) to a custom password. Before deploying or mounting the XBee Hive device, record the default password, so you have the information available when you need it even if you cannot physically access the label on the bottom of the device.

The default **admin** user is preconfigured with both Admin and Serial access. You can configure the **admin** user account to fit with the needs of your environment.

This section contains the following topics:

Change a local user's password	769
Configure a local user	771
Delete a local user	779

Change a local user's password

Note When updating the password for the local user, you will be prompted to enter the current password before applying the configuration update.

To change a user's password:

Web

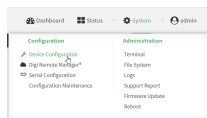
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

Remote Manager:

- a. Locate your device as described in [Use Digi Remote Manager to view and manage your device](#).
- b. Click the **Device ID**.
- c. Click **Settings**.
- d. Click to expand **Config**.

Local Web UI:

- a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



The **Configuration** window is displayed.

3. Click **Authentication > Users**.
4. Click the username to expand the user's configuration node.
5. For **Password**, enter the new password. The password must be at least eight characters long and must contain at least one uppercase letter, one lowercase letter, one number, and one special character.

For the **admin** user, the password field can be left blank:

- If the password field for the **admin** user is left blank, the **admin** user's password will be the default password printed on the device's label.
- If the **admin** user's password has been changed from the default and the configuration saved, if you then clear the password field for the **admin** user, this will result in the device's configuration being erased and reset to the default configuration.

Authentication

Idle timeout

Allow shell (Warning)

Methods

Groups

Users

admin

Enable

Password

Reset

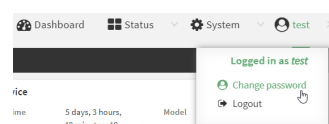
Login failure logout

Enable

Lockout tries

Lockout duration

You can also change the password for the active user by clicking the user name in the menu bar:



The active user must have full Admin access rights to be able to change the password.

6. Click **Apply** to save the configuration and apply the change.

Command line

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. At the config prompt, type:

```
(config)> auth user username password pwd
```

Where:

- *username* is the name of the user.
- *pwd* is the new password for the user. The password must be at least eight characters long and must contain at least one uppercase letter, one lowercase letter, one number, and one special character.

4. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

5. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Configure a local user

Required configuration items

- A username.
- A password. The password must be at least eight characters long and must contain at least one uppercase letter, one lowercase letter, one number, and one special character. For security reasons, passwords are stored in hash form. There is no way to get or display passwords in clear-text form, although prior to saving the configuration, the password can be shown by clicking **Reveal**.
- The authentication group or groups from which the user will inherit access rights. See [Authentication groups](#) for information about configuring groups.

Additional configuration items

- An alias for the user. Because the username cannot contain any special characters, such as hyphens (-) or periods (.), an alias allows the user to log in using a name that contains special characters.
- The number of unsuccessful login attempts before the user is locked out of the system.

- The amount of time that the user is locked out of the system after the specified number of unsuccessful login attempts.
- An optional public ssh key, to authenticate the user when using passwordless SSH login.
- Two-factor authentication information for user login over SSH, telnet, and the serial console:
 - The verification type for two-factor authentication: Either time-based or counter-based.
 - The security key.
 - Whether to allow passcode reuse (time based verification only).
 - The passcode refresh interval (time based verification only).
 - The valid code window size.
 - The login limit.
 - The login limit period.
 - One-time use eight-digit emergency scratch codes.

To configure a local user:

Web

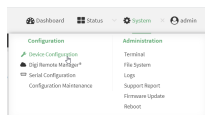
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

Remote Manager:

- a. Locate your device as described in [Use Digi Remote Manager to view and manage your device](#).
- b. Click the **Device ID**.
- c. Click **Settings**.
- d. Click to expand **Config**.

Local Web UI:

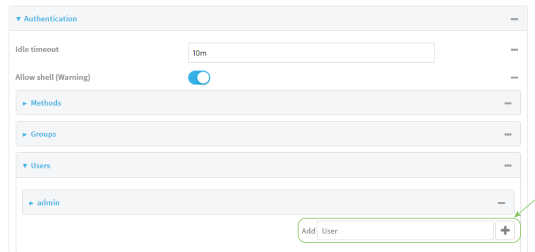
- a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



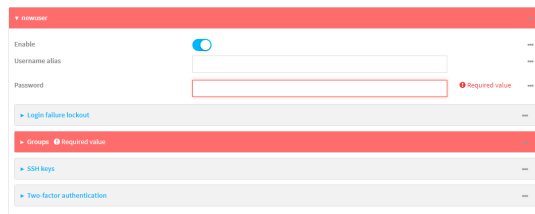
The **Configuration** window is displayed.

3. Click **Authentication > Users**.

4. In **Add User**, type a name for the user and click 



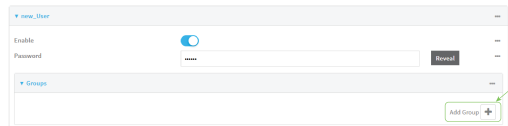
The user configuration window is displayed.



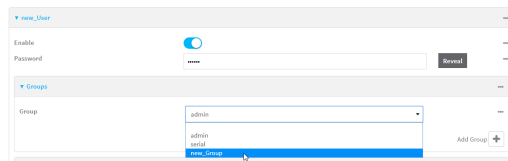
The user is enabled by default. To disable, toggle off **Enable**.

5. (Optional) For **Username alias**, type an alias for the user.
Because the name used to create the user and cannot contain special characters such as hyphens (-) or periods (.), an alias allows the user to log in using a name that contains special characters. For security purposes, if two users have the same alias, the alias will be disabled.
6. Enter a password for the user. The password must be at least eight characters long and must contain at least one uppercase letter, one lowercase letter, one number, and one special character.
7. Click to expand **Login failure logout**.
The login failure logout feature is enabled by default. To disable, toggle off **Enable**.
 - a. For **Lockout tries**, type the number of unsuccessful login attempts before the user is locked out of the device. The default is **5**.
 - b. For **Lockout duration**, type the amount of time that the user is locked out after the number of unsuccessful login attempts defined in **Lockout tries**.
Allowed values are any number of minutes, or seconds, and take the format **number {m|s}**.
For example, to set **Lockout duration** to ten minutes, enter **10m** or **600s**.
The minimum value is 1 second, and the maximum is 15 minutes. The default is 15 minutes.
8. Add groups for the user.
Groups define user access rights. See [Authentication groups](#) for information about configuring groups.

- a. Click to expand **Groups**.
- b. For **Add Group**, click 

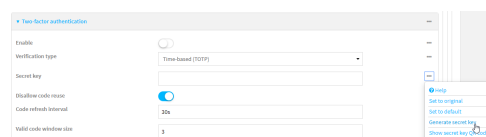


- c. For **Group**, select an appropriate group.



Note Every user must be configured with at least one group. You can add multiple groups to a user by clicking **Add** again and selecting the next group.

9. (Optional) Add SSH keys for the user to use passwordless SSH login:
 - a. Click **SSH keys**.
 - b. In **Add SSH key**, paste or type a public encryption key that this user can use for passwordless SSH login and click 
10. (Optional) Configure two-factor authentication for SSH, telnet, and serial console login:
 - a. Click **Two-factor authentication**.
 - b. Check **Enable** to enable two-factor authentication for this user.
 - c. Select the **Verification type**:
 - **Time-based (TOTP)**: Time-based One-Time Password (TOTP) authentication uses the current time to generate a one-time password.
 - **Counter-based (HOTP)**: HMAC-based One-Time Password (HOTP) uses a counter to validate a one-time password.
 - d. Generate a **Secret key**:
 - i. Click ... next to the field label and select **Generate secret key**.



- ii. Copy the secret key for use with an application or mobile device to generate passcodes.
- e. For time-based verification only, select **Disallow code reuse** to prevent a code from being used more than once during the time that it is valid.
- f. For time-based verification only, in **Code refresh interval**, type the amount of time that a code will remain valid.

Allowed values are any number of weeks, days, hours, minutes, or seconds, and take the format **number{w|d|h|m|s}**. For example, to set **Code refresh interval** to ten minutes, enter **10m** or **600s**.

- g. In **Valid code window size**, type the allowed number of concurrently valid codes. In cases where TOTP is being used, increasing the **Valid code window size** may be necessary when the clocks used by the server and client are not synchronized.
 - h. For **Login limit**, type the number of times that the user is allowed to attempt to log in during the **Login limit period**. Set **Login limit** to **0** to allow an unlimited number of login attempts during the **Login limit period**.
 - i. For **Login limit period**, type the amount of time that the user is allowed to attempt to log in.
Allowed values are any number of weeks, days, hours, minutes, or seconds, and take the format **number{w|d|h|m|s}**. For example, to set **Login limit period** to ten minutes, enter **10m** or **600s**.
 - j. Scratch codes are emergency codes that may be used once, at any time. To add a scratch code:
 - i. Click **Scratch codes**.
 - ii. For **Add Code**, click 
 - iii. For **Code**, enter the scratch code. The code must be eight digits, with a minimum of 10000000.
 - iv. Click  again to add additional scratch codes.
11. Click **Apply** to save the configuration and apply the change.

Command line

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Add a user. For example, to create a user named **new_user**:

```
(config)> add auth user new_user
(config auth user new_user)>
```

The user is enabled by default. To disable the user, type:

```
(config auth user new_user)> enable false
(config auth user new_user)>
```

4. (Optional) Create a username alias for the user.

Because the name to create the user cannot contain special characters such as hyphens (-) or periods (.), an alias allows the user to log in using a name that contains special characters. For security purposes, if two users have the same alias, the alias will be disabled.

```
(config auth user new_user> username username_alias
(config auth user new_user)>
```

5. Set the user's password. The password must be at least eight characters long and must contain at least one uppercase letter, one lowercase letter, one number, and one special character.

```
(config auth user new_user> password pwd
(config auth user new_user)>
```

6. Configure login failure lockout settings:
The login failure lockout feature is enabled by default. To disable:

```
(config auth user new_user> lockout enable false
(config auth user new_user)>
```

- a. Set the number of unsuccessful login attempts before the user is locked out of the device.
where *value* is any integer. The minimum value is **1**, and the default value is **5**.
- b. Set the amount of time that the user is locked out after the number of unsuccessful login attempts defined in **lockout tries**:

```
(config auth user new_user> lockout duration value
(config auth user new_user)>
```

where *value* is any number of minutes, or seconds, and takes the format ***number*{m|s}**.
For example, to set **duration** to ten minutes, enter either **10m** or **600s**:

```
(config auth user new_user> lockout duration 600s
(config auth user new_user)>
```

The minimum value is 1 second, and the maximum is 15 minutes. The default is 15 minutes.

7. Add groups for the user.
Groups define user access rights. See [Authentication groups](#) for information about configuring groups.

- a. Add a group to the user. For example, to add the admin group to the user:

```
(config auth user new_user> add group end admin
(config auth user new_user)>
```

Note Every user must be configured with at least one group.

- b. (Optional) Add additional groups by repeating the add group command:

```
(config auth user new_user> add group end serial
(config auth user new_user)>
```

To remove a group from a user:

- a. Use the **show** command to determine the index number of the group to be deleted:

```
(config auth user new_user> show group
0 admin
1 serial
(config auth user new_user>
```

- b. Type the following:

```
(config auth user new_user> del group n
(config auth user new_user>
```

Where *n* is index number of the authentication method to be deleted. For example, to delete the serial group as displayed by the example **show** command, above:

```
(config auth user new_user> del group 1
(config auth user new_user>
```

8. (Optional) Add SSH keys for the user to use passwordless SSH login:

- a. Change to the user's ssh_key node:

```
(config auth user new_user> ssh_key
(config auth user new_user ssh_key>
```

- b. Add the key by using the ssh_key command and pasting or typing a public encryption key that this user can use for passwordless SSH login:

```
(config auth user new_user ssh_key> ssh_key key
(config auth user new_user ssh_key>
```

9. (Optional) Configure two-factor authentication for SSH, telnet, and serial console login:

- a. Change to the user's two-factor authentication node:

```
(config auth user new_user> 2fa
(config auth user new_user 2fa>
```

- b. Enable two-factor authentication for this user:

```
(config auth user new_user 2fa> enable true
(config auth user new_user 2fa>
```

- c. Configure the verification type. Allowed values are:

- **totp**: Time-based One-Time Password (TOTP) authentication uses the current time to generate a one-time password.
- **hotp**: HMAC-based One-Time Password (HOTP) uses a counter to validate a one-time password.

The default value is **totp**.

```
(config auth user new_user 2fa> type totp
(config auth user new_user 2fa>
```

- d. Add a secret key:

```
(config auth user new_user 2fa)> secret key
(config auth user new_user 2fa)>
```

This key should be used by an application or mobile device to generate passcodes.

- e. For time-based verification only, enable **disallow_reuse** to prevent a code from being used more than once during the time that it is valid.

```
(config auth user new_user 2fa)> disallow_reuse true
(config auth user new_user 2fa)>
```

- f. For time-based verification only, configure the code refresh interval. This is the amount of time that a code will remain valid.

```
(config auth user new_user 2fa)> refresh_interval value
(config auth user new_user 2fa)>
```

where *value* is any number of weeks, days, hours, minutes, or seconds, and takes the format **number{w|d|h|m|s}**.

For example, to set **refresh_interval** to ten minutes, enter either **10m** or **600s**:

```
(config auth user name 2fa)> refresh_interval 600s
(config auth user name 2fa)>
```

The default is **30s**.

- g. Configure the valid code window size. This represents the allowed number of concurrently valid codes. In cases where TOTP is being used, increasing the valid code window size may be necessary when the clocks used by the server and client are not synchronized.

```
(config auth user new_user 2fa)> window_size 3
(config auth user new_user 2fa)>
```

- h. Configure the login limit. This represents the number of times that the user is allowed to attempt to log in during the Login limit period. Set to 0 to allow an unlimited number of login attempts during the Login limit period

```
(config auth user new_user 2fa)> login_limit 3
(config auth user new_user 2fa)>
```

- i. Configure the login limit period. This is the amount of time that the user is allowed to attempt to log in.

```
(config auth user new_user 2fa)> login_limit_period value
(config auth user new_user 2fa)>
```

where *value* is any number of weeks, days, hours, minutes, or seconds, and takes the format **number{w|d|h|m|s}**.

For example, to set **login_limit_period** to ten minutes, enter either **10m** or **600s**:

```
(config auth user name 2fa)> login_limit_period 600s
(config auth user name 2fa)>
```

The default is **30s**.

- j. Scratch codes are emergency codes that may be used once, at any time. To add a scratch code:

- i. Change to the user's scratch code node:

```
(config auth user new_user 2fa)> scratch_code
(config auth user new_user 2fa scratch_code)>
```

- ii. Add a scratch code:

```
(config auth user new_user 2fa scratch_code)> add end code
(config auth user new_user 2fa scratch_code)>
```

Where code is an digit number, with a minimum of 10000000.

- iii. To add additional scratch codes, use the **add end code** command again.

- 10. Save the configuration and apply the change.

```
(config auth user new 2fa scratch_code)> save
Configuration saved.
>
```

- 11. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Delete a local user

To delete a user from your XBee Hive:



Web

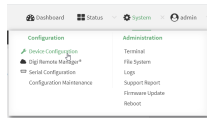
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

Remote Manager:

- a. Locate your device as described in [Use Digi Remote Manager to view and manage your device](#).
- b. Click the **Device ID**.
- c. Click **Settings**.
- d. Click to expand **Config**.

Local Web UI:

- a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



The **Configuration** window is displayed.

3. Click **Authentication > Users**.
4. Click the menu icon (...) next to the name of the user to be deleted and select **Delete**.



5. Click **Apply** to save the configuration and apply the change.

Command line

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. At the config prompt, type:

```
(config)> del auth user username
```

4. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

5. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Terminal Access Controller Access-Control System Plus (TACACS+)

Your XBee Hive device supports Terminal Access Controller Access-Control System Plus (TACACS+), a networking protocol that provides centralized authentication and authorization management for users who connect to the device. With TACACS+ support, the XBee Hive device acts as a TACACS+ client, which sends user credentials and connection parameters to a TACACS+ server over TCP. The TACACS+ server then authenticates the TACACS+ client requests and sends back a response message to the device.

When you are using TACACS+ authentication, you can have both local users and TACACS+ users able to log in to the device. To use TACACS+ authentication, you must set up a TACACS+ server that is accessible by the XBee Hive device prior to configuration. The process of setting up a TACACS+ server varies by the server environment.

This section contains the following topics:

TACACS+ user configuration	783
TACACS+ server failover and fallback to local authentication	784
Configure your XBee Hive device to use a TACACS+ server	784

TACACS+ user configuration

When configured to use TACACS+ support, the XBee Hive device uses a remote TACACS+ server for user authentication (password verification) and authorization (assigning the access level of the user). Additional TACACS+ servers can be configured as backup servers for user authentication.

This section outlines how to configure a TACACS+ server to be used for user authentication on your XBee Hive device.

Example TACACS+ configuration

With TACACS+, users are defined in the server configuration file. On Ubuntu, the default location and filename for the server configuration file is **/etc/tacacs+/tac_plus.conf**.

Note TACACS+ configuration, including filenames and locations, may vary depending on your platform and installation. This example assumes a Ubuntu installation.

To define users:

1. Open the TACACS+ server configuration file in a text editor. For example:

```
$ sudo gedit /etc/tacacs+/tac_plus.conf
```

2. Add users to the file using the following format. This example will create two users, one with admin and serial access, and one with only serial access.

```
user = user1 {  
    name = "User1 for XBee Hive"  
    pap = cleartext password1  
    service = system {  
        groupname = admin,serial  
    }  
}  
user = user2 {  
    name = "User2 for XBee Hive"  
    pap = cleartext password2  
    service = system {  
        groupname = serial  
    }  
}
```

The **groupname** attribute is optional. If used, the value must correspond to authentication groups configured on your XBee Hive. Alternatively, if the user is also configured as a local user on the XBee Hive device and the LDAP server authenticates the user but does not return any groups, the local configuration determines the list of groups. See [Authentication groups](#) for more information about authentication groups. The **groupname** attribute can contain one group or multiple groups in a comma-separated list.

3. Save and close the file.
4. Verify that your changes did not introduce any syntax errors:

```
$ sudo tac_plus -C /etc/tacacs+/tac_plus.conf -P
```

If successful, this command will echo the configuration file to standard out. If the command encounters any syntax errors, a message similar to this will display:

```
Error: Unrecognised token on line 1
```

5. Restart the TACACS+ server:

```
$ sudo /etc/init.d/tacacs_plus restart
```

TACACS+ server failover and fallback to local authentication

In addition to the primary TACACS+ server, you can also configure your XBee Hive device to use backup TACACS+ servers. Backup TACACS+ servers are used for authentication requests when the primary TACACS+ server is unavailable.

Falling back to local authentication

With user authentication methods, you can configure your XBee Hive device to use multiple types of authentication. For example, you can configure both TACACS+ authentication and local authentication, so that local authentication can be used as a fallback mechanism if the primary and backup TACACS+ servers are unavailable. Additionally, users who are configured locally but are not configured on the TACACS+ server are still able to log into the device. Authentication methods are attempted in the order they are listed until the first successful authentication result is returned; therefore if you want to ensure that users are authenticated first through the TACACS+ server, and only authenticated locally if the TACACS+ server is unavailable or if the user is not defined on the TACACS+ server, then you should list the TACACS+ authentication method prior to the Local users authentication method.

See [User authentication methods](#) for more information about authentication methods.

If the TACACS+ servers are unavailable and the XBee Hive device falls back to local authentication, only users defined locally on the device are able to log in. TACACS+ users cannot log in until the TACACS+ servers are brought back online.

Configure your XBee Hive device to use a TACACS+ server

This section describes how to configure a XBee Hive device to use a TACACS+ server for authentication and authorization.

Required configuration items

- Define the TACACS+ server IP address or domain name.
- Define the TACACS+ server shared secret.
- The group attribute configured in the TACACS+ server configuration.
- The service field configured in the TACACS+ server configuration.
- Add TACACS+ as an authentication method for your XBee Hive device.

Additional configuration items

- Whether other user authentication methods should be used in addition to the TACACS+ server, or if the TACACS+ server should be considered the authoritative login method.
- Enable command authorization, so that the device will communicate with the TACACS+ server to determine if the user is authorized to execute a specific command.
- Enable command accounting, so that the device will communicate with the TACACS+ server to log commands that the user executes.

- The TACACS+ server port. It is configured to 49 by default.
- Add additional TACACS+ servers in case the first TACACS+ server is unavailable.

Web

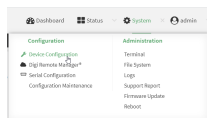
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

Remote Manager:

- a. Locate your device as described in [Use Digi Remote Manager to view and manage your device](#).
- b. Click the **Device ID**.
- c. Click **Settings**.
- d. Click to expand **Config**.

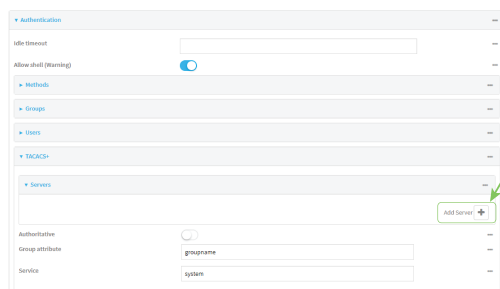
Local Web UI:

- a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



The **Configuration** window is displayed.

3. Click **Authentication > TACACS+ > Servers**.
4. Add TACACS+ servers:
 - a. For **Add server**, click 

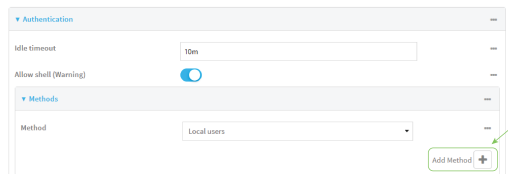


- b. For **Hostname**, type the hostname or IP address of the TACACS+ server.
- c. (Optional) Change the default **Port** setting to the appropriate port. Normally this should be left at the default setting of port 49.
- d. For **Secret**, type the TACACS+ server's shared secret. This is configured in the key parameter of the TACACS+ server's `tac_plus.conf` file, for example:

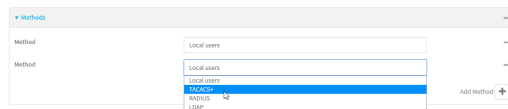
```
key = testing123
```

Note DAL authentication does not support the use of the **#** character in the key (e.g., DAL#123;&). If included, the server will be unable to decipher the request.

- e. (Optional) Click  again to add additional TACACS+ servers.
5. (Optional) Enable **Authoritative** to prevent other authentication methods from being attempted if TACACS+ login fails.
6. (Optional) For **Group attribute**, type the name of the attribute used in the TACACS+ server's configuration to identify the XBee Hive authentication group or groups that the user is a member of. For example, in [TACACS+ user configuration](#), the group attribute in the sample tac_plus.conf file is **groupname**, which is also the default setting in the XBee Hive configuration.
7. (Optional) For **Service**, type the value of the **service** attribute in the the TACACS+ server's configuration. For example, in [TACACS+ user configuration](#), the value of the **service** attribute in the sample tac_plus.conf file is **system**, which is also the default setting in the XBee Hive configuration.
8. (Optional) Enable **Command authorization**, which instructs the device to communicate with the TACACS+ server to determine if the user is authorized to execute a specific command. Only the first configured TACACS+ server will be used for command authorization.
9. (Optional) Enable **Command accounting**, which instructs the device to communicate with the TACACS+ server to log commands that the user executes. Only the first configured TACACS+ server will be used for command accounting.
10. Add TACACS+ to the authentication methods:
 - a. Click **Authentication > Methods**.
 - b. For **Add method**, click .



- c. Select **TACACS+** for the new method from the **Method** drop-down.



Authentication methods are attempted in the order they are listed until an authentication response, either pass or fail, is received. If **Authoritative** is enabled (see above), non-authoritative methods are not attempted. See [Rearrange the position of authentication methods](#) for information about rearranging the position of the methods in the list.

11. Click **Apply** to save the configuration and apply the change.

Command line

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. (Optional) Prevent other authentication methods from being used if TACACS+ authentication fails. Other authentication methods will only be used if the TACACS+ server is unavailable.

```
(config)> auth tacacs+ authoritative true
(config)>
```

4. (Optional) Configure the group_attribute. This is the name of the attribute used in the TACACS+ server's configuration to identify the XBee Hive authentication group or groups that the user is a member of. For example, in [TACACS+ user configuration](#), the group attribute in the sample tac_plus.conf file is **groupname**, which is also the default setting for the group_attribute in the XBee Hive configuration.

```
(config)> auth tacacs+ group_attribute attribute-name
(config)>
```

5. (Optional) Configure the type of service. This is the value of the **service** attribute in the the TACACS+ server's configuration. For example, in [TACACS+ user configuration](#), the value of the **service** attribute in the sample tac_plus.conf file is **system**, which is also the default setting in the XBee Hive configuration.

```
(config)> auth tacacs+ service service-name
(config)>
```

6. (Optional) Enable command authorization, which instructs the device to communicate with the TACACS+ server to determine if the user is authorized to execute a specific command. Only the first configured TACACS+ server will be used for command authorization.

```
(config)> auth tacacs+ command_authorization true
(config)>
```

7. (Optional) Enable command accounting, which instructs the device to communicate with the TACACS+ server to log commands that the user executes. Only the first configured TACACS+ server will be used for command accounting.

```
(config)> auth tacacs+ command_accounting true
(config)>
```

8. Add a TACACS+ server:

- a. Add the server:

```
(config)> add auth tacacs+ server end
(config auth tacacs+ server 0)>
```

- b. Enter the TACACS+ server's IP address or hostname:

```
(config auth tacacs+ server 0)> hostname hostname/ip-address  
(config auth tacacs+ server 0)>
```

- c. (Optional) Change the default port setting to the appropriate port:

```
(config auth tacacs+ server 0)> port port  
(config auth tacacs+ server 0)>
```

- d. (Optional) Repeat the above steps to add additional TACACS+ servers.

9. Add TACACS+ to the authentication methods. Authentication methods are attempted in the order they are listed until the first successful authentication result is returned. This example will add TACACS+ to the end of the list. See [User authentication methods](#) for information about adding methods to the beginning or middle of the list.

```
(config)> add auth method end tacacs+  
(config)>
```

10. Save the configuration and apply the change.

```
(config)> save  
Configuration saved.  
>
```

11. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Remote Authentication Dial-In User Service (RADIUS)

Your XBee Hive device supports Remote Authentication Dial-In User Service (RADIUS), a networking protocol that provides centralized authentication and authorization management for users who connect to the device. With RADIUS support, the XBee Hive device acts as a RADIUS client, which sends user credentials and connection parameters to a RADIUS server over UDP. The RADIUS server then authenticates the RADIUS client requests and sends back a response message to the device.

When you are using RADIUS authentication, you can have both local users and RADIUS users able to log in to the device. To use RADIUS authentication, you must set up a RADIUS server that is accessible by the XBee Hive device prior to configuration. The process of setting up a RADIUS server varies by the server environment. An example of a RADIUS server is FreeRADIUS.

This section contains the following topics:

RADIUS user configuration	790
RADIUS server failover and fallback to local configuration	790
Configure your XBee Hive device to use a RADIUS server	791

RADIUS user configuration

When configured to use RADIUS support, the XBee Hive device uses a remote RADIUS server for user authentication (password verification) and authorization (assigning the access level of the user). Additional RADIUS servers can be configured as backup servers for user authentication.

This section outlines how to configure a RADIUS server to be used for user authentication on your XBee Hive device.

Example FreeRADIUS configuration

With FreeRADIUS, users are defined in the **users** file in your FreeRADIUS installation. To define users:

1. Open the FreeRadius user file in a text editor. For example:

```
$ sudo gedit /etc/freeradius/3.0/users
```

2. Add users to the file using the following format:

```
user1 Cleartext-Password := "user1"
    Unix-FTP-Group-Names := "admin"

user2 Cleartext-Password := "user2"
    Unix-FTP-Group-Names := "serial"
```

The **Unix-FTP-Group-Names** attribute is optional. If used, the value must correspond to authentication groups configured on your XBee Hive. Alternatively, if the user is also configured as a local user on the XBee Hive device and the RADIUS server authenticates the user but does not return any groups, the local configuration determines the list of groups. See [Authentication groups](#) for more information about authentication groups. The **Unix-FTP-Group-Names** attribute can contain one group or multiple groups in a comma-separated list.

3. Save and close the file.
4. Verify that your changes did not introduce any syntax errors:

```
$ sudo freeradius -CX
```

This should return a message that completes similar to:

```
...
Configuration appears to be OK
```

5. Restart the FreeRADIUS server:

```
$ sudo /etc/init.d/freeradius restart
```

RADIUS server failover and fallback to local configuration

In addition to the primary RADIUS server, you can also configure your XBee Hive device to use backup RADIUS servers. Backup RADIUS servers are used for authentication requests when the primary RADIUS server is unavailable.

Falling back to local authentication

With user authentication methods, you can configure your XBee Hive device to use multiple types of authentication. For example, you can configure both RADIUS authentication and local authentication, so that local authentication can be used as a fallback mechanism if the primary and backup RADIUS servers are unavailable. Additionally, users who are configured locally but are not configured on the RADIUS server are still able to log into the device. Authentication methods are attempted in the order they are listed until the first successful authentication result is returned; therefore if you want to ensure that users are authenticated first through the RADIUS server, and only authenticated locally if the RADIUS server is unavailable or if the user is not defined on the RADIUS server, then you should list the RADIUS authentication method prior to the Local users authentication method.

See [User authentication methods](#) for more information about authentication methods.

If the RADIUS servers are unavailable and the XBee Hive device falls back to local authentication, only users defined locally on the device are able to log in. RADIUS users cannot log in until the RADIUS servers are brought back online.

Configure your XBee Hive device to use a RADIUS server

This section describes how to configure a XBee Hive device to use a RADIUS server for authentication and authorization.

Required configuration items

- Define the RADIUS server IP address or domain name.
- Define the RADIUS server shared secret.
- Add RADIUS as an authentication method for your XBee Hive device.

Additional configuration items

- Whether other user authentication methods should be used in addition to the RADIUS server, or if the RADIUS server should be considered the authoritative login method.
- The RADIUS server port. It is configured to 1812 by default.
- Add additional RADIUS servers in case the first RADIUS server is unavailable.
- The server NAS ID. If left blank, the default value is used:
 - If you are access the XBee Hive device by using the WebUI, the default value is for NAS ID is **httpd**.
 - If you are access the XBee Hive device by using ssh, the default value is **sshd**.
- Time in seconds before the request to the server times out. The default is 3 seconds and the maximum possible value is 60 seconds.
- Enable additional debug messages from the RADIUS client.

Web

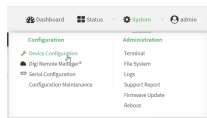
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

Remote Manager:

- a. Locate your device as described in [Use Digi Remote Manager to view and manage your device](#).
- b. Click the **Device ID**.
- c. Click **Settings**.
- d. Click to expand **Config**.

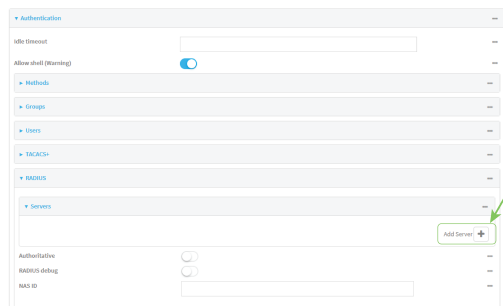
Local Web UI:

- a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



The **Configuration** window is displayed.

3. Click **Authentication > RADIUS > Servers**.
4. Add RADIUS servers:
 - a. For **Add server**, click 

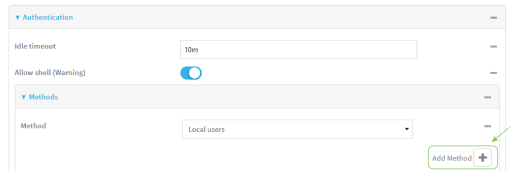


- b. For **Hostname**, type the hostname or IP address of the RADIUS server.
- c. (Optional) Change the default **Port** setting to the appropriate port. Normally this should be left at the default setting of port 1812.
- d. For **Secret**, type the RADIUS server's shared secret. This is configured in the secret parameter of the RADIUS server's client.conf file, for example:

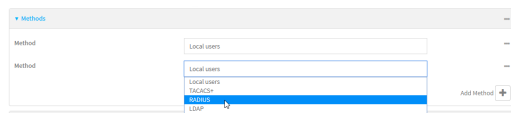
```
secret=testing123
```

- e. For **Timeout**, type or select the amount of time in seconds to wait for the RADIUS server to respond. Allowed value is any integer from **3** to **60**. The default value is **3**.
- f. (Optional) Click  again to add additional RADIUS servers.
5. (Optional) Enable **Authoritative** to prevent other authentication methods from being attempted if RADIUS login fails.
6. (Optional) Click **RADIUS debug** to enable additional debug messages from the RADIUS client.
7. (Optional) For **NAS ID**, type the unique identifier for this network access server (NAS). You can use the fully-qualified domain name of the NAS or any arbitrary string. If not set, the default value is used:

- If you are accessing the XBee Hive device by using the WebUI, the default value is for NAS ID is **httpd**.
 - If you are accessing the XBee Hive device by using ssh, the default value is **sshd**.
8. Add RADIUS to the authentication methods:
 - a. Click **Authentication > Methods**.
 - b. For **Add method**, click 



- c. Select **RADIUS** for the new method from the **Method** drop-down.



Authentication methods are attempted in the order they are listed until an authentication response, either pass or fail, is received. If **Authoritative** is enabled (see above), non-authoritative methods are not attempted. See [Rearrange the position of authentication methods](#) for information about rearranging the position of the methods in the list.

9. Click **Apply** to save the configuration and apply the change.

Command line

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. (Optional) Prevent other authentication methods from being used if RADIUS authentication fails. Other authentication methods will only be used if the RADIUS server is unavailable.

```
(config)> auth radius authoritative true
(config)>
```

4. (Optional) Enable debug messages from the RADIUS client:

```
(config)> auth radius debug true
(config)>
```

5. (Optional) Configure the NAS ID. This is a unique identifier for this network access server (NAS). You can use the fully-qualified domain name of the NAS or any arbitrary string. If not set, the default value is used:

- If you are accessing the XBee Hive device by using the WebUI, the default value is for NAS ID is **httpd**.
- If you are accessing the XBee Hive device by using ssh, the default value is **sshd**.

```
(config)> auth radius nas_id id
(config)>
```

6. Add a RADIUS server:

a. Add the server:

```
(config)> add auth radius server end
(config auth radius server 0)>
```

b. Enter the RADIUS server's IP address or hostname:

```
(config auth radius server 0)> hostname hostname/ip-address
(config auth radius server 0)>
```

c. (Optional) Change the default port setting to the appropriate port:

```
(config auth radius server 0)> port port
(config auth radius server 0)>
```

d. Configure the amount of time in seconds to wait for the RADIUS server to respond. Allowed value is any integer from **3** to **60**. The default value is **3**.

```
(config auth radius server 0)> timeout value
(config auth radius server 0)>
```

e. (Optional) Repeat the above steps to add additional RADIUS servers.

7. Add RADIUS to the authentication methods. Authentication methods are attempted in the order they are listed until the first successful authentication result is returned. This example will add RADIUS to the end of the list. See [User authentication methods](#) for information about adding methods to the beginning or middle of the list.

```
(config)> add auth method end radius
(config)>
```

8. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

9. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

LDAP

Your XBee Hive device supports LDAP (Lightweight Directory Access Protocol), a protocol used for directory information services over an IP network. LDAP can be used with your XBee Hive device for centralized authentication and authorization management for users who connect to the

device. With LDAP support, the XBee Hive device acts as an LDAP client, which sends user credentials and connection parameters to an LDAP server. The LDAP server then authenticates the LDAP client requests and sends back a response message to the device.

When you are using LDAP authentication, you can have both local users and LDAP users able to log in to the device. To use LDAP authentication, you must set up a LDAP server that is accessible by the XBee Hive device prior to configuration. The process of setting up a LDAP server varies by the server environment.

This section contains the following topics:

LDAP user configuration	796
LDAP server failover and fallback to local configuration	797
Configure your XBee Hive device to use an LDAP server	797

LDAP user configuration

When configured to use LDAP support, the XBee Hive device uses a remote LDAP server for user authentication (password verification) and authorization (assigning the access level of the user). Additional LDAP servers can be configured as backup servers for user authentication.

This section outlines how to configure a LDAP server to be used for user authentication on your XBee Hive device.

There are several different implementations of LDAP, including Microsoft Active Directory. This section uses OpenLDAP as an example configuration. Other implementations of LDAP will have different configuration methods.

Example OpenLDAP configuration

With OpenLDAP, users can be configured in a text file using the LDAP Data Interchange Format (LDIF). In this case, we will be using a file called **add_user.ldif**.

1. Create the **add_user.ldif** file in a text editor. For example:

```
$ gedit ./add_user.ldif
```

2. Add users to the file using the following format:

```
dn: uid=john,dc=example,dc=com
objectClass: inetOrgPerson
cn: John Smith
sn: Smith
uid: john
userPassword: password
ou: admin serial
```

- The value of **uid** and **userPassword** must correspond to the username and password used to log into the XBee Hive device.
- The **ou** attribute is optional. If used, the value must correspond to authentication groups configured on your XBee Hive. Alternatively, if the user is also configured as a local user on the XBee Hive device and the LDAP server authenticates the user but does not return any groups, the local configuration determines the list of groups. See [Authentication groups](#) for more information about authentication groups.

Other attributes may be required by the user's objectClass. Any objectClass may be used as long it allows the **uid**, **userPassword**, and **ou** attributes.

3. Save and close the file.
4. Add the user to the OpenLDAP server:

```
$ ldapadd -x -H 'ldap:/// -D 'cn=admin,dc=example,dc=com' -W -f add_user.ldif
adding new entry "uid=john,dc=example,dc=com"
```

5. Verify that the user has been added by performing an LDAP search:

```
$ ldapsearch -x -LLL -H 'ldap:/// -b 'dc=example,dc=com'
uid=john
dn: uid=john,dc=example,dc=com
objectClass: inetOrgPerson
cn: John Smith
```

```
sn: Smith
uid: john
ou: admin serial
```

LDAP server failover and fallback to local configuration

In addition to the primary LDAP server, you can also configure your XBee Hive device to use backup LDAP servers. Backup LDAP servers are used for authentication requests when the primary LDAP server is unavailable.

Falling back to local authentication

With user authentication methods, you can configure your XBee Hive device to use multiple types of authentication. For example, you can configure both LDAP authentication and local authentication, so that local authentication can be used as a fallback mechanism if the primary and backup LDAP servers are unavailable. Additionally, users who are configured locally but are not configured on the LDAP server are still able to log into the device. Authentication methods are attempted in the order they are listed until the first successful authentication result is returned; therefore if you want to ensure that users are authenticated first through the LDAP server, and only authenticated locally if the LDAP server is unavailable or if the user is not defined on the LDAP server, then you should list the LDAP authentication method prior to the Local users authentication method.

See [User authentication methods](#) for more information about authentication methods.

If the LDAP servers are unavailable and the XBee Hive device falls back to local authentication, only users defined locally on the device are able to log in. LDAP users cannot log in until the LDAP servers are brought back online.

Configure your XBee Hive device to use an LDAP server

This section describes how to configure a XBee Hive device to use an LDAP server for authentication and authorization.

Required configuration items

- Define the LDAP server IP address or domain name.
- Add LDAP as an authentication method for your XBee Hive device.

Additional configuration items

- Whether other user authentication methods should be used in addition to the LDAP server, or if the LDAP server should be considered the authoritative login method.
- The LDAP server port. It is configured to 389 by default.
- Whether to use Transport Layer Security (TLS) when communicating with the LDAP server.
- The distinguished name (DN) and password used to communicate with the server.
- The distinguished name used to search to user base.
- The group attribute.
- The number of seconds to wait to receive a message from the server.
- Add additional LDAP servers in case the first LDAP server is unavailable.



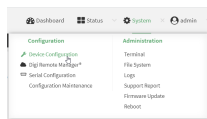
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

Remote Manager:

- a. Locate your device as described in [Use Digi Remote Manager to view and manage your device](#).
- b. Click the **Device ID**.
- c. Click **Settings**.
- d. Click to expand **Config**.

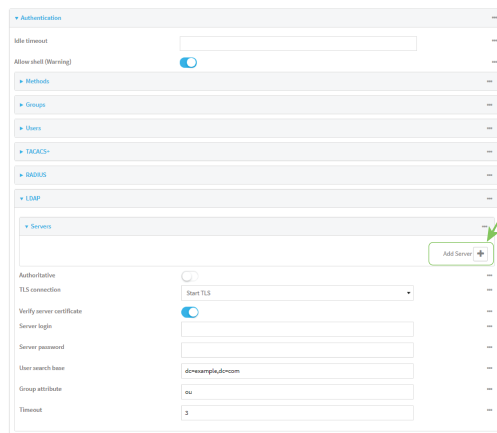
Local Web UI:

- a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



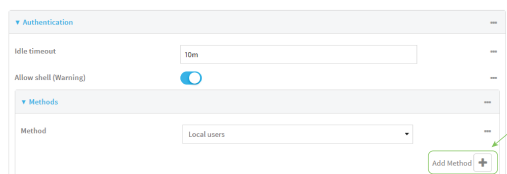
The **Configuration** window is displayed.

3. Click **Authentication > LDAP > Servers**.
4. Add LDAP servers:
 - a. For **Add server**, click 

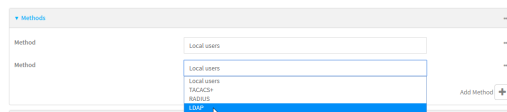


- b. For **Hostname**, type the hostname or IP address of the LDAP server.
 - c. (Optional) Change the default **Port** setting to the appropriate port. Normally this should be left at the default setting of port 389 for non-TLS and 636 for TLS.
 - d. (Optional) Click  again to add additional LDAP servers.
5. (Optional) Enable **Authoritative** to prevent other authentication methods from being attempted if LDAP login fails.
 6. For **TLS connection**, select the type of TLS connection used by the server:
 - **Disable TLS**: Uses a non-secure TCP connection on the LDAP standard port, 389.
 - **Enable TLS**: Uses an SSL/TLS encrypted connection on port 636.

- **Start TLS:** Makes a non-secure TCP connection to the LDAP server on port 389, then sends a request to upgrade the connection to a secure TLS connection. This is the preferred method for LDAP.
- 7. If **Enable TLS** or **Start TLS** are selected for **TLS connection**:
 - Leave **Verify server certificate** at the default setting of enabled to verify the server certificate with a known Certificate Authority.
 - Disable **Verify server certificate** if the server is using a self-signed certificate.
- 8. (Optional) For **Server login**, type a distinguished name (DN) that is used to bind to the LDAP server and search for users, for example **cn=user,dc=example,dc=com**. Leave this field blank if the server allows anonymous connections.
- 9. (Optional) For **Server password**, type the password used to log into the LDAP server. Leave this field blank if the server allows anonymous connections.
- 10. For **User search base**, type the distinguished name (DN) on the server to search for users. This can be the root of the directory tree (for example, **dc=example,dc=com**) or a sub-tree (for example, **ou=People,dc=example,dc=com**).
- 11. For **Login attribute**, enter the user attribute containing the login of the authenticated user. For example, in the [LDAP user configuration](#), the login attribute is **uid**. If this attribute is not set, the user will be denied access.
- 12. (Optional) For **Group attribute**, type the name of the user attribute that contains the list of XBee Hive authentication groups that the authenticated user has access to. See [LDAP user configuration](#) for further information about the group attribute.
- 13. For **Timeout**, type or select the amount of time in seconds to wait for the LDAP server to respond. Allowed value is between **3** and **60** seconds.
- 14. Add LDAP to the authentication methods:
 - a. Click **Authentication > Methods**.
 - b. For **Add method**, click .



- c. Select **LDAP** for the new method from the **Method** drop-down.



Authentication methods are attempted in the order they are listed until an authentication response, either pass or fail, is received. If **Authoritative** is enabled (see above), non-authoritative methods are not attempted. See [Rearrange the position of authentication methods](#) for information about rearranging the position of the methods in the list.

15. Click **Apply** to save the configuration and apply the change.

Command line

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. (Optional) Prevent other authentication methods from being used if LDAP authentication fails. Other authentication methods will only be used if the LDAP server is unavailable.

```
(config)> auth ldap authoritative true
(config)>
```

4. Set the type of TLS connection used by the LDAP server:

```
(config)> auth ldap tls value
(config)>
```

where *value* is one of:

- **off**: Uses a non-secure TCP connection on the LDAP standard port, 389.
- **on**: Uses an SSL/TLS encrypted connection on port 636.
- **start_tls**: Makes a non-secure TCP connection to the LDAP server on port 389, then sends a request to upgrade the connection to a secure TLS connection. This is the preferred method for LDAP.

The default is **off**.

5. If **tls** is set to **on** or **start_tls**, configure whether to verify the server certificate:

```
(config)> auth ldap verify_server_cert value
(config)>
```

where *value* is either:

- **true**: Verifies the server certificate with a known Certificate Authority.
- **false**: Does not verify the certificate. Use this option if the server is using a self-signed certificate.

The default is **true**.

6. Set the distinguished name (DN) that is used to bind to the LDAP server and search for users. Leave this option unset if the server allows anonymous connections.

```
(config)> auth ldap bind_dn dn_value
(config)>
```

For example:

```
(config)> auth ldap bind_dn cn=user,dc=example,dc=com
(config)>
```

7. Set the password used to log into the LDAP server. Leave this option unset if the server allows anonymous connections.

```
(config)> auth ldap bind_password password
(config)>
```

8. Set the distinguished name (DN) on the server to search for users. This can be the root of the directory tree (for example, **dc=example,dc=com**) or a sub-tree (for example, **ou=People,dc=example,dc=com**).

```
(config)> auth ldap base_dn value
(config)>
```

9. Set the login attribute:

```
(config)> auth ldap login_attribute value
(config)>
```

where *value* is the user attribute containing the login of the authenticated user. For example, in the [LDAP user configuration](#), the login attribute is **uid**. . If this attribute is not set, the user will be denied access.

10. (Optional) Set the name of the user attribute that contains the list of XBee Hive authentication groups that the authenticated user has access to. See [LDAP user configuration](#) for further information about the group attribute.

```
(config)> auth ldap group_attribute value
(config)>
```

For example:

```
(config)> auth ldap group_attribute ou
(config)>
```

11. Configure the amount of time in seconds to wait for the LDAP server to respond.

```
(config)> auth ldap timeout value
(config)>
```

where *value* is any integer from **3** to **60**. The default value is **3**.

12. Add an LDAP server:

- a. Add the server:

```
(config)> add auth ldap server end
(config auth ldap server 0)>
```

- b. Enter the LDAP server's IP address or hostname:

```
(config auth ldap server 0)> hostname hostname/ip-address
(config auth ldap server 0)>
```

- c. (Optional) Change the default port setting to the appropriate port:

```
(config auth ldap server 0)> port port
(config auth ldap server 0)>
```

- d. (Optional) Repeat the above steps to add additional LDAP servers.

13. Add LDAP to the authentication methods. Authentication methods are attempted in the order they are listed until the first successful authentication result is returned. This example will add LDAP to the end of the list. See [User authentication methods](#) for information about adding methods to the beginning or middle of the list.

```
(config)> add auth method end ldap
(config)>
```

14. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

15. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Configure serial authentication

This section describes how to configure authentication for serial access.



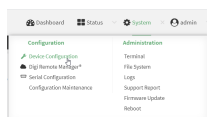
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

Remote Manager:

- a. Locate your device as described in [Use Digi Remote Manager to view and manage your device](#).
- b. Click the **Device ID**.
- c. Click **Settings**.
- d. Click to expand **Config**.

Local Web UI:

- a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



The **Configuration** window is displayed.

3. Click **Authentication > Serial**.

4. (Optional) For **TLS identity certificate**, paste a TLS certificate and private key in PEM format. If empty, the certificate for the web administration service is used. See [Configure the web administration service](#) for more information.
5. For **Peer authentication**, select the method used to verify the certificate of a remote peer.
6. **Include standard CAs** is enabled by default. This allows peers with certificates that have been signed by standard Certificate Authorities (CAs) to authenticate.
7. Click to expand **Custom certificate authorities** to add the public certificates of custom CAs.
 - a. For **Add CA certificate**, type the name of a custom CA and click .
 - b. Paste the public certificate for the custom CA in PEM format.
 - c. Repeat for additional custom CA certificates.
8. Click to expand **Peer certificates** to add the public certificates of trusted peers.
 - a. For **Add Peer certificate**, type the name of a trusted peer and click .
 - b. Paste the public certificate for the trusted peer in PEM format.
 - c. Repeat for additional trusted peer certificates.
9. Enable **TelNet Login**, which requires a user to login via the TelNet connection before accessing a port.
10. Click **Apply** to save the configuration and apply the change.

Command line

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. (Optional) Paste a TLS certificate and private key in PEM format:

```
(config)> auth serial identity "cert-and-private-key"
(config)>
```

4. Set the method used to verify the certificate of a remote peer:

```
(config)> auth serial verify value
(config)>
```

where *value* is either:

- **ca**: Uses certificate authorities (CAs) to verify.
- **peer**: Uses the remote peer's public certificate to verify.

5. By default, peers with certificates that have been signed by standard Certificate Authorities (CAs) are allowed to authenticate. To disable:

```
(config)> auth serial ca_standard false
(config)>
```

6. Add the public certificate for a custom certificate authority:

```
(config)> add auth serial ca_certs CA-cert-name "cert-and-private-key"
(config)>
```

where:

- *CA-cert-name* is the name of the certificate for the custom certificate authority.
- *cert-and-private-key* is the certificate and private key for the custom certificate authority.

Repeat for additional custom certificate authorities.

7. Require a user to login via the TelNet connection before accessing a port.

```
(config)> auth serial telnet_login?
(config)>
```

1. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

2. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Disable shell access

To prohibit access to the shell prompt for all authentication groups, disable the **Allow shell** parameter.. This does not prevent access to the Admin CLI.

Note If shell access is disabled, re-enabling it will erase the device's configuration and perform a factory reset.

Web

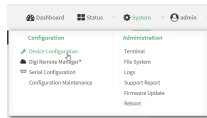
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

Remote Manager:

- a. Locate your device as described in [Use Digi Remote Manager to view and manage your device](#).
- b. Click the **Device ID**.
- c. Click **Settings**.
- d. Click to expand **Config**.

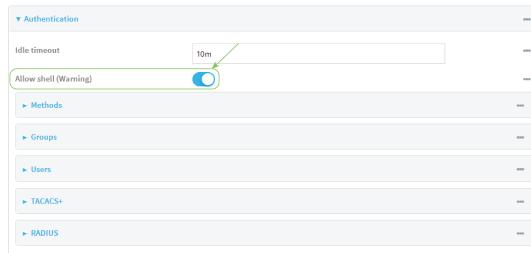
Local Web UI:

- a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



The **Configuration** window is displayed.

3. Click **Authentication**.
4. Click to disable **Allow shell**.



Note If shell access is disabled, re-enabling it will erase the device's configuration and perform a factory reset.

5. Click **Apply** to save the configuration and apply the change.

Command line

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Set the **allow_shell** parameter to **false**:

```
(config)> auth allow_shell false
```

Note If shell access is disabled, re-enabling it will erase the device's configuration and perform a factory reset.

4. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

5. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Set the idle timeout for XBee Hive users

To configure the amount of time that the user's active session can be inactive before it is automatically disconnected, set the **Idle timeout** parameter.

By default, the Idle timeout is set to 10 minutes.

Web

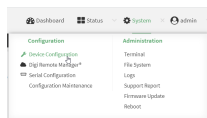
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

Remote Manager:

- a. Locate your device as described in [Use Digi Remote Manager to view and manage your device](#).
- b. Click the **Device ID**.
- c. Click **Settings**.
- d. Click to expand **Config**.

Local Web UI:

- a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

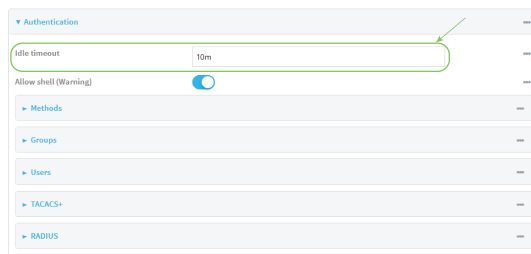


The **Configuration** window is displayed.

3. Click **Authentication**.
4. For **Idle timeout**, enter the amount of time that the active session can be idle before the user is automatically logged out.

Allowed values are any number of weeks, days, hours, minutes, or seconds, and take the format **number{w|d|h|m|s}**.

For example, to set **Idle timeout** to ten minutes, enter **10m** or **600s**.



5. Click **Apply** to save the configuration and apply the change.

Command line

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. At the config prompt, type:

```
(config)> auth idle_timeout value
```

where *value* is any number of weeks, days, hours, minutes, or seconds, and takes the format ***number{w|d|h|m|s}***.

For example, to set **idle_timeout** to ten minutes, enter either **10m** or **600s**:

```
(config)> auth idle_timeout 600s
(config)>
```

4. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

5. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Example user configuration

Example 1: Administrator user with local authentication

Goal: To create a user with administrator rights who is authenticated locally on the device.



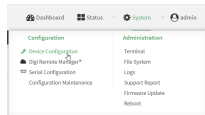
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

Remote Manager:

- a. Locate your device as described in [Use Digi Remote Manager to view and manage your device](#).
- b. Click the **Device ID**.
- c. Click **Settings**.
- d. Click to expand **Config**.

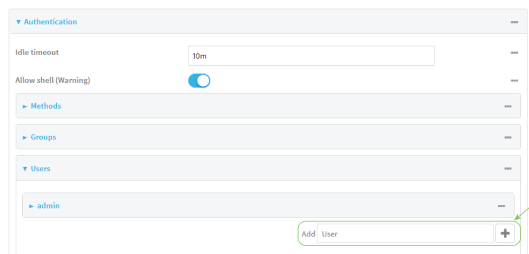
Local Web UI:

- a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



The **Configuration** window is displayed.

3. Click **Authentication > Users**.
4. In **Add User**: enter a name for the user and click



The user configuration window is displayed.

5. Enter a **Password** for the user.
6. Assign the user to the **admin** group:
 - a. Click **Groups**.
 - b. For **Add Group**, click .
 - c. For **Group**, select the **admin** group.
 - d. Verify that the **admin** group has full administrator rights:
 - i. Click **Authentication > Groups**.
 - ii. Click **admin**.
 - iii. Verify that the admin group has **Admin access** enabled. If not, click **Admin access** to enable.
 - iv. Verify that **Access level** is set to **Full access**. If not, select **Full access**.
 - e. Verify that **Local users** is one of the configured authentication methods:
 - i. Click **Authentication > Methods**.
 - ii. Verify that **Local users** is one of the methods listed in the list. If not:
 - i. For **Add Method**, click .
 - ii. For **Method**, select **Local users**.
7. Click **Apply** to save the configuration and apply the change.

Command line

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Verify that the **admin** group has full administrator rights:

```
(config)> show auth group admin acl
admin
  enable true
  level full
...
(config)>
```

If **admin > enable** is set to false:

```
(config)> auth group admin acl admin enable true
(config)>
```

If **admin > level** is set to read-only:

```
(config)> auth group admin acl admin level full
(config)>
```

4. Verify that **local** is one of the configured authentication methods:

```
(config)> show auth method
0 local
(config)>
```

If **local** is not listed:

```
(config)> add auth method end local
(config)>
```

5. Create the user. In this example, the user is being created with the username **adminuser**:

```
(config)> add auth user adminuser
(config auth user adminuser)>
```

6. Assign a password to the user:

```
(config auth user adminuser)> password pwd
(config auth user adminuser)>
```

7. Assign the user to the **admin** group:

```
(config auth user adminuser)> add group end admin
(config auth user adminuser)>
```

8. Save the configuration and apply the change.

```
(config auth user adminuser)> save
Configuration saved.
>
```

9. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Example 2: RADIUS, TACACS+, and local authentication for one user

Goal: To create a user with administrator rights who is authenticated by using all three authentication methods.

In this example, when the user attempts to log in to the XBee Hive device, user authentication will occur in the following order:

1. The user is authenticated by the RADIUS server. If the RADIUS server is unavailable,
2. The user is authenticated by the TACACS+ server. If both the RADIUS and TACACS+ servers are unavailable,
3. The user is authenticated by the XBee Hive device using local authentication.

This example uses a FreeRadius 3.0 server running on ubuntu, and a TACACS+ server running on ubuntu. Server configuration may vary depending on the platforms or type of servers used in your environment.



1. Configure a user on the RADIUS server:
 - a. On the ubuntu machine hosting the FreeRadius server, open the **/etc/freeradius/3.0/users** file:

```
$ sudo gedit /etc/freeradius/3.0/users
```

 - b. Add a RADIUS user to the **users** file:

```
admin1 Cleartext-Password := "password1"
      Unix-FTP-Group-Names := "admin"
```

In this example:

 - The user's username is **admin1**.
 - The user's password is **password1**.
 - The authentication group on the XBee Hive device, **admin**, is identified in the **Unix-FTP-Group-Names** parameter.
 - c. Save and close the **users** file.
2. Configure a user on the TACACS+ server:
 - a. On the ubuntu machine hosting the TACACS+ server, open the **/etc/tacacs+/tac_plus.conf** file:

```
$ sudo gedit /etc/tacacs+/tac_plus.conf
```

 - b. Add a TACACS+ user to the **tac_plus.conf** file:

```
user = admin1 {
    name = "Admin1 for TX64"
    pap = cleartext password1
    service = system {
        groupname = admin
    }
}
```

In this example:

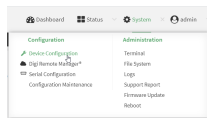
 - The user's username is **admin1**.
 - The user's password is **password1**.
 - The authentication group on the XBee Hive device, **admin**, is identified in the **groupname** parameter.
 - c. Save and close the **tac_plus.conf** file.
3. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
4. Access the device configuration:

Remote Manager:

- a. Locate your device as described in [Use Digi Remote Manager to view and manage your device](#).
- b. Click the **Device ID**.
- c. Click **Settings**.
- d. Click to expand **Config**.

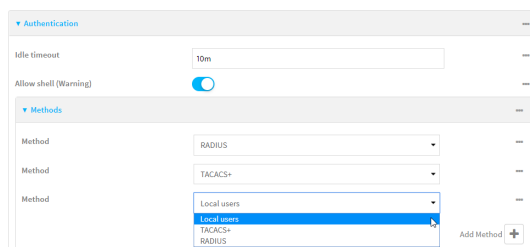
Local Web UI:

- a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

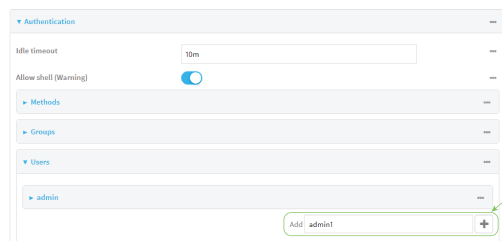


The **Configuration** window is displayed.

5. Configure the authentication methods:
 - a. Click **Authentication > Methods**.
 - b. For **Method**, select **RADIUS**.
 - c. For **Add Method**, click to add a new method.
 - d. For the new method, select **TACACS+**.
 - e. Click to add another new method.
 - f. For the new method, select **Local users**.

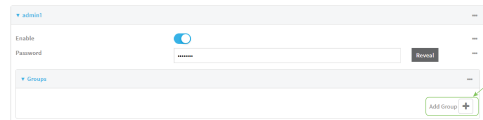


6. Create the local user:
 - a. Click **Authentication > Users**.
 - b. In **Add User:**, type **admin1** and click .

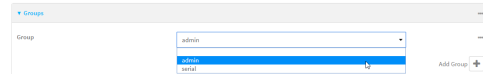


- c. For **password**, type **password1**.

- d. Assign the user to the **admin** group:
 - i. Click **Groups**.
 - ii. For **Add Group**, click 



- iii. For **Group**, select the **admin** group.



- a. Verify that the **admin** group has full administrator rights:
 - i. Click **Authentication > Groups**.
 - ii. Click **admin**.
 - iii. Verify that the admin group has **Admin access** enabled. If not, click **Admin access** to enable.
 - iv. Verify that **Access level** is set to **Full access**. If not, select **Full access**.
7. Click **Apply** to save the configuration and apply the change.

Command line

1. Configure a user on the RADIUS server:
 - a. On the ubuntu machine hosting the FreeRadius server, open the **/etc/freeradius/3.0/users** file:

```
$ sudo gedit /etc/freeradius/3.0/users
```

- b. Add a RADIUS user to the **users** file:

```
admin1 Cleartext-Password := "password1"
  Unix-FTP-Group-Names := "admin"
```

In this example:

- The user's username is **admin1**.
 - The user's password is **password1**.
 - The authentication group on the XBee Hive device, **admin**, is identified in the **Unix-FTP-Group-Names** parameter.
- c. Save and close the **users** file.
 2. Configure a user on the TACACS+ server:
 - a. On the ubuntu machine hosting the TACACS+ server, open the **/etc/tacacs+/tac_plus.conf** file:

```
$ sudo gedit /etc/tacacs+/tac_plus.conf
```

- b. Add a TACACS+ user to the **tac_plus.conf** file:

```

user = admin1 {
    name = "Admin1 for TX64"
    pap = cleartext password1
    service = system {
        groupname = admin
    }
}

```

In this example:

- The user's username is **admin1**.
- The user's password is **password1**.
- The authentication group on the XBee Hive device, **admin**, is identified in the **groupname** parameter.

- c. Save and close the **tac_plus.conf** file.

3. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

4. At the command line, type **config** to enter configuration mode:

```

> config
(config)>

```

5. Configure the authentication methods:

- a. Determine the current authentication method configuration:

```

(config)> show auth method
0 local
(config)>

```

This output indicates that on this example system, only local authentication is configured.

- b. Add RADIUS authentication to the beginning of the list:

```

(config)> add auth method 0 radius
(config)>

```

- c. Add TACACS+ authentication second place in the list:

```

(config)> add auth method 1 tacacs+(config)>

```

- d. Verify that authentication will occur in the correct order:

```

(config)> show auth method
0 radius
1 tacacs+

```

```
2 local
(config)>
```

6. Verify that the **admin** group has full administrator rights:

```
(config)> show auth group admin acl
admin
    enable true
    level full
...
(config)>
```

If **admin > enable** is set to false:

```
(config)> auth group admin acl admin enable true
(config)>
```

If **admin > level** is set to read-only:

```
(config)> auth group admin acl admin level full
(config)>
```

7. Configure the local user:

- a. Create a local user with the username **admin1**:

```
(config)> add auth user admin1
(config auth user admin1)>
```

- b. Assign a password to the user:

```
(config auth user adminuser)> password password1
(config auth user adminuser)>
```

- c. Assign the user to the **admin** group:

```
(config auth user adminuser)> add group end admin
(config auth user adminuser)>
```

8. Save the configuration and apply the change.

```
(config auth user adminuser)> save
Configuration saved.
>
```

9. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Firewall

This chapter contains the following topics:

Firewall configuration	818
Port forwarding rules	823
Packet filtering	830
Configure custom firewall rules	837
Configure captive portals	840
Configure Quality of Service options	845
Web filtering	854

Firewall configuration

Firewall configuration includes the following configuration options:

- **Zones:** A zone is a firewall access group to which network interfaces can be added. You then use zones to configure packet filtering and access control lists for interfaces that are included in the zone. Preconfigured zones include:
 - **Any:** Matches any network interface, even if they are not assigned to this zone.
 - **Loopback:** Zone for interfaces that are used for communication between processes running on the device.
 - **Internal:** Used for interfaces connected to trusted networks. By default, the firewall will allow most access from this zone.
 - **External:** Used for interfaces to connect to untrusted zones, such as the internet. This zone has Network Address Translation (NAT) enabled by default. By default, the firewall will block most access from this zone.
 - **Edge:** Used for interfaces connected to trusted networks, where the device is a client on the edge of the network rather than a router or gateway.
 - **Setup:** Used for interfaces involved in the initial setup of the device. By default, the firewall will only allow this zone to access administration services.
 - **IPsec:** The default zone for IPsec tunnels.
 - **Dynamic routes:** Used for routes learned using routing services.
- **Port forwarding:** A list of rules that allow network connections to the XBee Hive to be forwarded to other servers by translating the destination address.
- **Packet filtering:** A list of packet filtering rules that determine whether to accept or reject network connections that are forwarded through the XBee Hive.
- **Custom rules:** A script that is run to install advanced firewall rules beyond the scope/capabilities of the standard device configuration.
- **Quality Of Service:** Quality of Service (QOS) options for bandwidth allocation and policy-based traffic shaping and prioritizing.

Create a custom firewall zone

In addition to the preconfigured zones, you can create your custom zones that can be used to configure packet filtering and access control lists for network interfaces.

To create a zone:



1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

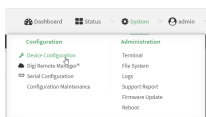
Remote Manager:

- a. Locate your device as described in [Use Digi Remote Manager to view and manage your device](#).
- b. Click the **Device ID**.

- c. Click **Settings**.
- d. Click to expand **Config**.

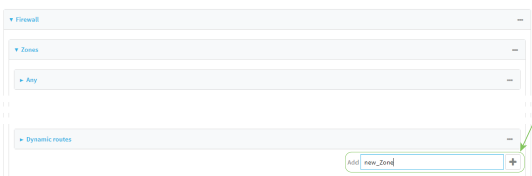
Local Web UI:

- a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

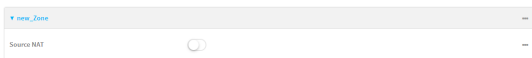


The **Configuration** window is displayed.

3. Click **Firewall > Zones**.
4. In **Add Zone**, enter a name for the zone and click **+**



The firewall configuration window is displayed.



5. (Optional) If traffic on this zone will be forwarded from a private network to the internet, enable Network Address Translation (NAT).
6. Click **Apply** to save the configuration and apply the change.

See [Configure the firewall zone for a network interface](#) for information about how to configure network interfaces to use a zone.

Command line

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Add the new zone. For example, to add a zone named **my_zone**:

```
(config)> add firewall zone my_zone
(config firewall zone my_zone)>
```

4. (Optional) Enable Network Address Translation (NAT):

```
(config firewall zone my_zone)> src_nat true
(config firewall zone my_zone)>
```

5. Save the configuration and apply the change.

```
(config firewall zone my_zone)> save
Configuration saved.
>
```

6. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

See [Configure the firewall zone for a network interface](#) for information about how to configure network interfaces to use a zone.

Configure the firewall zone for a network interface

Firewall zones allow you to group network interfaces for the purpose of packet filtering and access control. There are several preconfigured firewall zones, and you can create custom zones as well. The firewall zone that a network interfaces uses is selected during interface configuration.

This example procedure uses an existing network interface named **ETH** and changes the firewall zone from the default zone, **Internal**, to **External**.

Web

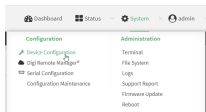
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

Remote Manager:

- a. Locate your device as described in [Use Digi Remote Manager to view and manage your device](#).
- b. Click the **Device ID**.
- c. Click **Settings**.
- d. Click to expand **Config**.

Local Web UI:

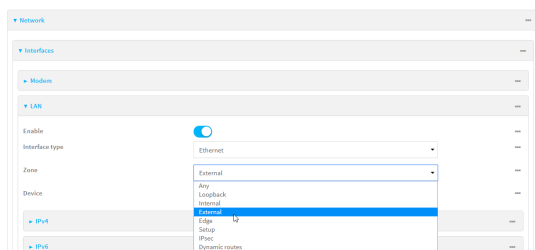
- a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



The **Configuration** window is displayed.

3. Click **Network > Interfaces > ETH**.

4. For **Zone**, select **External**.



5. Click **Apply** to save the configuration and apply the change.

Command line

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. At the config prompt, type:

```
(config)> network interface eth zone my_zone
(config)>
```

4. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

5. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Delete a custom firewall zone

You cannot delete preconfigured firewall zones. To delete a custom firewall zone:



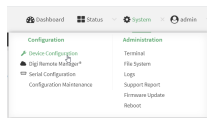
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

Remote Manager:

- a. Locate your device as described in [Use Digi Remote Manager to view and manage your device](#).
- b. Click the **Device ID**.
- c. Click **Settings**.
- d. Click to expand **Config**.

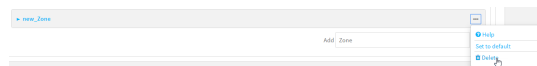
Local Web UI:

- a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



The **Configuration** window is displayed.

3. Click **Firewall > Zones**.
4. Click the menu icon (...) next to the appropriate custom firewall zone and select **Delete**.



5. Click **Apply** to save the configuration and apply the change.

Command line

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Use the **del** command to delete a custom firewall rule. For example:

```
(config)> del firewall zone my_zone
```

4. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

5. Type **exit** to exit the Admin CLI.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Port forwarding rules

Most computers are protected by a firewall that prevents users on a public network from accessing servers on the private network. To allow a computer on the Internet to connect to a specific server on a private network, set up one or more port forwarding rules. Port forwarding rules provide mapping instructions that direct incoming traffic to the proper device on a LAN.

Configure port forwarding

Required configuration items

- The network interface for the rule.
Network connections will only be forwarded if their destination address matches the IP address of the selected network interface.
- The public-facing port number that network connections must use for their traffic to be forwarded.
- The IP address of the server to which traffic should be forwarded.
- The port or range of ports to which traffic should be forwarded.

Additional configuration items

- A label for the port forwarding rule.
- The IP version (either IPv4 or IPv6) that incoming network connections must match.
- The protocols that incoming network connections must match.

- A white list of devices, based on either IP address or firewall zone, that are authorized to leverage this forwarding rule.

To configure a port forwarding rule:

Web

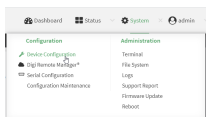
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

Remote Manager:

- a. Locate your device as described in [Use Digi Remote Manager to view and manage your device](#).
- b. Click the **Device ID**.
- c. Click **Settings**.
- d. Click to expand **Config**.

Local Web UI:

- a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

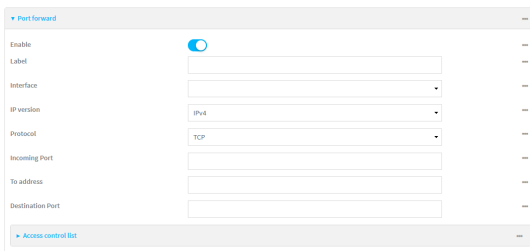


The **Configuration** window is displayed.

3. Click **Firewall > Port forwarding**.
4. For **Add port forward**, click .



The port forwarding rule configuration window is displayed.



Port forwarding rules are enabled by default. To disable, toggle off **Enable**.

5. (Optional) Type a **Label** that will be used to identify the rule.

6. For **Interface**, select the network interface for the rule.
Network connections will only be forwarded if their destination address matches the IP address of the selected network interface.
7. For **IP version**, select either **IPv4** or **IPv6**.
Network connections will only be forwarded if they match the selected IP version.
8. For **Protocol**, select the type of internet protocol.
Network connections will only be forwarded if they match the selected protocol.
9. For **Incoming port(s)**, type the public-facing port number that network connections must use for their traffic to be forwarded.
10. For **To Address**, type the IP address of the server to which traffic should be forwarded.
11. For **Destination Port(s)**, type the port number, comma-separated list of port numbers, or range of port numbers on the server to which traffic should be forwarded. For example, to forward traffic to ports one, three, and five through ten, enter: **1, 3, 5-10**.
12. (Optional) Click **Access control list** to create a white list of devices that are authorized to leverage this forwarding rule, based on either the IP address or firewall zone:
 - To white list IP addresses:
 - a. Click **Addresses**.
 - b. For **Add Address**, enter an IP address and click .
 - c. Repeat for each additional IP address that should be white listed.
 - To specify firewall zones for white listing:
 - a. Click **Zones**.
 - b. For **Add zone**, click .
 - c. For **Zone**, select the appropriate zone.
 - d. Repeat for each additional zone.
13. Click **Apply** to save the configuration and apply the change.

Command line

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. At the config prompt, type:

```
(config)> add firewall dnat end
(config firewall dnat 0)>
```

Port forwarding rules are enabled by default. To disable the rule:

```
(config firewall dnat 0)> enable false
(config firewall dnat 0)>
```

4. Set the network interface for the rule.

```
(config firewall dnat 0)> interface
(config firewall dnat 0)>
```

Network connections will only be forwarded if their destination address matches the IP address of this network interface.

- a. Use the **?** to determine available interfaces:
- b. Set the interface. For example:

```
(config firewall dnat 0)> interface eth1
(config firewall dnat 0)>
```

5. Set the IP version. Allowed values are **ipv4** and **ipv6**. The default is **ipv4**.

```
(config firewall dnat 0)> ip_version ipv6
(config firewall dnat 0)>
```

6. Set the public-facing port number that network connections must use for their traffic to be forwarded.

```
(config firewall dnat 0)> port port
(config firewall dnat 0)>
```

7. Set the type of internet protocol .

```
(config firewall dnat 0)> protocol value
(config firewall dnat 0)>
```

Network connections will only be forwarded if they match the selected protocol. Allowed values are **custom**, **tcp**, **tcpudp**, or **udp**. The default is **tcp**.

8. Set the IP address of the server to which traffic should be forwarded:

- For IPv4 addresses:

```
(config firewall dnat 0)> to_address ip-address
(config firewall dnat 0)>
```

- For IPv6 addresses:

```
(config firewall dnat 0)> to_address6 ip-address
(config firewall dnat 0)>
```

9. Set the public-facing port number(s) that network connections must use for their traffic to be forwarded.

```
(config firewall dnat 0)> to_port value
(config firewall dnat 0)>
```

where *value* is the port number, comma-separated list of port numbers, or range of port numbers on the server to which traffic should be forwarded. For example, to forward traffic to ports one, three, and five through ten, enter **1, 3, 5-10**.

10. (Optional) To create a white list of devices that are authorized to leverage this forwarding rule, based on either the IP address or firewall zone, change to the `acl` node:

```
(config firewall dnat 0)> acl
(config firewall dnat 0 acl)>
```

- To white list an IP address:

- For IPv4 addresses:

```
(config firewall dnat 0 acl> add address end ip-address
(config firewall dnat 0 acl)>
```

- For IPv6 addresses:

```
(config firewall dnat 0 acl> add address6 end ip-address
(config firewall dnat 0 acl)>
```

Repeat for each appropriate IP address.

- To specify the firewall zone for white listing:

```
(config firewall dnat 0 acl)> add zone end zone
```

Repeat for each appropriate zone.

To view a list of available zones:

```
(config firewall dnat 0 acl)> ... zone ?
```

Zones: A list of groups of network interfaces that can be referred to by packet filtering rules and access control lists.

Additional Configuration

```
any
dynamic_routes
edge
external
internal
ipsec
loopback
setup
```

```
(config firewall dnat 0 acl)>
```

11. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

12. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Delete a port forwarding rule

To delete a port forwarding rule:

Web

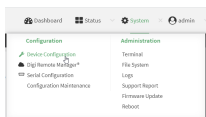
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

Remote Manager:

- a. Locate your device as described in [Use Digi Remote Manager to view and manage your device](#).
- b. Click the **Device ID**.
- c. Click **Settings**.
- d. Click to expand **Config**.

Local Web UI:

- a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



The **Configuration** window is displayed.

3. Click **Firewall > Port forwarding**.
4. Click the menu icon (...) next to the appropriate port forwarding rule and select **Delete**.



5. Click **Apply** to save the configuration and apply the change.

Command line

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Determine the index number of the port forwarding rule you want to delete:

```
(config)> show firewall dnat
0
  acl
    no address
    no zone
  enable true
  interface
  ip_version ipv4
  label IPv4 port forwarding rule
  port 10000
  protocol tcp
  to_address6 10.10.10.10
  to_port 10001

1
  acl
    no address6
    no zone
  enable false
  interface
  ip_version ipv6
  label IPv6 port forwarding rule
  port 10002
  protocol tcp
  to_address6 c097:4533:bd63:bb12:9a6f:5569:4b53:c29a
  to_port 10003
(config)>
```

4. To delete the rule, use the index number with the **del** command. For example:

```
(config)> del firewall dnat 1
```

5. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

6. Type **exit** to exit the Admin CLI.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Packet filtering

By default, one preconfigured packet filtering rule, **Allow all outgoing traffic**, is enabled and monitors traffic going to and from the XBee Hive device. The predefined settings are intended to block unauthorized inbound traffic while providing an unrestricted flow of outgoing data. You can modify the default packet filtering rule and create additional rules to define how the device accepts or rejects traffic that is forwarded through the device.

Configure packet filtering

Required configuration items

- The action that the packet filtering rule will perform, either **Accept**, **Reject**, or **Drop**.
- The source firewall zone: Packets originating from interfaces on this zone will be monitored by this rule.
- The destination firewall zone: Packets destined for interfaces on this zone will be accepted, rejected, or dropped by this rule.

Additional configuration requirements

- A label for the rule.
- The IP version to be matched, either **IPv4**, **IPv6**, or **Any**.
- The protocol to be matched, one of:
 - **TCP**
 - **UDP**
 - **ICMP**
 - **ICMP6**
 - **Any**

To configure a packet filtering rule:



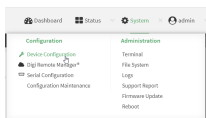
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

Remote Manager:

- a. Locate your device as described in [Use Digi Remote Manager to view and manage your device](#).
- b. Click the **Device ID**.
- c. Click **Settings**.
- d. Click to expand **Config**.

Local Web UI:

- a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



The **Configuration** window is displayed.

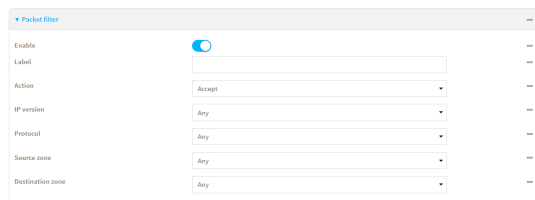
3. Click **Firewall > Packet filtering**.

- To create a new packet filtering rule, for **Add packet filter**, click 



- To edit the default packet filtering rule or another existing packet filtering rule, click to expand the rule.

The packet filtering rule configuration window is displayed.



Packet filters are enabled by default. To disable, toggle off **Enable**.

4. (Optional) Type a **Label** that will be used to identify the rule.
5. For **Action**, select one of:
 - **Accept**: Allows matching network connections.
 - **Reject**: Blocks matching network connections, and sends an ICMP error if appropriate.
 - **Drop**: Blocks matching network connections, and does not send a reply.
6. Select the **IP version**.
7. Select the **Protocol**.
8. For **Source zone**, select the firewall zone that will be monitored by this rule for incoming connections from network interfaces that are a member of this zone.
See [Firewall configuration](#) for more information about firewall zones.
9. For **Destination zone**, select the firewall zone. Packets destined for network interfaces that are members of this zone will either be accepted, rejected or dropped by this rule.
See [Firewall configuration](#) for more information about firewall zones.
10. Click **Apply** to save the configuration and apply the change.

Command line

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

To edit the default packet filtering rule or another existing packet filtering rule:

- a. Determine the index number of the appropriate packet filtering rule:

```
(config)> show firewall filter
0
  action accept
  dst_zone any
  enable true
  ip_version any
  label Allow all outgoing traffic
  protocol any
  src_zone internal
1
  action drop
  dst_zone internal
  enable true
  ip_version any
  label myfilter
  protocol any
  src_zone external
(config)>
```

- b. Select the appropriate rule by using its index number:

```
(config)> firewall filter 1
(config firewall filter 1)>
```

To create a new packet filtering rule:

```
(config)> add firewall filter end
(config firewall filter 1)>
```

Packet filtering rules are enabled by default. To disable the rule:

```
(config firewall filter 1)> enable false
(config firewall filter 1)>
```

3. (Optional) Set the label for the rule.

```
(config firewall filter 1)> label "My filter rule"
(config firewall filter 1)>
```

4. Set the action to be performed by the filter rule.

```
(config firewall filter 1)> action value
(config firewall filter 1)>
```

where *value* is one of:

- **accept**: Allows matching network connections.
 - **reject**: Blocks matching network connections, and sends an ICMP error if appropriate.
 - **drop**: Blocks matching network connections, and does not send a reply.
5. Set the firewall zone that will be monitored by this rule for incoming connections from network interfaces that are a member of this zone:

See [Firewall configuration](#) for more information about firewall zones.

```
(config firewall filter 1)> src_zone my_zone
(config firewall filter 1)>
```

6. Set the destination firewall zone. Packets destined for network interfaces that are members of this zone will either be accepted, rejected or dropped by this rule.

See [Firewall configuration](#) for more information about firewall zones.

```
(config firewall filter 1)> dst_zone my_zone
(config firewall filter 1)>
```

7. Set the IP version.

```
(config firewall filter 1)> ip_version value
(config firewall filter 1)>
```

where *value* is one of:

- **any**
 - **ipv4**
 - **ipv6**
 - The default is **any**.
8. Set the protocol.

```
(config firewall filter 1)> protocol value
(config firewall filter 1)>
```

where *value* is one of:

- **any**
- **icmp**
- **icmpv6**
- **tcp**
- **udp**

The default is **any**.

9. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

10. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Enable or disable a packet filtering rule

To enable or disable a packet filtering rule:

Web

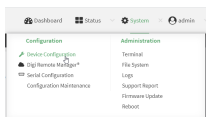
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

Remote Manager:

- a. Locate your device as described in [Use Digi Remote Manager to view and manage your device](#).
- b. Click the **Device ID**.
- c. Click **Settings**.
- d. Click to expand **Config**.

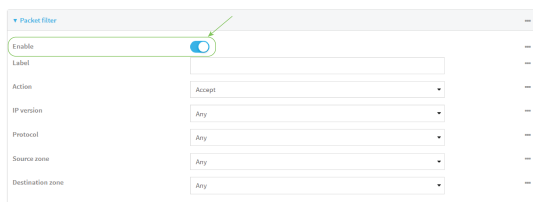
Local Web UI:

- a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



The **Configuration** window is displayed.

3. Click **Firewall > Packet filtering**.
4. Click the appropriate packet filtering rule.
5. Click **Enable** to toggle the rule between enabled and disabled.



6. Click **Apply** to save the configuration and apply the change.

Command line

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Determine the index number of the appropriate port forwarding rule:

```
(config)> show firewall filter
0
  action accept
  dst_zone any
  enable true
  ip_version any
  label Allow all outgoing traffic
  protocol any
  src_zone internal
1
  action drop
  dst_zone internal
  enable true
  ip_version any
  label My packet filter
  protocol any
  src_zone external
(config)>
```

4. To enable a packet filtering rule, use the index number with the **enable true** command. For example:

```
(config)> firewall filter 1 enable true
```

5. To disable a packet filtering rule, use the index number with the **enable false** command. For example:

```
(config)> firewall filter 1 enable false
```

6. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

7. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Delete a packet filtering rule

To delete a packet filtering rule:

Web

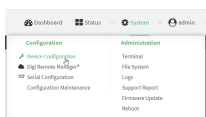
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

Remote Manager:

- a. Locate your device as described in [Use Digi Remote Manager to view and manage your device](#).
- b. Click the **Device ID**.
- c. Click **Settings**.
- d. Click to expand **Config**.

Local Web UI:

- a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



The **Configuration** window is displayed.

3. Click **Firewall > Packet filtering**.
4. Click the menu icon (...) next to the appropriate packet filtering rule and select **Delete**.



5. Click **Apply** to save the configuration and apply the change.

Command line

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBees local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

- Determine the index number of the packet filtering rule you want to delete:

```
(config)> show firewall filter
0
  action accept
  dst_zone any
  enable true
  ip_version any
  label Allow all outgoing traffic
  protocol any
  src_zone internal
1
  action drop
  dst_zone internal
  enable true
  ip_version any
  label My packet filter
  protocol any
  src_zone external
(config)>
```

- To delete the rule, use the index number with the **del** command. For example:

```
(config)> del firewall filter 1
```

- Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

- Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Configure custom firewall rules

Custom firewall rules consist of a script of shell commands that can be used to install firewall rules, ipsets, and other system configuration. These commands are run whenever system configuration changes occur that might cause changes to the firewall.

To configure custom firewall rules:

Web

- Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
- Access the device configuration:

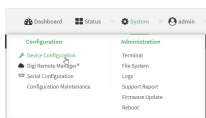
Remote Manager:

- Locate your device as described in [Use Digi Remote Manager to view and manage your device](#).

- b. Click the **Device ID**.
- c. Click **Settings**.
- d. Click to expand **Config**.

Local Web UI:

- a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



The **Configuration** window is displayed.

3. Click **Firewall > Custom rules**.



4. **Enable** the custom rules.
5. (Optional) Enable **Override** to override all preconfigured firewall behavior and rely solely on the custom firewall rules.
6. For **Rules**, type the shell command that will execute the custom firewall rules script.
7. Click **Apply** to save the configuration and apply the change.

Command line

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Enable custom firewall rules:

```
(config)> firewall custom enable true
(config)>
```

4. (Optional) Instruct the device to override all preconfigured firewall behavior and rely solely on the custom firewall rules:

```
(config)> firewall custom override true
(config)>
```

5. Set the shell command that will execute the custom firewall rules script:

```
(config)> firewall custom rules "shell-command"
(config)>
```

6. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

7. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Configure captive portals

Captive portals are commonly used on public-access networks to require users to login or accept terms and conditions before accessing the internet.

Note Captive portals are available on the XBee HiveW Wi-Fi enabled model only.

To configure captive portals:

Web

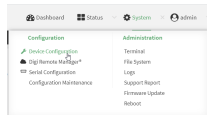
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

Remote Manager:

- a. Locate your device as described in [Use Digi Remote Manager to view and manage your device](#).
- b. Click the **Device ID**.
- c. Click **Settings**.
- d. Click to expand **Config**.

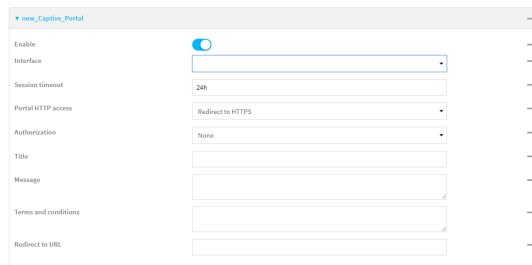
Local Web UI:

- a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



The **Configuration** window is displayed.

3. Click **Firewall > Captive portals**.
4. For **Add captive portal**:, enter a name for the portal and click .


 A screenshot of the 'new_Captive_Portal' configuration window. The window has a title bar 'new_Captive_Portal'. It contains several configuration fields: 'Enable' (a toggle switch currently turned on), 'Interface' (a dropdown menu), 'Session Timeout' (a text input field with '24h'), 'Portal HTTP access' (a dropdown menu with 'Redirect to HTTPS'), 'Authorization' (a dropdown menu with 'None'), 'Title' (a text input field), 'Message' (a text input field), 'Terms and conditions' (a text input field), and 'Redirect to URL' (a text input field).

The captive portal configuration window is displayed.

The captive portal is enabled by default. To disable, toggle off **Enable**.

5. For **Interface**, select the network interface for the portal.
Traffic received on this interface's network device will not be forwarded unless the client has been granted access.
6. For **Session timeout**, type the amount of time that a user session remains valid. After the session times out, the user will be required to log in again.
Allowed values are any number of weeks, days, hours, minutes, or seconds, and take the format **number{w|d|h|m|s}**.
For example, to set **Session timeout** to ten minutes, enter **10m** or **600s**.
7. For **Portal HTTP access**, configure whether the portal can be accessed over an insecure connection.
 - **Allow**: Allows access to the portal page over an insecure connection (HTTP port 80).
 - **Redirect to HTTPS**: Automatically redirects the request to a secure connection (HTTPS port 443).
 - **Disallow**: Does not allow access over an insecure connection (HTTP port 80).

Note This setting does not affect access to HTTP port 80 after the client has been granted access to the portal.

8. For **Authorization**, select the method that will be used to authorize the user:
 - **None**: Users are not required to enter any information to access the portal.
 - **User login**: Users are required to authenticate with an account on this device. Users must be part of a user group that allows access to this portal.
 - **Collect user information**: Users are required to complete a form to continue. The form fields may be customize.
9. (Optional) For **Title**, enter the title of the portal page that the user will see when accessing the portal.
10. (Optional) For **Message**, enter a message that will appear on the portal page.
11. (Optional) For **Terms and Conditions**, enter the terms and conditions that will appear on the portal page. Users will be required to agree to the terms and conditions before being granted access to the portal.
12. (Optional) For **Redirect to URL**, enter the URL to which the user will be directed when granted access to the portal. If left blank, the user will be directed to the domain of the URL in the original access request.
13. Click **Apply** to save the configuration and apply the change.

Command line

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. To create an active portal called **portal1**:

```
(config)> add firewall portal portal1
(config firewall portal portal1)>
```

Captive portals are enabled by default. To disable the portal:

```
(config firewall portal portal1)> enable false
(config firewall portal portal1)>
```

4. Set the network interface for the portal. Traffic received on this interface's network device will not be forwarded unless the client has been granted access.
 - a. Use the **?** to determine available interfaces:
 - b. Set the interface. For example:

```
(config firewall portal portal1)> interface /network/interface/eth1
(config firewall portal portal1)>
```

5. Set the amount of time that a user session remains valid. After the session times out, the user will be required to log in again.

```
(config firewall portal portal1)> timeout value
(config firewall portal portal1)>
```

where *value* is any number of weeks, days, hours, minutes, or seconds, and takes the format **number{w|d|h|m|s}**.

For example, to set **Session timeout** to ten minutes, enter either **10m** or **600s**:

```
(config firewall portal portal1)> timeout 600s
(config firewall portal portal1)>
```

6. Configure whether the portal can be accessed over an insecure connection.

```
(config firewall portal portal1)> http value
(config firewall portal portal1)>
```

where *value* is one of:

- **allow**: Allows access to the portal page over an insecure connection (HTTP port 80).
- **redirect**: Automatically redirects the request to a secure connection (HTTPS port 443).
- **disallow**: Does not allow access over an insecure connection (HTTP port 80).

Note This setting does not affect access to HTTP port 80 after the client has been granted access to the portal.

7. Set the method that will be used to authorize the user:

```
(config firewall portal portal1)> auth value
(config firewall portal portal1)>
```

where *value* is one of:

- **none:** Users are not required to enter any information to access the portal.
- **login:** Users are required to authenticate with an account on this device. Users must be part of a user group that allows access to this portal.
- **info:** Users are required to complete a form to continue. The form fields may be customize.

8. (Optional) Set the title of the portal page that the user will see when accessing the portal:

```
(config firewall portal portal1)> title "Corporate portal"
(config firewall portal portal1)>
```

9. (Optional) Set a message that will appear on the portal page:

```
(config firewall portal portal1)> message "Welcome to the corporate web portal"
(config firewall portal portal1)>
```

10. (Optional) Set the terms and conditions that will appear on the portal page. Users will be required to agree to the terms and conditions before being granted access to the portal.

```
(config firewall portal portal1)> terms "Accept the terms and conditions of this portal"
(config firewall portal portal1)>
```

11. (Optional) Set the URL to which the user will be directed when granted access to the portal. If left blank, the user will be directed to the domain of the URL in the original access request.

```
(config firewall portal portal1)> url https://myportal.com
(config firewall portal portal1)>
```

12. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

13. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Delete captive portals

To delete captive portals:



Web

1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.

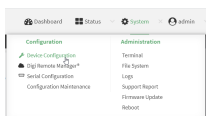
2. Access the device configuration:

Remote Manager:

- Locate your device as described in [Use Digi Remote Manager to view and manage your device](#).
- Click the **Device ID**.
- Click **Settings**.
- Click to expand **Config**.

Local Web UI:

- On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



The **Configuration** window is displayed.

- Click **Firewall > Captive portals**.
- Click the down caret (⌵) next to the appropriate captive portal and select **Delete**.
- Click **Apply** to save the configuration and apply the change.

Command line

- Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

- At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

- To delete a captive portal, use the **del** command. For example:

```
(config)> del firewall portal portal1
```

- Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

- Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Configure Quality of Service options

Quality of Service (QoS) options allow you to manage the traffic performance of various services, such as Voice over IP (VoIP), cloud computing, traffic shaping, traffic prioritizing, and bandwidth allocation. When configuring QoS, you can only control the queue for outgoing packets on each interface (egress packets), not what is received on the interface (packet ingress).

A QoS *binding* contains the policies and rules that apply to packets exiting the XBee Hive device on the binding's interface. By default, the XBee Hive device has two preconfigured QoS bindings, **Outbound** and **Inbound**. These bindings are an example configuration designed for a typical VoIP site:

- **Outbound** provides an example of matching packets as they are routed from the device onto the WAN interface.
- **Inbound** provides an example of matching packets as they are routed from the device onto a LAN interface.

These example bindings are disabled by default.

Enable the preconfigured bindings

↩ Web

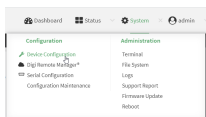
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

Remote Manager:

- a. Locate your device as described in [Use Digi Remote Manager to view and manage your device](#).
- b. Click the **Device ID**.
- c. Click **Settings**.
- d. Click to expand **Config**.

Local Web UI:

- a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



The **Configuration** window is displayed.

3. Click **Firewall > Quality of Service**.
4. Click to expand either **Outbound** or **Inbound**.
5. **Enable** the binding.
6. Select an **Interface**.
7. Examine the remaining default settings and modify as appropriate for your network.
8. Click **Apply** to save the configuration and apply the change.

Command line

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Enable one of the preconfigured bindings:
 - To enable the Outbound binding:

```
(config)> firewall qos 0 enable true
(config)>
```

- To enable the Inbound binding:

```
(config)> firewall qos 1 enable true
(config)>
```

4. Set the interface for the binding. Use the index number of the binding; for example, to set the interface for the Outbound binding:
 - a. Use the **?** to determine available interfaces:
 - b. Set the interface. For example:

```
(config)> firewall qos 0 interface /network/interface/eth1
(config)>
```

5. Examine the remaining default settings and modify as appropriate for your network.
6. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

7. Type **exit** to exit the Admin CLI.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Create a new binding

Web

1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

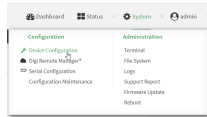
Remote Manager:

- a. Locate your device as described in [Use Digi Remote Manager to view and manage your device](#).

- b. Click the **Device ID**.
- c. Click **Settings**.
- d. Click to expand **Config**.

Local Web UI:

- a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

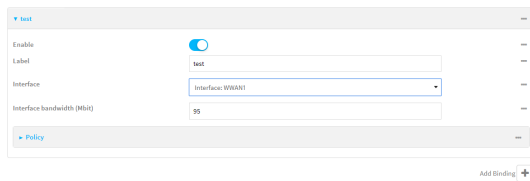


The **Configuration** window is displayed.

3. Click **Firewall > Quality of Service**.
4. For **Add Binding**, click 

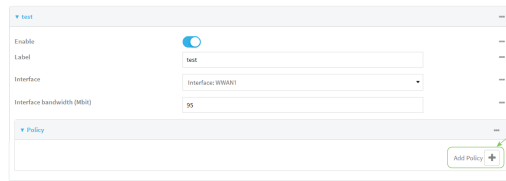


The quality of service binding configuration window is displayed.

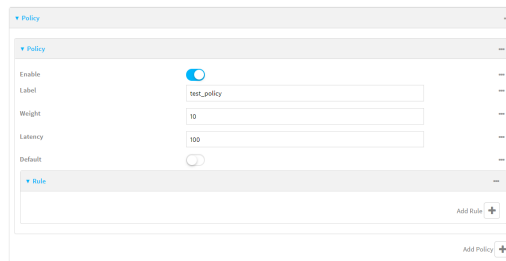


5. **Enable** the binding.
6. (Optional) Type a **Label** for the binding.
7. Select an **Interface** to queue egress packets on. The binding will only match traffic that is being sent out on this interface.
8. (Optional) For **Interface bandwidth (Mbit)**, set the maximum egress bandwidth of the interface, in megabits, allocated to this binding. Typically, this should be 95% of the available bandwidth. Allowed value is any integer between **1** and **1000**.
9. Create a policy for the binding:
At least one policy is required for each binding. Each policy can contain up to 30 rules.

- a. Click to expand **Policy**.
- b. For **Add Policy**, click 

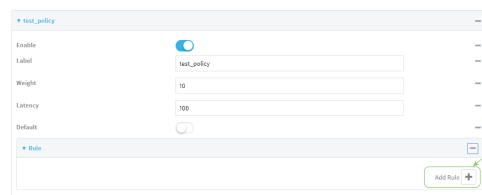


The QoS binding policy configuration window is displayed.



New QoS binding policies are enabled by default. To disable, toggle off **Enable**.

- c. (Optional) Type a **Label** for the binding policy.
- d. For **Weight**, type a value for the amount of available bandwidth allocated to the policy, relative to other policies for this binding.
The larger the weight, with respect to the other policy weights, the larger portion of the maximum bandwidth is available for this policy. For example, if a binding contains three policies, and each policy contains a weight of 10, each policy will be allocated one third of the total interface bandwidth.
- e. For **Latency**, type the maximum delay before the transmission of packets. A lower latency means that the packets will be scheduled more quickly for transmission.
- f. Select **Default** to identify this policy as a fall-back policy. The fall-back policy will be used for traffic that is not matched by any other policy. If there is no default policy associated with this binding, packets that do not match any policy rules will be dropped.
- g. If **Default** is disabled, you must configure at least one rule:
 - i. Click to expand **Rule**.
 - ii. For **Add Rule**, click 



The QoS binding policy rule configuration window is displayed.

The screenshot shows a configuration window for a firewall rule named 'test_rule'. The 'Enable' toggle is turned on. The 'Label' field contains 'test_rule'. The 'Type Of Service' field is empty. The 'Protocol' is set to 'any'. The 'Source port' and 'Destination port' are both set to 'any'. At the bottom, there are two expandable sections: 'Source address' and 'Destination address', both currently collapsed.

New QoS binding policy rules are enabled by default. To disable, toggle off **Enable**.

- iii. (Optional) Type a **Label** for the binding policy rule.
- iv. For **Type Of Service**, type the value of the Type of Service (ToS) packet header that defines packet priority. If unspecified, this field is ignored.
See <https://www.tucny.com/Home/dscp-tos> for a list of common TOS values.
- v. For **Protocol**, select the IP protocol matching criteria for this rule.
- vi. For **Source port**, type the port, or **any**, as a source traffic matching criteria.
- vii. For **Destination port**, type the port, or **any**, as a destination traffic matching criteria.
- viii. Click to expand **Source address** and select the **Type**:
 - **Any**: Source traffic from any address will be matched.
 - **Interface**: Only traffic from the selected **Interface** will be matched.
 - **IPv4 address**: Only traffic from the IP address typed in **IPv4 address** will be matched. Use the format *IPv4_address[/netmask]*, or use **any** to match any IPv4 address.
 - **IPv6 address**: Only traffic from the IP address typed in **IPv6 address** will be matched. Use the format *IPv6_address[/prefix_length]*, or use **any** to match any IPv6 address.
 - **MAC address**: Only traffic from the MAC address typed in **MAC address** will be matched.
- ix. Click to expand **Destination address** and select the **Type**:
 - **Any**: Traffic destined for anywhere will be matched.
 - **Interface**: Only traffic destined for the selected **Interface** will be matched.
 - **IPv4 address**: Only traffic destined for the IP address typed in **IPv4 address** will be matched. Use the format *IPv4_address[/netmask]*, or use **any** to match any IPv4 address.
 - **IPv6 address**: Only traffic destined for the IP address typed in **IPv6 address** will be matched. Use the format *IPv6_address[/prefix_length]*, or use **any** to match any IPv6 address.

Repeat to add a new rule. Up to 30 rules can be configured.

10. Click **Apply** to save the configuration and apply the change.

Command line

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Add a binding:

```
(config)> add firewall qos end
(config firewall qos 2)>
```

New binding are enabled by default. To disable:

```
(config firewall qos 2)> enable false
(config firewall qos 2)>
```

4. (Optional) Set a label for the new binding:

```
(config firewall qos 2)> label my_binding
(config firewall qos 2)>
```

5. Set the interface to queue egress packets on. The binding will only match traffic that is being sent out on this interface:
 - a. Use the **?** to determine available interfaces:
 - b. Set the interface. For example:

```
(config firewall qos 2)> interface /network/interface/eth1
(config firewall qos 2)>
```

6. (Optional) Set the maximum egress bandwidth of the interface, in megabits, allocated to this binding.

```
(config firewall qos 2)> bandwidth int
(config firewall qos 2)>
```

where *int* is an integer between **1** and **1000**. Typically, this should be 95% of the available bandwidth. The default is **95**.

7. Create a policy for the binding:

At least one policy is required for each binding. Each policy can contain up to 30 rules.

 - a. Change to the policy node of the configuration:

```
(config firewall qos 2)> policy
(config firewall qos 2 policy)>
```

- b. Add a policy:

```
(config firewall qos 2 policy)> add end
(config firewall qos 2 policy 0)>
```

New QoS binding policies are enabled by default. To disable:

```
(config firewall qos 2 policy 0)> enable false
(config firewall qos 2 policy 0)>
```

- c. (Optional) Set a label for the new binding policy:

```
(config firewall qos 2 policy 0)> label my_binding_policy
(config firewall qos 2 policy 0)>
```

- d. Set a value for the amount of available bandwidth allocated to the policy, relative to other policies for this binding.

The larger the weight, with respect to the other policy weights, the larger portion of the maximum bandwidth is available for this policy. For example, if a binding contains three policies, and each policy contains a weight of 10, each policy will be allocated one third of the total interface bandwidth.

```
(config firewall qos 2 policy 0)> weight int
(config firewall qos 2 policy 0)>
```

where *int* is any integer between **1** and **65535**. The default is **10**.

- e. Set the maximum delay before the transmission of packets. A lower number means that the packets will be scheduled more quickly for transmission.

```
(config firewall qos 2 policy 0)> latency int
(config firewall qos 2 policy 0)>
```

where *int* is any integer, **1** or greater. The default is **100**.

- f. To identify this policy as a fall-back policy:

```
(config firewall qos 2 policy 0)> default true
(config firewall qos 2 policy 0)>
```

The fall-back policy will be used for traffic that is not matched by any other policy. If there is no default policy associated with this binding, packets that do not match any policy rules will be dropped. If the policy is not a fall-back policy, you must configure at least one rule:

- i. Change to the rule node of the configuration:

```
(config firewall qos 2 policy 0)> rule
(config firewall qos 2 policy 0 rule)>
```

- ii. Add a rule:

```
(config firewall qos 2 policy 0 rule)> add end
(config firewall qos 2 policy 0 rule 0)>
```

New QoS binding policy rules are enabled by default. To disable:

```
(config firewall qos 2 policy 0 rule 0)> enable false
(config firewall qos 2 policy 0 rule 0)>
```

- iii. (Optional) Set a label for the new binding policy rule:

```
(config firewall qos 2 policy 0 rule 0)> label my_binding_policy_rule
(config firewall qos 2 policy 0 rule 0)>
```

- iv. Set the value of the Type of Service (ToS) packet header that defines packet priority. If unspecified, this field is ignored.

```
(config firewall qos 2 policy 0 rule 0)> tos value
(config firewall qos 2 policy 0 rule 0)>
```

where *value* is a hexadecimal number. See <https://www.tucny.com/Home/dscp-tos> for a list of common TOS values.

- v. Set the IP protocol matching criteria for this rule:

```
(config firewall qos 2 policy 0 rule 0)> protocol value
(config firewall qos 2 policy 0 rule 0)>
```

where *value* is one of **tcp**, **udp**, or **any**.

- vi. Set the source port to define a source traffic matching criteria:

```
(config firewall qos 2 policy 0 rule 0)> srcport value
(config firewall qos 2 policy 0 rule 0)>
```

where *value* is the IP port number, a range of port numbers using the format *IP_port-IP_port*, or **any**.

- vii. Set the destination port to define a destination matching criteria:

```
(config firewall qos 2 policy 0 rule 0)> dstport value
(config firewall qos 2 policy 0 rule 0)>
```

where *value* is the IP port number, a range of port numbers using the format *IP_port-IP_port*, or **any**.

- viii. Set the source address type:

```
(config network qos 2 policy 0 rule 0)> src type value
(config network qos 2 policy 0 rule 0)>
```

where *value* is one of:

- **any**: Source traffic from any address will be matched.
See [Firewall configuration](#) for more information about firewall zones.
- **interface**: Only traffic from the selected interface will be matched. Set the interface:

- i. Use the **?** to determine available interfaces:
- ii. Set the interface. For example:

```
(config network qos 2 policy 0 rule 0)> src interface /network/interface/eth1
(config network qos 2 policy 0 rule 0)>
```

- **address:** Only traffic from the IP address typed in **IPv4 address** will be matched. Set the address that will be matched:

```
(config network qos 2 policy 0 rule 0)> src address value
(config network qos 2 policy 0 rule 0)>
```

where value uses the format **IPv4_address[/netmask]**, or **any** to match any IPv4 address.

- **address6:** Only traffic from the IP address typed in **IPv6 address** will be matched. Set the address that will be matched:

```
(config network qos 2 policy 0 rule 0)> src address6 value
(config network qos 2 policy 0 rule 0)>
```

where value uses the format **IPv6_address[/prefix_length]**, or **any** to match any IPv6 address.

- **mac:** Only traffic from the MAC address typed in **MAC address** will be matched. Set the MAC address to be matched:

```
(config network qos 2 policy 0 rule 0)> src mac MAC_address
(config network qos 2 policy 0 rule 0)>
```

- ix. Set the destination address type:

```
(config network qos 2 policy 0 rule 0)> dst type value
(config network qos 2 policy 0 rule 0)>
```

where *value* is one of:

- **any:** Traffic destined for anywhere will be matched.
See [Firewall configuration](#) for more information about firewall zones.
- **interface:** Only traffic destined for the selected **Interface** will be matched.
Set the interface:
 - i. Use the **?** to determine available interfaces:
 - ii. Set the interface. For example:

```
(config network qos 2 policy 0 rule 0)> dst interface /network/interface/eth1
(config network qos 2 policy 0 rule 0)>
```

- **address:** Only traffic destined for the IP address typed in **IPv4 address** will be matched. Set the address that will be matched:

```
(config network qos 2 policy 0 rule 0)> src address value
(config network qos 2 policy 0 rule 0)>
```

where value uses the format *IPv4_address[/netmask]*, or **any** to match any IPv4 address.

- **address6**: Only traffic destined for the IP address typed in **IPv6 address** will be matched. Set the address that will be matched:

```
(config network qos 2 policy 0 rule 0)> src address6 value
(config network qos 2 policy 0 rule 0)>
```

where value uses the format *IPv6_address[/prefix_length]*, or **any** to match any IPv6 address.

Repeat to add a new rule. Up to 30 rules can be configured.

8. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

9. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Web filtering

Web filtering allows you to control access to services that can be accessed through the XBee Hive device by forwarding all Domain Name System (DNS) traffic to a web filtering service. This allows the network security administrator to configure a set of policies with the web filtering service that are applied to all routing devices with web filtering enabled. For example, a policy may allow or deny access to a specific service or type of service such as social media, gaming, and so on.

Your XBee Hive device supports two methods for configuring web filtering:

- Cisco Umbrella (formally known as OpenDNS).
- Manual DNS server entry.

Configure web filtering with Cisco Umbrella

Required configuration items

- Enable web filtering.
- A Cisco Umbrella account.
See <https://umbrella.cisco.com> for information about how to create a Cisco Umbrella account. A 14 day trial account is available.
- A customer-specific API token.

Task one: Generate a Cisco Umbrella API token

1. Log into the Cisco Umbrella Dashboard (<https://dashboard.umbrella.com>).
2. On the menu, select **Admin > API Keys**.

The **API Keys** page displays.

3. Click **+** (Create).
4. Select **Legacy Network Devices**.
5. Click **Create**.
6. Copy the token.

Task two: Configure web filtering

Web

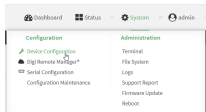
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

Remote Manager:

- a. Locate your device as described in [Use Digi Remote Manager to view and manage your device](#).
- b. Click the **Device ID**.
- c. Click **Settings**.
- d. Click to expand **Config**.

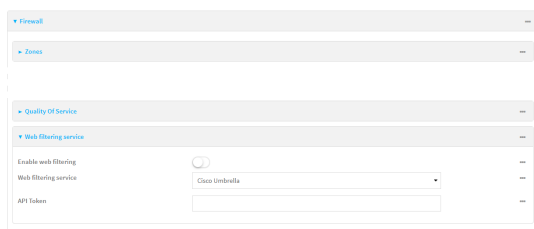
Local Web UI:

- a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



The **Configuration** window is displayed.

3. Click **Firewall > Web filtering service**.



4. Click **Enable web filtering** to enable.
5. For **Web filtering service**, select **Cisco Umbrella**.
6. Paste the **API token** that was generated in [Task one: Generate a Cisco Umbrella API token](#).
7. Click **Apply** to save the configuration and apply the change.

Command line

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Enable web filtering:

```
(config)> firewall web-filter enable true
(config)>
```

4. Set the web filter service type to **umbrella**:

```
(config)> firewall web-filter service umbrella
(config)>
```

5. Set `umbrella_token` to the API token generated in [Task one: Generate a Cisco Umbrella API token](#):

```
(config)> firewall web-filter umbrella_token token
(config)>
```

6. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

7. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Clear the Cisco Umbrella device ID

If the Cisco Umbrella device ID being used by your XBee Hive is invalid, you can clear the device ID.

Command line

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the Admin CLI prompt, use the **rm** command to delete the **web-filter-id** file, and confirm the deletion:

```
> rm /etc/config/web-filter-id
rm: remove '/etc/config/web-filter-id'? yes
>
```

3. Restart the web filtering service:

```
> config firewall web-filter enable false
> config firewall web-filter enable true
>
```

Configure web filtering with manual DNS servers

Required configuration items

- Enable web filtering.
- The IP address of one or more DNS servers. Cisco provides two open DNS servers for web filtering:
 - 208.67.222.222
 - 208.67.220.220

Note These two IP addresses do not work with the OpenDNS option. See <https://www.opendns.com/setupguide/> for more information about using Cisco DNS servers for web filtering.

To configure web filtering with manual DNS servers:

Web

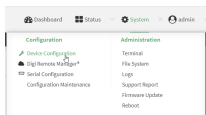
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

Remote Manager:

- a. Locate your device as described in [Use Digi Remote Manager to view and manage your device](#).
- b. Click the **Device ID**.
- c. Click **Settings**.
- d. Click to expand **Config**.

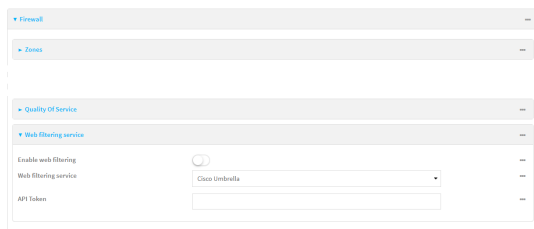
Local Web UI:

- a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

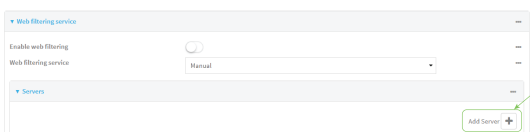


The **Configuration** window is displayed.

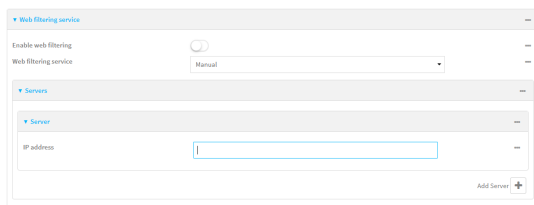
- Click **Firewall > Web filtering service**.



- Click **Enable web filtering** to enable.
- For **Web filtering service**, select **Manual**.
- Click to expand **Servers**.
- Click to add a server.



- For **IP address**, enter the IP address of the DNS server.



- (Optional) Repeat for additional DNS servers.
- Click **Apply** to save the configuration and apply the change.

Command line

- Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
- At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

- Enable web filtering:

```
(config)> firewall web-filter enable true
(config)>
```

4. Set the web filter service type to **manual**:

```
(config)> firewall web-filter service manual
(config)>
```

5. Add a DNS server:

```
(config)> add firewall web-filter server end
(config firewall web-filter server 0)>
```

6. Set the DNS server's IP address:

```
(config firewall web-filter server 0)> ip ip_address
(config firewall web-filter server 0)>
```

7. (Optional) Repeat for additional DNS servers.

For example, to configure manual web-filtering using Cisco's open DNS servers:

- a. Enable web filtering:

```
(config)> firewall web-filter enable true
(config)>
```

- b. Set the web filter service type to **manual**:

```
(config)> firewall web-filter service manual
(config)>
```

- c. Add the first DNS server:

- i. Add the server:

```
(config)> add firewall web-filter server end
(config firewall web-filter server 0)>
```

- ii. Set the server's IP address:

```
(config firewall web-filter server 0)> ip 208.67.222.220
(config firewall web-filter server 0)>
```

- d. Add the second DNS server:

- i. Move back one node in the configuration tree:

```
(config firewall web-filter server 0)> ..
(config firewall web-filter server)>
```

- ii. Add the server:

```
(config firewall web-filter server)> add end
(config firewall web-filter server 1)>
```

- iii. Set the server's IP address:

```
(config firewall web-filter server 1)> ip 208.67.222.222
(config firewall web-filter server 0)>
```

8. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

9. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Verify your web filtering configuration

If your web filtering implementation has the service set to Cisco Umbrella, or if it is configured to use manual DNS servers and uses the Cisco open DNS servers, you can verify the web filtering implementation by using the Cisco test site www.internetbadguys.com.

To verify the implementation:



Web

This procedure assumes you have already configured web filtering to use either Cisco Umbrella or the Cisco open DNS servers.

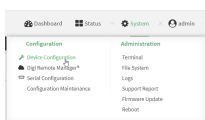
- See [Configure web filtering with Cisco Umbrella](#) for information about configuring web filtering with Cisco Umbrella.
 - See [Configure web filtering with manual DNS servers](#) for information about configuring web filtering to use Cisco open DNS servers.
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
 2. Access the device configuration:

Remote Manager:

- a. Locate your device as described in [Use Digi Remote Manager to view and manage your device](#).
- b. Click the **Device ID**.
- c. Click **Settings**.
- d. Click to expand **Config**.

Local Web UI:

- a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



The **Configuration** window is displayed.

3. Disable web filtering:
 - a. Click **Firewall > Web filtering service**.
 - b. Click **Enable web filtering** to disable.



- c. Click **Apply** to save the configuration and apply the change.
4. From a new tab in your browser, attempt to connect to the Cisco test URL <http://www.internetbadguys.com>.
The connection should be successful.
5. Return to the XBee Hive WebUI and enable web filtering:
 - a. Click **Firewall > Web filtering service**.
 - b. Click **Enable web filtering** to enable.
 - c. Click **Apply** to save the configuration and apply the change.
6. From your browser, attempt to connect to <http://www.internetbadguys.com> again.
The connection attempt should fail with the message, "This site is blocked due to a phishing threat."

Command line

This procedure assumes you have already configured web filtering to use either Cisco Umbrella or the Cisco open DNS servers.

- See [Configure web filtering with Cisco Umbrella](#) for information about configuring web filtering with Cisco Umbrella.
 - See [Configure web filtering with manual DNS servers](#) for information about configuring web filtering to use Cisco open DNS servers.
1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
 2. Disable web filtering:

```
> config firewall web-filter enable false
>
```

3. Attempt to connect to the Cisco test URL <http://www.internetbadguys.com> by using either a web browser or the **curl** command from a Linux shell:

```
$ curl -I http://www.internetbadguys.com
HTTP/1.1 200 OK
Server: Apache
Content-Type: text/html; charset=UTF-8
Accept-Ranges: bytes
```

```
Date: Thu, Jan 11, 2024 12:10:00
X-Varnish: 4201397492
Age: 0
Via: 1.1 varnish
Connection: keep-alive
```

```
$
```

You should receive an "HTTP/1.1 200 OK" message, as highlighted above.

4. Return to the Admin CLI and enable web filtering:

```
> config firewall web-filter enable true
>
```

5. Attempt to connect to <http://www.internetbadguys.com> again:

```
$ curl -I www.internetbadguys.com
HTTP/1.1 403 Forbidden
Server: openresty/1.9.7.3
Date: Thu, Jan 11, 2024 12:10:00
Content-Type: text/html
Connection: keep-alive
```

```
$
```

You should receive an "HTTP/1.1 403 Forbidden" message, as highlighted above.

Show web filter service information

To view information about the web filter service:

Command line

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the Admin CLI prompt, use the [show web-filter](#) command to view information about the web-filter service:

```
> show web-filter

Enabled   : true
Service   : umbrella
Device ID : 0004b5s63f5e2de7aa

>
```

If the device is configured to use Cisco Umbrella for web filtering, a device ID is displayed. The device ID is a unique ID assigned to the device by Cisco Umbrella. If there is a problem

with the device ID, you can clear the ID. See [Clear the Cisco Umbrella device ID](#) for instructions.

Containers

The XBee Hive device includes support for LXC Linux containers. LXC containers are a lightweight, operating system level method of virtualization that allows you to run one or more isolated Linux instances on a the same host using the host's Linux kernal.

Note Container support must be enabled in Digi Remote Manager. Contact your Digi sales representative for information.

This chapter contains the following topics:

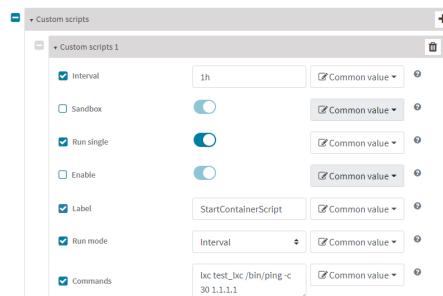
Use Digi Remote Manager to deploy and run containers	865
Upload a new LXC container	869
Configure a container	870
Starting and stopping the container	875
View the status of containers	876
Schedule a script to run in the container	878
Create a custom container	880

Use Digi Remote Manager to deploy and run containers

Note Container support must be enabled in Digi Remote Manager. Contact your Digi sales representative for information.

1. In Digi Remote Manager, [create a new template](#).
 - a. For the **Settings** step:
 - Click **Import from device** and import settings from an appropriate device.
 - Configure a script to run the container:
 - i. Click **System**.
 - ii. Click **Scheduled tasks > Custom scripts**.
 - iii. Click  to add a custom script.
 - iv. Click the **Label** checkbox and type an identifiable label for the script, for example, **StartContainerScript**.
 - v. To ensure that the script is always running:
 - i. Click the **Run mode** checkbox and select **Interval**.
 - ii. Click the **Interval** checkbox and enter a very short interval (for example, one minute).
 - iii. Click the **Run single** checkbox, and toggle on to enable.
- This will configure the device to regularly check if the script is running, but only run if it is currently not running.
- vi. For **Commands**, type the command to run the script. The command will vary depending on how you want to run the script, and what application you want to run inside the script. For example, to run the ping command inside a container, the command would be:

```
lxc container_name /bin/ping -c 30 1.1.1.1
```



- b. For the **Containers** step:
 - i. Click  to add a container to the template.

If no containers have been uploaded, or if Click  to upload a container file.

Upload a Container

Upload

Customer ID
Internal - Digi Test (2)

Image File*
test_lxc.tgz Browse

Name*
Test container

Version
Version 1

Type
lxc

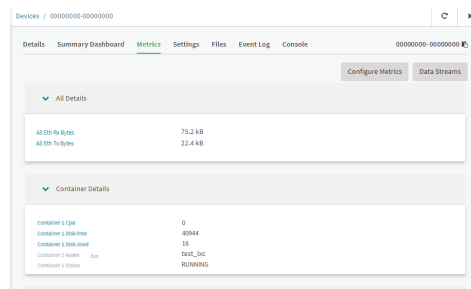
Device Type
Digi EX15W

Firmware Version*
22.8.33.50

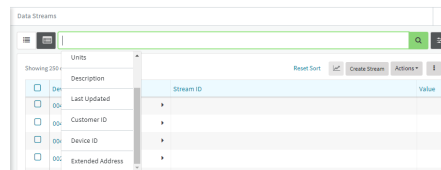
Firmware Info

- i. Click **Browse** and select the container file.
- ii. Type the **Name** of the container.
The **Name** entered here must be the same name as the container .tgz file. This is absolutely necessary, otherwise the container file will not be properly configured on the local devices.
- iii. (Optional) Include a version number for the container.
- iv. (Optional) Select the **Device Type** and **Firmware Version** that applies to the container.
If set, these options will limit the container to only be included in templates that match the specified device type and firmware version. If these are left blank, the container can be included in any template.
- v. Click **Upload**.
- vi. Repeat to upload additional containers.
- ii. Select one or more containers to add to the template.
- iii. Click **Done**.
- iv. Click **Save**.
- v. Click **Continue**.

- c. For the **Automation** step:
 - i. Click to toggle on **Enable Scanning**.
 - ii. Click to toggle on **Remediate**.
2. [Run a manual template scan](#) to apply the container and configuration settings to all applicable devices.
3. Verify that the container is running on a device:
 - To verify by using device metrics:
 - a. From the Digi Remote Manager main menu, click **Management > Devices**.
 - b. Click the **Device ID** to open the device's **Details** page..
 - c. Click **Metrics**.
 - d. Information about configured containers is located under the **Container Details** heading.

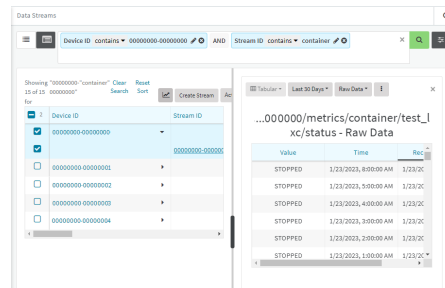


- To verify by using the **Data streams** page:
 - a. From the Remote Manager main menu, click **Management > Data Streams**.
 - b. Locate the container's data stream:
 - i. Click  to search using advance filtering.
 - ii. Click in the search text bar and select **Device ID** from the menu.

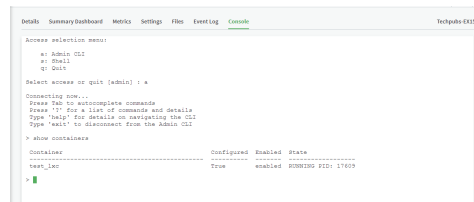


- iii. Type the device ID and press the Enter key.
- iv. Click in the search text bar again and select **Stream ID** from the menu.
- v. Type container and press the Enter key.

- vi. Click the **Stream ID** to view container status.



- To verify by using the **show containers** command on the local device:
 - a. From the Remote Manager main menu, click **Management > Devices**.
 - b. Select the device.
 - c. From the **Actions** menu, select **Open Console**.
 - d. At the prompt, type **show containers**.



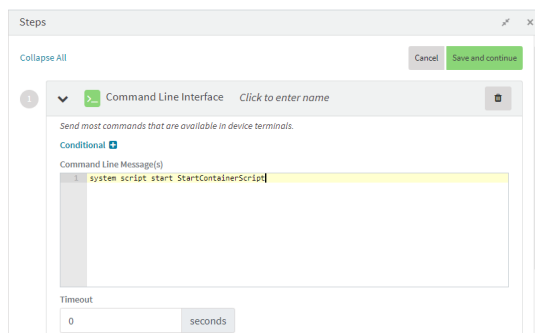
Use an automation to start the container

You can also use an automation to start a container:

1. Follow the steps in the previous procedure, except:
 - For **Run mode**, select **Manual**.
 - Do not set **Interval** or **Run single**.
2. [Create an automation](#) that uses a [Command Line Interface step](#).

For the **Command Line Message**, use the [system script start](#) command, using the label provided for the script in the previous procedure:

system script start StartContainerScript



Once the automation has been created, you can:

- Run the automation [manually](#).
- Include the automation in a template as a post-remediation or post-scan step.

When creating or editing a template, at the **Automation** page:

1. For **Post Remediation Options**, click **Run Automation** and select the automation.
2. For **On Successful Scan Options**, click **Run Automation** and select the automation.

- Include a trigger for the automation.

When creating or editing an automation, at the **Triggers** page:

1. Click to enable **Triggered** to configure the automation to be triggered, either on a schedule or by device activity.
 - a. To configure the script to be run on a schedule:
 - i. Click to enable **By Schedule**.
 - ii. Click **Start Time**.
 - iii. From the calendar provided, select the date and time that the script should be started for the first time.
 - iv. By default, the script will run only once. Click to enable **Repeat** to configure the script to run on a regular basis:

Every	1	Week
Until	Optional end time	Hour Day Week

- i. Type or select the number of times, and select the time period.
 - ii. (Optional) Click **Until** to select a date and time when the automation schedule will stop repeating.
- b. To configure the automation to be triggered by device activity, click to enable one or more of the following:
 - **Run when a device enters the target scope**
 - **Run when a device in the target scope enters a maintenance window:**
 - **Run when a device in the target scope leaves debug mode**

Target scope refers to a device that either:

- Is member of a group that was selected on the **Target** page.
- Has a tag that was selected on the **Target** page.
- Is one of the devices included on the **Target** page.

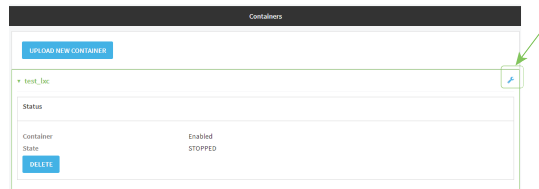
Upload a new LXC container



Log into the XBee Hive WebUI as a user with full Admin access rights.

1. From the main menu, click **Status**. Under **Services**, click **Containers**.
2. Click **Upload New Container**.

- From your local file system, select the container file in *.tgz format.
You can download a simple example container file, [test_lxc.tgz](#), from the Digi website.
- Create Configuration** is selected by default. This will create a configuration on the device for the container when it is installed. If deselected, you will need to create the configuration manually.
- Click **Apply**.
- If **Create Configuration** was deselected when the container was created, click ***** to go to the container configuration.



See [Configure a container](#) for further information about configuring the container.

Configure a container

Required configuration items

- The following configuration options are completed automatically if **Create Configuration** was selected when the container was created. See [Upload a new LXC container](#) for details:
 - Name of the container.
 - Enable the container.
 - Whether or not the container should use the device's system libraries.
- Determine whether or not the device should including virtual networking capabilities.

Additional configuration items

- If virtual networking is enabled:
 - The bridge to be used to provide network connectivity.

Note The virtual networking feature should not be used as the XBee Hive hardware does not support bridging.

- A static IP address for the container.
 - The network gateway.
- Serial ports on the device that the container will have access to.

Web

- Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.

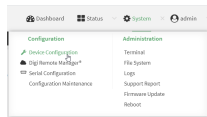
2. Access the device configuration:

Remote Manager:

- Locate your device as described in [Use Digi Remote Manager to view and manage your device](#).
- Click the **Device ID**.
- Click **Settings**.
- Click to expand **Config**.

Local Web UI:

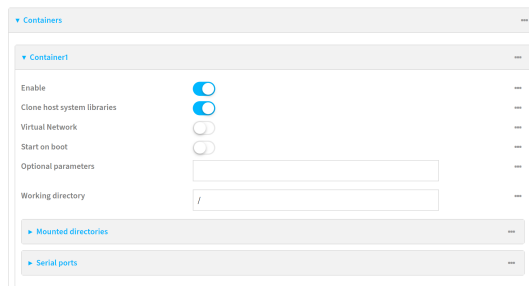
- On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



The **Configuration** window is displayed.

- Click **System > Containers**.
- For **Add Container**, type the name of the container and click **Go**.

The Container configuration window is displayed.



New containers are enabled by default. To disable, toggle off **Enable**.

- Clone host system libraries** is enabled by default. This allows the container to use the device's system libraries.
- Enable **Virtual Network** if the container should have network access:
 - Select a **Network Bridge Device** that will provide access to the container.
 - (Optional) Enter a static **IP Address** and netmask for the container. This must be a valid IP address for the bridge, or, if left blank, a DHCP server can assign the container an IP address.
 - (Optional) For **Gateway**, type the IP address of the network gateway.
- Enable **Start on boot** to configure the container to start when the system boots.
 - For **Restart timeout**, set the amount of time to wait before restarting the container, if the container ever stops. The default timeout of **0s** means that if the container stops, it will not be restarted.

Allowed values are any number of weeks, days, hours, minutes, or seconds, and take the format ***number{w|d|h|m|s}***.

For example, to set **Restart timeout** to ten minutes, enter **10m** or **600s**.

8. (Optional) Type any **Optional parameters** for the container. Parameters are in the format accepted by the lxc utility.
9. (Optional) Type a **Working directory** to configure an initial working directory for the container. The directory is an absolute path within the container and must begin with "/". The default is /.
10. (Optional) Click to expand **Mounted directories** to configure system directories that will be mounted inside the container. Any mounted directories need to be accessible to a non-privileged user.
 - a. For **Add Directory**, click 
 - b. For **Directory**, type the pathname of the directory to be mounted. The leading slash should be removed, so for example to mount the /opt directory, type **opt**.
11. (Optional) Click to expand **Serial ports** to assign serial ports that the container will have access to.
 - a. For **Add Port**, click 
 - b. For **Port**, select the serial port.
12. Click **Apply** to save the configuration and apply the change.

Command line

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Create a new container:

```
(config)> add system container name
(config system container name)>
```

where *name* is the

New access points are enabled by default.

4. New containers are enabled by default. To disable:

```
(config system container name)> enable false
(config system container name)>
```

5. By default, the container will use the device's system libraries. To disable:

```
(config system container name)> dal false
(config system container name)>
```

6. If the device will use virtual networking:

a. Enable virtual networking:

```
(config system container name)> network true
(config system container name)>
```

b. Set the network bridge device that will be used to provide network access:

i. Use the ? to determine the available bridges:

```
(config system container name)> bridge ?
```

Network Bridge Device: Containers require a bridge to access the network. Choose which bridge to connect the container to.

Format:

hotspot_bridge

lan1

Current value:

```
(config system container name)>
```

ii. Set the bridge:

```
(config system container name)> bridge lan1
(config system container name)>
```

c. (Optional) Set the IP address and netmask for the container:

```
(config system container name)> address IP_address/netmask
(config system container name)>
```

d. (Optional) Set the IP address of the network gateway:

```
(config system container name)> gateway IP_address
(config system container name)>
```

7. To configure the container to start when the device boots:

```
(config system container name)> start_on_boot true
(config system container name)>
```

a. Set the amount of time to wait before restarting the container, if the container ever stops:

```
(config system container name)> restart_timeout value
(config system container name)>
```

where *value* is any number of weeks, days, hours, minutes, or seconds, and takes the format ***number*{*w*|*d*|*h*|*m*|*s*}**.

For example, to set **restart_timeout** to ten minutes, enter either **10m** or **600s**:

```
(config system container name)> restart_timeout 600s
(config system container name)>
```

The default timeout of **0s** means that if the container stops, it will not be restarted.

8. Type any optional parameters for the container:

```
(config system container name)> args parameters
(config system container name)>
```

Parameters are in the format accepted by the lxc utility.

9. (Optional) Set an initial working directory for the container.

```
(config system container name)> workdir /value
(config system container name)>
```

The directory is an absolute path within the container and must begin with "/". The default is */*.

10. (Optional) Set any system directories that should be mounted inside the container. Any mounted directories need to be accessible to a non-privileged user.

- a. Add a system directory to be mounted:

```
(config system container name)> system_dirs directory
(config system container name)>
```

where *directory* is the pathname of the directory to be mounted. The leading slash should be removed, so for example to mount the */opt* directory, type **opt**.

- b. Repeat for additional directories.

11. For **Add Directory**, click 

- a. For **Directory**, type the pathname of the directory to be mounted. The leading slash should be removed, so for example to mount the */opt* directory, type **opt**.

12. (Optional) Assign serial ports that the container will have access to:

- a. Determine available serial ports:

```
(config system container name)> ... serial
```

Serial

Additional Configuration

```
port1          Port 1
...
```

```
(config system container name)>
```

- b. Add the port:

```
(config system container name)> add ports end port1
(config system container name)>
```

13. Save the configuration and apply the change.

```
(config network wireless client new_client)> save
Configuration saved.
>
```

14. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Starting and stopping the container

Container commands are not available from the Admin CLI. You must access the device shell in order to run Python applications from the command line. See [Authentication groups](#) for information about configuring authentication groups that include shell access.

Note Container support must be enabled in Digi Remote Manager. Contact your Digi sales representative for information.

Starting the container

There are two methods to start containers:

- Non-persistent: Changes made to the container file system will be lost when the container is stopped.
- Persistent: Changes made to the container file system when not be lost when the container is stopped.

Starting a container in non-persistent mode

To start the container in non-persistent mode:

1. Select a device in Remote Manager that is configured to allow shell access to the admin user, and click **Actions > Open Console**. Alternatively, log into the XBee Hive local command line as a user with shell access.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **shell** to access the device shell.
2. At the shell prompt, type:

```
# lxc container_name
lxc #
```

where *container_name* is the name of the container as configured on the device. For example:

```
# lxc test_lxc
lxc #
```

This will start the container by using **/bin/sh -l**, which runs the shell and loads the shell profile. The default shell profile includes an **lxc #** prompt.

Starting a container in persistent mode

To start the container in persistent mode, include the **-p** option at the command line. For example:

1. Select a device in Remote Manager that is configured to allow shell access to the admin user, and click **Actions > Open Console**. Alternatively, log into the XBee Hive local command line as a user with shell access.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **shell** to access the device shell.

2. At the shell prompt, type:

```
# lxc test_lxc -p
lxc #
```

This will start the container by using **/bin/sh -l**, which runs the shell and loads the shell profile. The default shell profile includes an **lxc #** prompt.

Starting a container by including an executable

You can supply an executable to run when you start the container, along with any parameters. If you don't supply a parameter, the default behavior is to run the executable by using **/bin/sh -l**, which runs the shell and loads the shell profile. This is useful when you use the **Clone DAL** option when uploading the container, which includes the device's system libraries. In this case, the command without any additional parameters will use the device's shell. See [Upload a new LXC container](#) for more information.

For example, to start a container and run a python script called `my_python_script.py` in the default shell, type:

```
# lxc test_lxc /usr/bin/python3 /usr/bin/my_python_script.py
```

This will run the script from `/usr/bin` inside the container. If you have `/usr/bin/my_python_script.py` on your device's native system, it will be ignored.

Stopping the container

1. Select a device in Remote Manager that is configured to allow shell access to the admin user, and click **Actions > Open Console**. Alternatively, log into the XBee Hive local command line as a user with shell access.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **shell** to access the device shell.

2. At the lxc shell prompt, type:

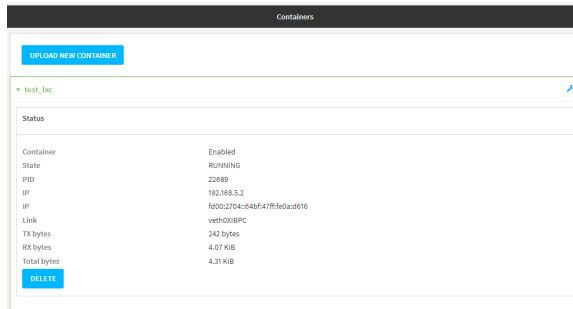
```
lxc # exit
#
```

View the status of containers



1. Log into the XBee Hive WebUI as a user with full Admin access rights.
2. From the main menu, click **Status**. Under **Services**, click **Containers**.

The **Containers** status page displays.



Command line

Show status of all containers

Use the `show containers` command with no additional arguments to show the status of all containers on the system:

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type `admin` to access the Admin CLI.
2. At the prompt, type:

```
> show containers
```

```
Container Configured Enabled State
-----
mytest1  True    enabled STOPPED
test_lxc True    enabled RUNNING PID 19327
>
```

3. Type `exit` to exit the Admin CLI.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type `quit` to disconnect from the device.

Show status of a specific container

Use the `show containers container name` command to show the status of the specified container:

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type `admin` to access the Admin CLI.
2. At the prompt, type:

```
> show containers container test_lxc
```

```
Container Configured Enabled State
-----
```

```
test_lxc True    enabled RUNNING PID 19327
```

```
>
```

3. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Schedule a script to run in the container

This simple example will:

1. Start the container in non-persistent mode.
2. Execute a ping command every ten seconds from inside the container.

Web

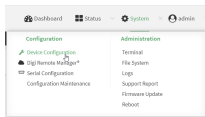
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

Remote Manager:

- a. Locate your device as described in [Use Digi Remote Manager to view and manage your device](#).
- b. Click the **Device ID**.
- c. Click **Settings**.
- d. Click to expand **Config**.

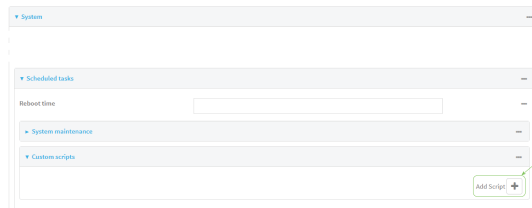
Local Web UI:

- a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



The **Configuration** window is displayed.

3. Click **System > Scheduled tasks > Custom scripts**.
4. For **Add Script**, click .



The script configuration window is displayed.

5. (Optional) For **Label**, type `container_script`.
6. For **Run mode**, select **Interval**.
7. For **Interval**, type **10s**.
8. For **Commands**, type the following:

```
lxc container_name /bin/ping -c 1 IP_address
```

For example:

```
lxc test_lxc /bin/ping -c 1 192.168.1.146
```

9. Click to disable **Sandbox**. Sandbox restrictions are not necessary when a container is used.
10. Click **Apply** to save the configuration and apply the change.

Command line

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Add a script:

```
(config)> add system schedule script end
(config system schedule script 0)>
```

4. Provide a label for the script, for example:

```
(config system schedule script 0)> label test_lxc
(config system schedule script 0)>
```

5. Set the mode to interval:

```
(config system schedule script 0)> when interval
(config system schedule script 0)>
```

- Set the interval to ten seconds:

```
(config system schedule script 0)> on_interval 10s
(config system schedule script 0)>
```

- Set the commands that will execute the script:

```
(config system schedule script 0)> commands "lxc script_name /bin/ping -c 1 IP_address"
(config system schedule script 0)>
```

For example:

```
(config system schedule script 0)> commands "lxc test_lxc /bin/ping -c 1 192.168.1.146"
(config system schedule script 0)>
```

- Disable the **sandbox**. Sandbox restrictions are not necessary when a container is used.

```
(config system schedule script 0)> sandbox false
(config system schedule script 0)>
```

- Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

- Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Create a custom container

This example creates a simple custom container that contains a python script in the /etc directory. In this example, we will use a simple container file named test_lxc.tgz. You can download [test_lxc.tgz](#) from the Digi website.

At the command line of a Linux host, we will unpack the file, add a simple python script, and create a new container file that includes the python script.

Create the custom container file

- At the command line of a Linux host, unpack the test_lxc.tgz file:

```
$ tar -xvf test_lxc.tgz
rootfs/
rootfs/usr/
rootfs/etc/
rootfs/etc/group
rootfs/etc/profile
rootfs/etc/passwd
rootfs/tmp/
$
```

2. Change to the rootfs/etc directory:

```
$ cd rootfs/etc
$
```

3. Create a file named test.py with the following contents:

```
print("Hello world.\n")
```

4. Change directories to leave the container file structure:

```
$ cd ../../
```

5. Change user and group permissions on all files in the container file structure:

```
$ sudo chown -R 165536 rootfs
$ sudo chgrp -R 165536 rootfs
```

6. Tar and zip the directory structure to create a new container file:

```
$ sudo tar -czvf python_lxc.tgz rootfs
```

If using macOS, include the `--disable-copyfile` option with this command:

```
$ sudo tar --disable-copyfile -czvf python_lxc.tgz rootfs
```

Test the custom container file

1. Add the new container to your XBee Hive device:

Log into the XBee Hive WebUI as a user with full Admin access rights.

- a. From the main menu, click **Status**. Under **Services**, click **Containers**.
- b. Click **Upload New Container**.
- c. From your local file system, select the container file.

You can download a simple example container file, [test_lxc.tgz](#), from the Digi website.

- d. **Create Configuration** is selected by default. This will create a configuration on the device for the container when it is installed. If deselected, you will need to create the configuration manually.

- e. Click **Apply**.

2. Select a device in Remote Manager that is configured to allow shell access to the admin user, and click **Actions** > **Open Console**. Alternatively, log into the XBee Hive local command line as a user with shell access.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **shell** to access the device shell.

3. At the shell prompt, type:

```
# lxc python_lxc
lxc #
```

4. Execute the python command:

```
lxc # python /etc/test.py  
Hello world.  
lxc #
```

Monitoring

This chapter contains the following topics:

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Configure the monitoring of a device's internet connection

Monitor the bandwidth and performance of the overall internet connection of a device over time. Ping tests and speed tests will be performed at configurable intervals. The data is reported to Digi Remote Manager. You can view the metrics on the device dashboard. This setting is **not enabled by default**.

Note You do not have the option to select an interface. This monitoring reports metrics on the connection that is active at the time.

Web

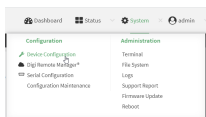
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

Remote Manager:

- a. Locate your device as described in [Use Digi Remote Manager to view and manage your device](#).
- b. Click the **Device ID**.
- c. Click **Settings**.
- d. Click to expand **Config**.

Local Web UI:

- a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



The **Configuration** window is displayed.

3. Click **Monitoring > Performance Quality**.
4. To **Enable** performance quality monitoring, click the toggle.
5. (Optional) To enable speed tests, click the **Use speedtest** toggle.
Speed tests are run once per hour if enabled and are independent of the ping test interval.
6. To configure ping tests:
 - a. For **Test Interval**, select how often the ping test should occur.
 - b. For **Ping Host**, type the IP address of the host to use. (The default is blank).
 - c. For **Ping Count**, type the number of pings to send for statistics collection. (default is 10).
 - d. For **Ping Pretest Count**, type the number of pings to send for the pre-test (default is 3).
This wakes up the network so it is ready to perform the testing.
7. Click **Apply** to save the configuration and apply the change.

Command line

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. To **Enable** performance quality monitoring:

```
(config monitoring perf_quality) enable true
```

4. (Optional) To enable speed tests:

```
(config monitoring perf-quality) speedtest true
```

Speed tests are run once per hour if enabled and are independent of the ping test interval.

5. To configure ping tests:

- a. To set how often the ping test should occur:

```
(config monitoring perf-quality) interval [value]
```

with *value* being 10min, 20min, 5min.

- b. Add the number of pings for statistics collection:

```
(config monitoring perf_quality) ping_count [value].
```

with *value* being the number of pings. The default value is **10**.

- c. Add the ping host:

```
(config monitoring perf_quality) ping_host [value]
```

with *value* being the IP address of the resolver you'd like to use. The default is blank.

- d. For **Ping Pretest Count**, type the number of pings to send for the pre-test (default is 3). This wakes up the network so it is ready to perform the testing.

```
(config monitoring perf_quality) ping_pretest_count [value].
```

with *value* being the number of pings to send for the pretest to wake up the network so it is ready to perform the testing. The default is **3**.

6. Save the configuration and apply the change.

```
(config network wireless client new_client)> save
Configuration saved.
>
```

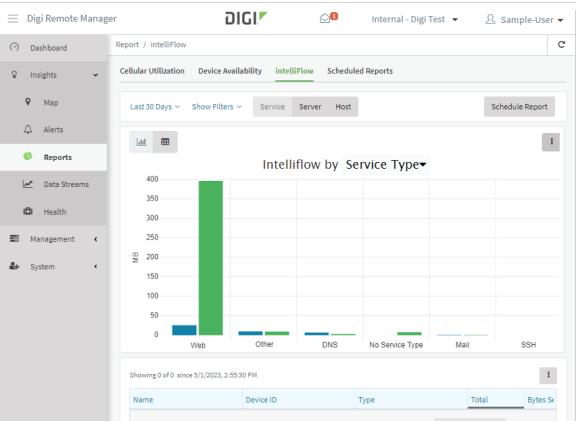
7. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

intelliFlow

Digi intelliFlow is a reporting and graphical presentation tool for visualizing your network’s data usage and network traffic information.

intelliFlow can be enabled on Digi Remote Manager to provide a full analysis of all Digi devices on your network. Contact your Digi sales representative for information about enabling intelliFlow on Remote Manager.



IntelliFlow is also available on the local device for device-specific visualization of network use. To use intelliFlow on the local device, you must have access to the local WebUI. Once you enable intelliFlow, the **Status > intelliFlow** option is available in the main menu. By default, intelliFlow is disabled on the local device.

On the local device, intelliFlow provides charts on the following information:

- System utilisation
- Top data usage by host
- Top data usage by server
- Top data usage by service
- Host data usage over time

intelliFlow charts are dymanic; at any point, you can click inside the chart to drill down to view more granular information, and menu options allow you to change various aspects of the information being displayed.

This section contains the following topics:

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Configure domain name groups	891
Use intelliFlow to display average CPU and RAM usage	894
Use intelliFlow to display top data usage information	895
Use intelliFlow to display data usage by host over time	897

Enable intelliFlow

Required configuration items

- Enable intelliFlow.

Additional configuration items

- The firewall zone for internal clients being monitored by intelliFlow.

To enable intelliFlow:

Web

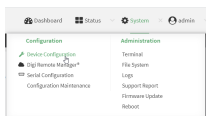
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

Remote Manager:

- a. Locate your device as described in [Use Digi Remote Manager to view and manage your device](#).
- b. Click the **Device ID**.
- c. Click **Settings**.
- d. Click to expand **Config**.

Local Web UI:

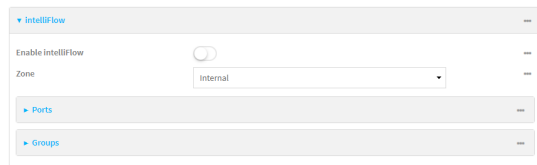
- a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



The **Configuration** window is displayed.

3. Click **Monitoring > intelliFlow**.

The intelliFlow configuration window is displayed.



4. Click **Enable intelliFlow**.
5. For **Zone**, select the firewall zone. Internal clients that are being monitored by IntelliFlow should be present on the specified zone.
6. Click **Apply** to save the configuration and apply the change.

Command line

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Enable IntelliFlow:

```
(config)> monitoring intelliflow enable true
```

4. Set the firewall zone. Internal clients that are being monitored by IntelliFlow should be present on the specified zone:
 - a. Determine available zones:

```
(config)> monitoring intelliflow zone ?
```

Zone: The firewall zone which is assigned to the network interface(s) that IntelliFlow will see as internal clients. IntelliFlow relies on an internal to external relationship, where the internal clients are present on the zone specified.

Format:

any
dynamic_routes
edge
external
internal
ipsec
loopback
setup

Default value: internal

Current value: internal

```
(config)>
```

- b. Set the zone to be used by IntelliFlow:

```
(config)> monitoring intelliflow zone my_zone
```

5. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

6. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Configure service types

The service type is used to categorize several ports under one service. For example, port numbers 80, 443, and 8080 are included in the **Web** service type.

There are several predefined service types:

- Web: Ports 80, 443, and 8080.
- FTP: Ports 20, 21, 989, and 990.
- SSH: Port 22.
- Telnet: Ports 23 and 992.
- Mail: Ports 25, 110, 143, 220, 993 and 995.
- DNS: Port 53.
- IRC: Ports 194 and 994.
- RSYNC: Ports 873.

You can add and remove ports from the predefined service port types, and you can also define your own service types. For example, to define a service type called "MyService" using ports 9000 and 9001:

Web

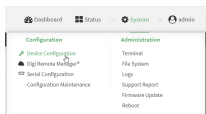
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

Remote Manager:

- a. Locate your device as described in [Use Digi Remote Manager to view and manage your device](#).
- b. Click the **Device ID**.
- c. Click **Settings**.
- d. Click to expand **Config**.

Local Web UI:

- a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



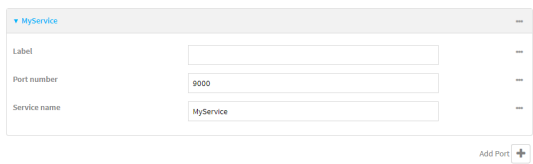
The **Configuration** window is displayed.

3. Click **Monitoring > intelliFlow**.
4. Click to expand **Ports**.

- At the bottom of the list of ports, click  to add a port.



- Label** is optional.
- For **Port number**, type **9000**.
- For **Service name**, type **MyService**.



- Click  to add a another port.
- For **Port number**, type **9001**.
- For **Service name**, type **MyService**.
- Click **Apply** to save the configuration and apply the change.

Command line

- Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

- At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

- Add a port:

```
(config)> add monitoring intelliflow ports end
(config monitoring intelliflow ports 20)>
```

- Set the port number:

```
(config monitoring intelliflow ports 20)> port 9000
(config monitoring intelliflow ports 20)>
```

- Set the service type:

```
(config monitoring intelliflow ports 20)> service MyService
(config monitoring intelliflow ports 20)>
```

6. Add another port:

```
(config monitoring intelliflow ports 20)> add .. end
(config monitoring intelliflow ports 21)>
```

7. Set the port number:

```
(config monitoring intelliflow ports 21)> port 9001
(config monitoring intelliflow ports 21)>
```

8. Set the service type:

```
(config monitoring intelliflow ports 21)> service MyService
(config monitoring intelliflow ports 21)>
```

9. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

10. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Configure domain name groups

Domain name groups are used to categorize several domains names in one group. For example, digi.com and devicecloud.com could be grouped together in an intelliFlow group called Digi.

Web

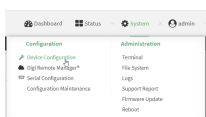
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

Remote Manager:

- a. Locate your device as described in [Use Digi Remote Manager to view and manage your device](#).
- b. Click the **Device ID**.
- c. Click **Settings**.
- d. Click to expand **Config**.

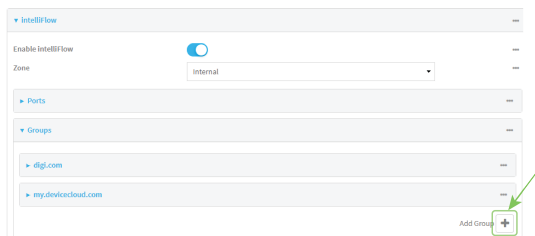
Local Web UI:

- a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



The **Configuration** window is displayed.

3. Click **Monitoring > intelliFlow > Groups**.
4. Click  to add a domain.



5. **Label** is optional.
6. For **Domain name**, type **digi.com**.
7. For **Group**, type **Digi**.
8. Click  to add another port.
9. For **Domain name**, type **devicecloud.com**.
10. For **Group**, type **Digi**.
11. Click **Apply** to save the configuration and apply the change.

Command line

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Add a group:

```
(config)> add monitoring intelliflow groups end
(config monitoring intelliflow groups 1)>
```

4. Set the domain name:

```
(config monitoring intelliflow groups 1)> domain digi.com
(config monitoring intelliflow groups 1)>
```

5. Set the group name:

```
(config monitoring intelliflow groups 1)> group Digi
(config monitoring intelliflow groups 1)>
```

6. Add another port:

```
(config monitoring intelliflow groups 1)> add .. end  
(config monitoring intelliflow groups 2)>
```

7. Set the port number:

```
(config monitoring intelliflow groups 2)> domain devicecloud.com  
(config monitoring intelliflow groups 2)>
```

8. Set the service type:

```
(config monitoring intelliflow groups 2)> group Digi  
(config monitoring intelliflow groups 2)>
```

9. Save the configuration and apply the change.

```
(config)> save  
Configuration saved.  
>
```

10. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Use intelliFlow to display average CPU and RAM usage

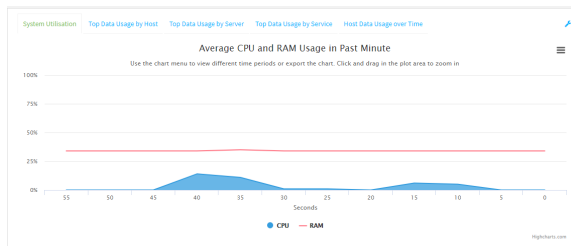
This procedure is only available from the WebUI.

To display display average CPU and RAM usage:

Web

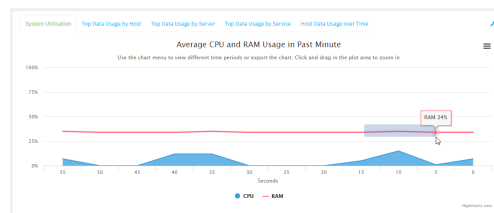
1. Log into the XBee Hive WebUI as a user with full Admin access rights.
2. If you have not already done so, enable intelliFlow. See [Enable intelliFlow](#).
3. From the menu, click **Status > intelliFlow**.

The System Utilisation chart is displayed:

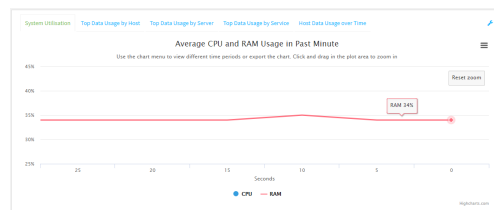


■ Display more granular information:

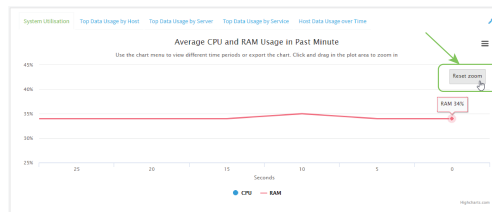
1. Click and drag over an area in the chart to zoom into that area and provide more granular information.



2. Release to display the selected portion of the chart:



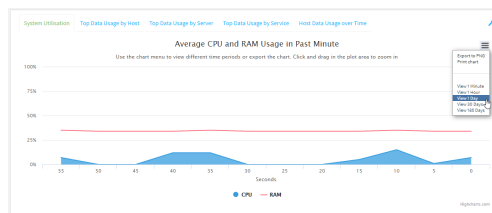
3. Click **Reset zoom** to return to the original display:



■ Change the time period displayed by the chart.

By default, the **System utilisation** chart displays the average CPU and RAM usage over the last minute. You can change this to display the average CPU and RAM usage:

- Over the last hour.
 - Over the last day.
 - Over the last 30 days.
 - Over the last 180 days.
1. Click the menu icon (☰).
 2. Select the time period to be displayed.



■ Save or print the chart.

1. Click the menu icon (☰).
2. To save the chart to your local filesystem, select **Export to PNG**.
3. To print the chart, select **Print chart**.

Use intelliFlow to display top data usage information

With intelliFlow, you can display top data usage information based on the following:

- Top data usage by host
- Top data usage by server
- Top data usage by service

To generate a top data usage chart:

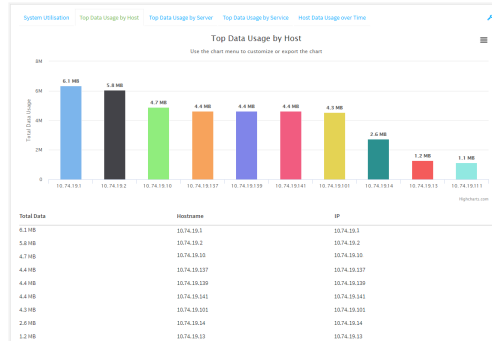


Web

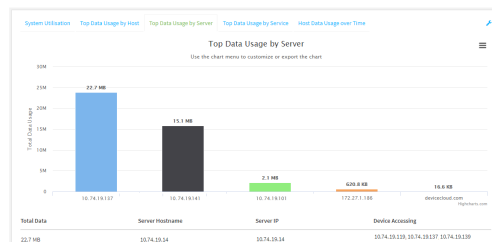
1. Log into the XBee Hive WebUI as a user with full Admin access rights.
2. If you have not already done so, enable intelliFlow. See [Enable intelliFlow](#).
3. From the menu, click **Status > intelliFlow**.

4. Display a data usage chart:

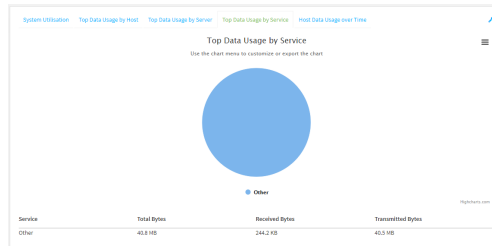
- To display the **Top Data Usage by Host** chart, click **Top Data Usage by Host**.



- To display the **Top Data Usage by Server** chart, click **Top Data Usage by Server**.

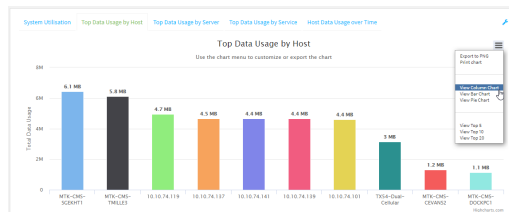


- To display the **Top Data Usage by Service** chart, click **Top Data Usage by Service**.



5. Change the type of chart that is used to display the data:

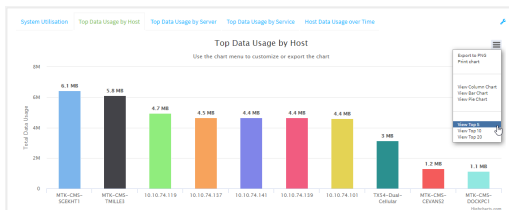
- Click the menu icon (☰).
- Select the type of chart.



6. Change the number of top users displayed.

You can display the top five, top ten, or top twenty data users.

- Click the menu icon (☰).
- Select the number of top users to displayed.



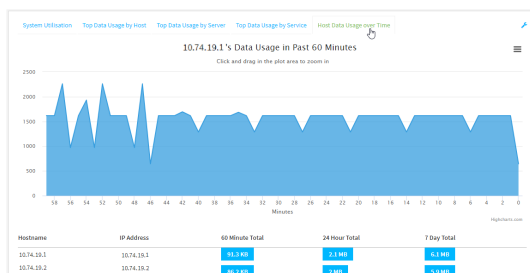
- Save or print the chart.
 - Click the menu icon (☰).
 - To save the chart to your local filesystem, select **Export to PNG**.
 - To print the chart, select **Print chart**.

Use intelliFlow to display data usage by host over time

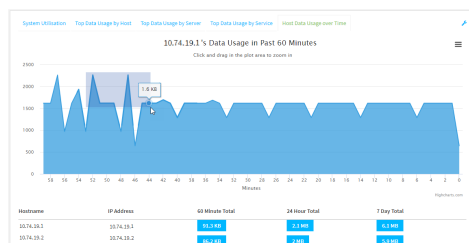
To generate a chart displaying a host's data usage over time:



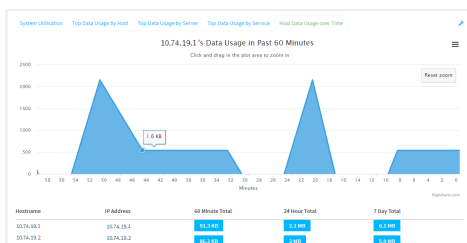
- Log into the XBee Hive WebUI as a user with full Admin access rights.
- If you have not already done so, enable intelliFlow. See [Enable intelliFlow](#).
- From the menu, click **Status > intelliFlow**.
- Click **Host Data Usage Over Time**.



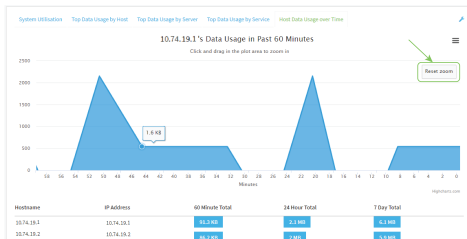
- Display more granular information:
 - Click and drag over an area in the chart to zoom into that area and provide more granular information.



- b. Release to display the selected portion of the chart:



- c. Click **Reset zoom** to return to the original display:



- Save or print the chart.
 - a. Click the menu icon (☰).
 - b. To save the chart to your local filesystem, select **Export to PNG**.
 - c. To print the chart, select **Print chart**.

Configure NetFlow Probe

NetFlow probe is used to probe network traffic on the XBee Hive device and export statistics to NetFlow collectors.

Required configuration items

- Enable NetFlow.
- The IP address of a NetFlow collector.

Additional configuration items

- The NetFlow version.
- Enable flow sampling and select the flow sampling technique.
- The number of flows from which the flow sampler can sample.
- The number of seconds that a flow is inactive before it is exported to the NetFlow collectors.
- The number of seconds that a flow is active before it is exported to the NetFlow collectors.
- The maximum number of simultaneous flows.
- A label for the NetFlow collector.
- The port of the NetFlow collector.
- Additional NetFlow collectors.

To probe network traffic and export statistics to NetFlow collectors:

Web

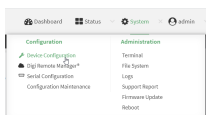
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

Remote Manager:

- a. Locate your device as described in [Use Digi Remote Manager to view and manage your device](#).
- b. Click the **Device ID**.
- c. Click **Settings**.
- d. Click to expand **Config**.

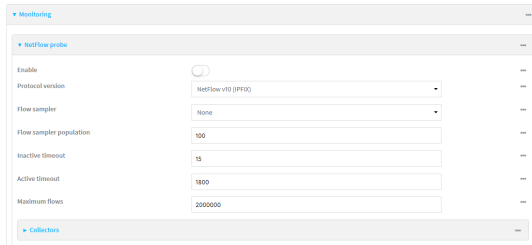
Local Web UI:

- a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



The **Configuration** window is displayed.

3. Click **Monitoring > NetFlow probe**.



4. **Enable** NetFlow probe.
5. **Protocol version:** Select the **Protocol version**. Available options are:
 - **NetFlow v5**—Supports IPv4 only.
 - **NetFlow v9**—Supports IPv4 and IPv6.
 - **NetFlow v10 (IPFIX)**—Supports both IPv4 and IPv6 and includes IP Flow Information Export (IPFIX).

The default is **NetFlow v10 (IPFIX)**.

6. Enable **Flow sampler** by selecting a sampling technique. Flow sampling can reduce flow processing and transmission overhead by providing a representative subset of all flows. Available options are:
 - **None**—No flow sampling method is used. Each flow is accounted.
 - **Deterministic**—Selects every n th flow, where n is the value of **Flow sampler population**.

- **Random**—Randomly selects one out of every n flows, where n is the value of **Flow sampler population**.
 - **Hash**—Randomly selects one out of every n flows using the hash of the flow key, where n is the value of **Flow sampler population**.
7. For **Flow sampler population**, if you selected a flow sampler, enter the number of flows for the sampler. Allowed value is any number between **2** and **16383**. The default is **100**.
 8. For **Inactive timeout**, type the the number of seconds that a flow can be inactive before sent to a collector. Allowed value is any number between **1** and **15**. The default is **15**.
 9. For **Active timeout**, type the number of seconds that a flow can be active before sent to a collector. Allowed value is any number between **1** and **1800**. The default is **1800**.
 10. For **Maximum flows**, type the maximum number of flows to probe simultaneously. Allowed value is any number between **0** and **2000000**. The default is **2000000**.
 11. Add collectors:
 - a. Click to expand **Collectors**.
 - b. For **Add Collector**, click .
 - c. (Optional) Type a **Label** for the collector.
 - d. For **Address**, type the IP address of the collector.
 - e. (Optional) For **Port**, enter the port number used by the collector. The default is 2055.
 Repeat to add additional collectors.
 12. Click **Apply** to save the configuration and apply the change.

Command line

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Enable NetFlow:

```
(config)> monitoring netflow enable true
(config)>
```

4. Set the protocol version:

```
(config)> monitoring netflow protocol version
(config)>
```

where *version* is one of:

- **v5**—NetFlow v5 supports IPv4 only.
- **v9**—NetFlow v9 supports IPv4 and IPv6.
- **v10**—NetFlow v10 (IPFIX) supports both IPv4 and IPv6 and includes IP Flow Information Export (IPFIX).

The default is **v10**.

1. Enable flow sampling by selecting a sampling technique. Flow sampling can reduce flow processing and transmission overhead by providing a representative subset of all flows.

```
(config)> monitoring netflow sampler type
(config)>
```

where *type* is one of:

- **none**—No flow sampling method is used. Each flow is accounted.
- **deterministic**—Selects every *n*th flow, where *n* is the value of the flow sample population.
- **random**—Randomly selects one out of every *n* flows, where *n* is the value of the flow sample population.
- **hash**—Randomly selects one out of every *n* flows using the hash of the flow key, where *n* is the value of the flow sample population.

5. If you are using a flow sampler, set the number of flows for the sampler:

```
(config)> monitoring netflow sampler_population value
(config)>
```

where *value* is any number between **2** and **16383**. The default is **100**.

6. Set the number of seconds that a flow can be inactive before sent to a collector:

```
(config)> monitoring netflow inactive_timeout value
(config)>
```

where *value* is any is any number between **1** and **15**. The default is **15**.

7. Set the number of seconds that a flow can be active before sent to a collector:

```
(config)> monitoring netflow active_timeout value
(config)>
```

where *value* is any is any number between **1** and **1800**. The default is **1800**.

8. Set the maximum number of flows to probe simultaneously:

```
(config)> monitoring netflow max_flows value
(config)>
```

where *value* is any is any number between **0** and **2000000**. The default is **2000000**.

9. Add collectors:

- a. Add a collector:

```
(config)> add monitoring netflow collector end
(config monitoring netflow collector 0)>
```

- b. Set the IP address of the collector:

```
(config monitoring netflow collector 0)> address ip_address
(config monitoring netflow collector 0)>
```

- c. (Optional) Set the port used by the collector:

```
(config monitoring netflow collector 0)> port port  
(config monitoring netflow collector 0)>
```

- d. (Optional) Set a label for the collector:

```
(config monitoring netflow collector 0)> label "This is a collector."  
(config monitoring netflow collector 0)>
```

Repeat to add additional collectors.

10. Save the configuration and apply the change.

```
(config monitoring netflow collector 0)> save  
Configuration saved.  
>
```

11. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

File system

This chapter contains the following topics:

The XBee Hive local file system	904
Display directory contents	904
Create a directory	905
Display file contents	906
Copy a file or directory	906
Move or rename a file or directory	907
Delete a file or directory	908
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The XBee Hive local file system

The XBee Hive local file system has approximately 150 MB of space available for storing files, such as Python programs, alternative configuration files and firmware versions, and release files, such as cellular module images. The writable directories within the file system are:

- /tmp
- /opt
- /etc/config

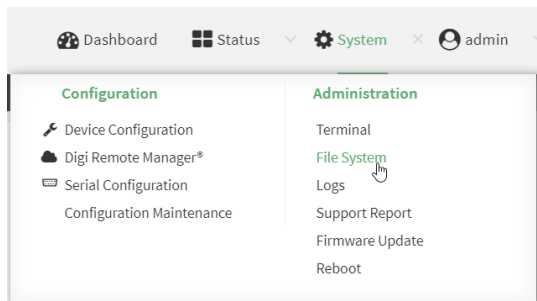
Files stored in the /tmp directory do not persist across reboots. Therefore, /tmp is a good location to upload temporary files, such as files used for firmware updates. Files stored in /opt and /etc/config do persist across reboots, but are deleted if a factory reset of the system is performed. See [Device reset](#) for more information.

Display directory contents

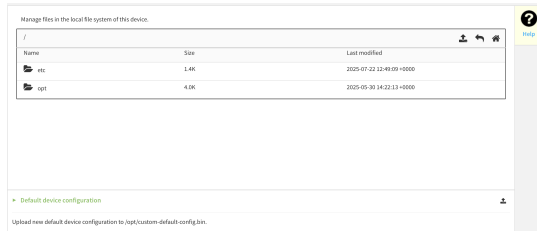
To display directory contents by using the WebUI or the Admin CLI:

Web

1. Log into the XBee Hive WebUI as a user with full Admin access rights.
2. On the menu, click **System**. Under **Administration**, click **File System**.



The **File System** page appears.



3. Highlight a directory and click  to open the directory and view the files in the directory.

Command line

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the Admin CLI prompt, type **ls /path/dir_name**. For example, to display the contents of the **/etc/config** directory:

```
> ls /etc/config
-rw-r--r-- 1 root  root    856 Nov 20 20:12 accns.json
drw----- 2 root  root    160 Sep 23 04:02 analyzer
drwxr-xr-x 3 root  root    224 Sep 23 04:02 cc_acl
-rw-r--r-- 1 root  root    47 Sep 23 04:02 dhcp.leases
...
>
```

3. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Create a directory

Command line

This procedure is not available through the WebUI. To make a new directory, use the **mkdir** command, specifying the name of the directory.

For example:

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the Admin CLI prompt, type **mkdir /path/dir_name**. For example, to create a directory named **temp** in **/etc/config**:

```
> mkdir /etc/config/temp
>
```

3. Verify that the directory was created:

```
> ls /etc/config
...
-rw-r--r-- 1 root  root    1436 Aug 12 21:36 ssl.crt
-rw----- 1 root  root    3895 Aug 12 21:36 ssl.pem
-rw-r--r-- 1 root  root     10 Aug 5 06:41 start
drwxr-xr-x 2 root  root     160 Aug 25 17:49 temp
>
```

4. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Display file contents

This procedure is not available through the WebUI. To display the contents of a file by using the Admin CLI, use the [more](#) command, specifying the name of the directory.

For example:

Command line

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the Admin CLI prompt, type **more /path/filename**. For example, to view the content of the file **accns.json** in **/etc/config**:

```
> more /etc/config/accns.json
{
  "auth":
    "user": {
      "admin": {
        "password": "$2a$05$W1sls1oxsadf/n4J0XT.Rgr6ewr1yerHtXQdbafsatGswKg0YUm"
      }
    },
  "schema": {
    "version": "461"
  }
}
>
```

3. Type **exit** to exit the Admin CLI.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Copy a file or directory

This procedure is not available through the WebUI. To copy a file or directory by using the Admin CLI, use the [cp](#) command, specifying the existing path and filename followed by the path and filename of the new file, or specifying the existing path and directory name followed by the path and directory name of the new directory.

Command line

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the Admin CLI prompt, type **cp /path/filename|dir_name /path[filename]|dir_name**. For example:
 - To copy the file **/etc/config/accns.json** to a file named **backup_cfg.json** in a directory named **/etc/config/test**, enter the following:

```
> cp /etc/config/accns.json /etc/config/test/backup_cfg.json
```

```
>
```
 - To copy a directory named **/etc/config/test** to **/opt**:

```
> cp /etc/config/test/ /opt/
```

```
>
```
3. Type **exit** to exit the Admin CLI.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Move or rename a file or directory

This procedure is not available through the WebUI. To move or rename a file or directory by using the Admin CLI, use the **mv** command.

Command line

To rename a file named **test.py** in **/etc/config/scripts** to **final.py**:

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the Admin CLI prompt, type:

```
> mv /etc/config/scripts/test.py /etc/config/scripts/final.py
```

```
>
```
3. Type **exit** to exit the Admin CLI.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

To move **test.py** from **/etc/config/scripts** to **/opt**:

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the Admin CLI prompt, type:

```
> mv /etc/config/scripts/test.py /opt/
```

```
>
```

3. Type **exit** to exit the Admin CLI.

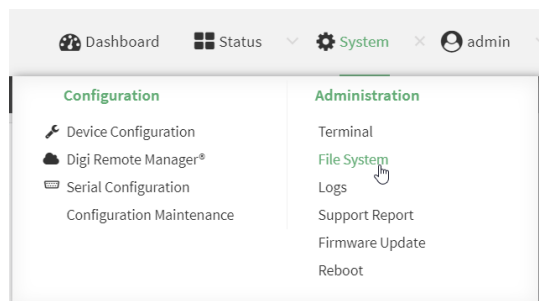
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Delete a file or directory

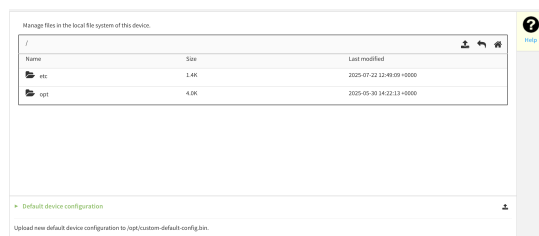
To delete a file or directory by using the WebUI or the Admin CLI:

Web

1. Log into the XBee Hive WebUI as a user with full Admin access rights.
2. On the menu, click **System**. Under **Administration**, click **File System**.



The **File System** page appears.



3. Highlight the directory containing the file to be deleted and click **↗** to open the directory.
4. Highlight the file to be deleted and click **✖**.
5. Click **OK** to confirm.

Command line

To delete a file named **test.py** in **/etc/config/scripts**:

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the Admin CLI prompt, type:

```
> rm /etc/config/scripts/test.py
rm: remove '/etc/config/scripts/test.py'? yes
>
```

3. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

To delete a directory named **temp** from **/opt**:

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the Admin CLI prompt, type:

```
> rm /opt/temp/
rm: descend into directory '/opt/temp'? yes
rm: remove directory '/opt/temp'? yes
>
```

3. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

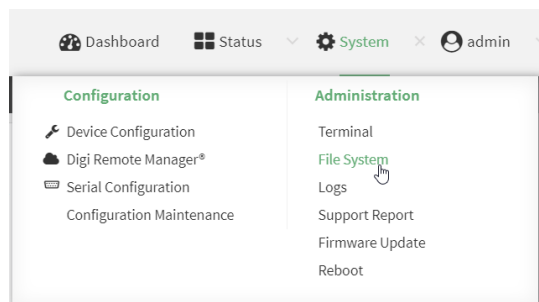
Upload and download files

You can download and upload files by using the WebUI or from the command line by using the [scp](#) Secure Copy command, or by using a utility such as SSH File Transfer Protocol (SFTP) or an SFTP application like FileZilla.

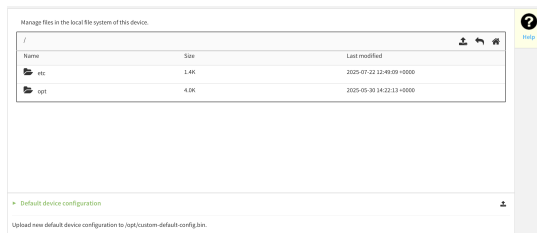
Upload and download files by using the WebUI

Upload files

1. Log into the XBee Hive WebUI as a user with full Admin access rights.
2. On the menu, click **System**. Under **Administration**, click **File System**.



The **File System** page appears.

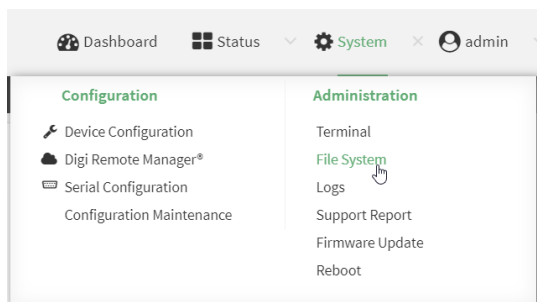


3. Highlight the directory to which the file will be uploaded and click  to open the directory.
4. Click  (upload).
5. Browse to the location of the file on your local machine. Select the file and click **Open** to upload the file.

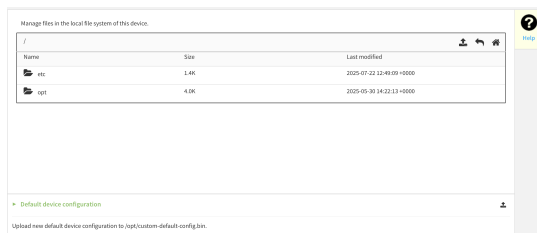
Download files

Log into the Xbee Hive WebUI as a user with full Admin access rights.

1. On the menu, click **System**. Under **Administration**, click **File System**.



The **File System** page appears.



2. Highlight the directory to which the file will be uploaded and click  to open the directory.
3. Highlight the appropriate file and click  (download).

Upload and download files by using the Secure Copy command

Copy a file from a remote host to the Xbee Hive device

To copy a file from a remote host to the Xbee Hive device, use the **scp** command as follows:

```
> scp host hostname-or-ip user username remote remote-path local local-path to local
```

where:

- *hostname-or-ip* is the hostname or IP address of the remote host.
- *username* is the name of the user on the remote host.
- *remote-path* is the path and filename of the file on the remote host that will be copied to the XBee Hive device.
- *local-path* is the location on the XBee Hive device where the copied file will be placed.

For example:

To copy firmware from a remote host with an IP address of 192.168.4.1 to the /etc/config directory on the XBee Hive device, issue the following command:

```
> scp host 192.168.4.1 user admin remote /home/admin/bin/XBee Hive-25.8.bin local /etc/config/scripts to
local
admin@192.168.4.1's password: adminpwd
XBee Hive-25.8.bin          100% 36MB 11.1MB/s   00:03
>
```

Transfer a file from the XBee Hive device to a remote host

To copy a file from the XBee Hive device to a remote host, use the **scp** command as follows:

```
> scp host hostname-or-ip user username remote remote-path local local-path to remote
```

where:

- *hostname-or-ip* is the hostname or IP address of the remote host.
- *username* is the name of the user on the remote host.
- *remote-path* is the location on the remote host where the file will be copied.
- *local-path* is the path and filename on the XBee Hive device.

For example:

To copy a support report from the XBee Hive device to a remote host at the IP address of 192.168.4.1:

1. Use the **system support-report** command to generate the report:

```
> system support-report path /var/log/
Saving support report to /var/log/support-report-0040D0133536-24-01-12-12:10:00.bin
Support report saved.
>
```

2. Use the **scp** command to transfer the report to a remote host:

```
> scp host 192.168.4.1 user admin remote /home/admin/temp/ local /var/log/support-report-
00:40:D0:13:35:36-24-01-12-12:10:00.bin to remote
admin@192.168.4.1's password: adminpwd
support-report-0040D0133536-24-01-12-12:10:00.bin
>
```

Upload and download files using SFTP

Transfer a file from a remote host to the XBee Hive device

This example uploads firmware from a remote host to the XBee Hive device with an IP address of **192.168.2.1**, using the username **ahmed**:

```
$ sftp ahmed@192.168.2.1
Password:
Connected to 192.168.2.1
sftp> put XBee Hive-25.8
Uploading XBee Hive-25.8 to XBee Hive-25.8
XBee Hive-25.8                               100% 24M 830.4KB/s 00:00
sftp> exit
$
```

Transfer a file from the XBee Hive device to a remote host

This example downloads a file named **test.py** from the Digi XBee Hive Gateway device at the IP address of **192.168.2.1** with a username of **ahmed** to the local directory on the remote host:

```
$ sftp ahmed@192.168.2.1
Password:
Connected to 192.168.2.1
sftp> get test.py
Fetching test.py to test.py
test.py                                       100% 254 0.3KB/s 00:00
sftp> exit
$
```

Command line interface

This chapter contains the following topics:

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Access the command line interface

You can access the XBee Hive command line interface using an SSH connection, a telnet connection, or a serial connection on a serial port configured for the **Login** serial port mode. You can use an open-source terminal software, such as PuTTY or TeraTerm, to access the device through one of these mechanisms.

You can also access the command line interface in the WebUI by using the **Terminal**, or the Digi Remote Manager by using the **Console**.

To access the command line, your device must be configured to allow access, and you must log in as a user who has been configured for the appropriate access.

For further information about configuring access to these services, see:

- Serial: [Configure Login mode for a serial port](#)
- WebUI: [Configure the web administration service](#)
- SSH: [Configure SSH access](#)
- Telnet: [Configure telnet access](#)

Log in to the command line interface

Command line

1. Connect to the XBee Hive device by using a serial connection, SSH or telnet, or the **Terminal** in the WebUI or the **Console** in the Digi Remote Manager. See [Access the command line interface](#) for more information.
 - For serial connections, the default configuration is:
 - **9600** baud rate
 - **8** data bits
 - **no** parity
 - **1** stop bit
 - **no** flow control
 - For SSH and telnet connections, the Setup IP address of the device is **192.168.2.1** on the .
2. At the login prompt, enter the username and password of a user with Admin access:

```
login: admin
Password: *****
```

The default username is **admin**. The default unique password for your device is printed on the device label.

3. Depending on the device configuration, you may be presented with another menu, for example:

Access selection menu:

```
a: Admin CLI
s: Shell
```

q: Quit

Select access or quit [admin] :

Type **a** or **admin** to access the XBee Hive command line.

You will now be connected to the Admin CLI:

Connecting now...
 Press Tab to autocomplete commands
 Press '?' for a list of commands and details
 Type 'help' for details on navigating the CLI
 Type 'exit' to disconnect from the Admin CLI

>

See [Command line interface](#) for detailed instructions on using the command line interface.

Exit the command line interface

Command line

1. At the command prompt, type **exit**.

> exit

2. Depending on the device configuration, you may be presented with another menu, for example:

Access selection menu:

a: Admin CLI
 s: Shell
 q: Quit

Select access or quit [admin] :

Type **q** or **quit** to exit.

Execute a command from the web interface

1. Log into the XBee Hive WebUI as a user with full Admin access rights.
2. At the main menu, click **Terminal**. The device console appears.

XBee Hive login:

3. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
 Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

The Admin CLI prompt appears.

>

Display help for commands and parameters

The help command

When executed from the root command prompt, **help** displays information about autocomplete operations, how to move the cursor on the XBee Hive command line, and other keyboard shortcuts:

```
> help
```

```
Commands
```

```
?      Show commands help
<Tab>   Tab completion, displays all valid commands to complete command,
        if only one command is possible, it is used
<Space> Like tab except shortest prefix is used if command is valid
<Enter> Enter an input. If quoting then a new line is created instead. If
        the input is invalid then characters will be deleted until a
        prefix for a valid command is found.
Ctrl + A Move cursor to start of line
Ctrl + E Move cursor to end of line
Ctrl + W Delete word under cursor until start of line or [' ', , \/, .]
Ctrl + R If the current input is invalid then characters will be deleted
        until a prefix for a valid command is found.
Ctrl + left Jump cursor left until start of line or [' ', , \/, .]
Ctrl + right Jump cursor right until start of line or [' ', , \/, .]
```

```
>
```

The question mark (?) command

When executed from the root command prompt, **?** displays available commands:

```
> ?
```

```
Commands
```

```
config View and modify the configuration
exit   Exit the CLI
analyzer Analyzer commands.
cp      Copy a file or directory.
grep    Grep a file.
help    Show CLI editing and navigation commands.
ls      List a directory.
mkdir   Create a directory.
modem   Modem commands.
more    View a file.
mv      Move a file or directory.
ping    Ping a host.
powerctrl Power control commands.
reboot  Reboot the system.
rm      Remove a file or directory.
scp     Copy a file or directory over SSH.
show    Show instance statistics.
system  System commands.
```

```
tail    Tail a file.
traceroute Print the route packets trace to network host.
update  Update firmware.
xbee    XBee commands.
```

```
>
```

Display help for individual commands

When included with a command name, both **?** and **help** provide further information about the command. For example:

1. To display further information about the **show** command, type either **show ?** or **show help**:

```
> show ?
```

```
Commands
```

```
arp      Show ARP tables
cloud    Show drm statistics
config   Show config deltas.
containers Show container statistics.
dhcp-lease Show DHCP leases.
dns      Show DNS servers.
event    Show event list
ipsec    Show IPsec statistics.
l2tp     Show L2TP statistics.
l2tppeth Show L2TPv3 ethernet statistics.
location Show location information.
log      Show syslog.
manufacture Show manufacturer information.
modbus-gateway Show modbus gateway status & statistics.
modem    Show modem statistics.
mqtt     Show MQTT broker information
nemo     Show NEMO statistics.
network  Show network interface statistics.
ntp      Show NTP information.
openvpn  Show OpenVPN statistics.
route    Show IP routing information.
scep-client Show SCEP client statistics.
scripts  Show scheduled scripts.
serial   Show serial statistics.
surelink Show Surelink statistics.
system   Show system statistics.
usb      Show USB information.
version  Show firmware version.
vrrp     Show VRRP statistics.
web-filter Show web filter information.
wifi     Show Wi-Fi statistics.
```

```
> show
```

Use the Tab key or the space bar to display abbreviated help

When executed from the root command prompt, pressing the **Tab** key or the space bar displays an abbreviated list of available commands:

Similar behavior is available with any command name:

```
> config network interface <space>
..      ...      setupip      setuplinklocalip lan
loopback
> config network interface
```

Auto-complete commands and parameters

When entering a command and parameter, press the **Tab** key to cause the command line interface to auto-complete as much of the command and parameter as possible. Typing the space bar has similar behavior. If multiple commands are available that will match the entered text, auto-complete is not performed and the available commands are displayed instead.

Auto-complete applies to these command elements only :

- Command names. For example, typing **net<Tab>** auto-completes the command as **network**.
- Parameter names. For example:
 - **ping hostname int<Tab>** auto-completes the parameter as **interface**.
 - **system b<Tab>** auto-completes the parameter as **backup**.
- Parameter values, where the value is one of an enumeration or an on|off type; for example:

```
(config)> serial port1 enable t<Tab>
```

auto-completes to

```
(config)> serial port1 enable true
```

Auto-complete does not function for:

- Parameter values that are string types.
- Integer values.
- File names.
- Select parameters passed to commands that perform an action.

Available commands

The following commands are available from the Admin CLI prompt:

Command	Description
config	Used to view and modify the configuration. See Device configuration using the command line interface for more information about using the config command.
exit	Exits the CLI.
analyzer	Analyzer commands.
cat	View a file.
clear	Commands to clear the device's status or systems.
container	Create, delete, or interact with a container.
cp	Copies a file or directory.
grep	Grep a file.
help	Displays: - CLI editing and navigation commands, when executed from the root of the Admin CLI prompt. - Available commands, syntax diagram, and parameter information, when executed in conjunction with another command. See Display help for commands and parameters for information about the help command.
ls	Lists the contents of a directory.
mkdir	Creates a directory.
modem	Executes modem commands.
monitoring	Monitoring commands.
more	Displays the contents of a file.
mv	Moves a file or directory.
ping	Pings a remote host using Internet Control Message Protocol (ICMP) Echo Request messages.
powerctrl	Power control commands. See Enter suspend mode for information about the powerctrl command.
pyinstall	Installs and manages Python packages.
poweroff	Powers off the system.

Command	Description
reboot	Reboots the XBee Hive device.
rm	Removes a file.
scp	Uses the secure copy protocol (SCP) to transfer files between the XBee Hive device and a remote host. See Use the scp command for information about using the scp command.
show	Displays information about the device and the device's configuration. See Display status and statistics using the show command for more information about the show command.
iperf	Perform a speedtest.
ssh	SSH login to a remote server.
system	Issues commands related to system functionality.
tail	Tail a file.
telnet	Telnet login to a remote server.
traceroute	Sends and tracks route packets to a destination host.
xbee	XBee commands. See XBee-specific commands for more information.

Note For commands that operate on the XBee Hive's file system, such as the **cp**, **ls**, and **mkdir** commands, see [File system](#) for information about the file system, including how to copy, move and delete files and directories.

XBee-specific commands

The **xbee** command includes a set of sub-commands to work with XBee devices from the CLI.

XBee command	Description
network	XBee network commands to clear, show, and discover the network. See Manage an XBee network .
get	Reads any parameter from the local XBee—the one in the XBee Hive—or from any remote XBee device in the network. See Read XBee parameters .
set	Writes the value of any parameter of the local or any remote XBee device. See Write XBee parameters .
execute	Executes a command in the local XBee device or any remote XBee device in the network. See Execute XBee AT commands .
update	Updates the local or any remote XBee device with a provided profile. See Apply XBee profiles .

To see all the available options, run **xbee ?**.

```
> xbee ?
```

Commands

```
execute  Execute XBee AT command.
get      Get XBee parameter.
network  XBee network commands.
set      Set XBee parameter.
update   Update XBee profile.
```

To identify an XBee device, use its 64-bit address or its node identifier (**NI**).

To refer to an XBee device, this guide uses **XBEE-ID** as its identifier—node identifier or 64-bit address.

In case any **xbee** command fails, the error is formatted as:

```
[ERROR]: ...
```

Manage an XBee network

The XBee Hive is designed to inspect, manage, and work with live XBee networks. The XBee Hive discovers the devices in the network, lists all the connected nodes, and provides information such as their 64-bit address, node identifier, role, and so on.

The XBee Hive network caches a list of known nodes that reflects the real XBee network. It adds new nodes to its network cache in these scenarios:

- When any kind of communication occurs between any remote node in the network and the XBee Hive.
- When the XBee Hive actively searches for remote nodes in the network periodically or by customer request.

The available commands to manage an XBee network are:

Command	Description
show	Displays the list of known XBee nodes included in the network cache of the XBee Hive. See Show the network .
discover	Explores the XBee network to find its nodes and adds them to the network cache of the XBee Hive. See Discover the network .
clear	Eliminates all the known XBee nodes in the network cache of the XBee Hive. See Clear the network cache .
export	Exports the XBee network to a xnet file. See Export the network .

Use **xbee network ?** to display the available options.

```
> xbee network ?
```

Commands

```
clear  XBee network clear.
discover XBee network discovery.
export Export XBee network.
show  XBee network show.
```

Discover the network

In order to find the XBee nodes on your network, you can launch a discovery. Use the command **xbee network discover**:

- While running and when an XBee device is discovered, a line is printed showing its 64-bit address.
- When the process finishes, it shows the total amount of remote nodes discovered.

Example: xbee network discover

```
> xbee network discover
Device discovered: 0013A200DDDDDDDD1
Device discovered: 0013A200DDDDDDDD2
Device discovered: 0013A200DDDDDDDD3

Network discover completed! 3 devices in the network.

>
```

Note See [One-shot discovery](#) for more information on how to perform a one-shot discovery from the WebUI.

Show the network

This command shows all nodes known to the XBee Hive and included in its network cache. To show the current nodes on your network, run **xbee network show**:

- The first node displayed is the XBee device on the XBee Hive, the local one, followed by the remote ones.
- The information for each XBee node is displayed in columns:
 - 64-bit address—**SH** and **SL**—in hexadecimal.
 - Node identifier (**NI**).
 - Role of the node: coordinator, router or end device.
 - 16-bit address in hexadecimal.
 - Firmware version in hexadecimal.
 - Hardware name and version in hexadecimal.

Example: xbee network show

```
> xbee network show
```

64-bit address	Node identifier	Role	16-bit address	Firmware	Hardware
0013A200417BD6ED	C1-EU8	Coordinator	00 00	1009	XBee 3 Micro and SMT (0x41)
0013A2004195C889	COOR	Router	29 E8	1009	XBee 3 TH (0x42)
0013A2004195C88D	CASTOR	Router	6C 5B	1009	XBee 3 TH (0x42)

```
0013A20041940C75 POLUX      Router    C7 E9      1009      XBee 3 Micro and SMT (0x41)
>
```

Note See [Review the current XBee network state](#) to display the list of known nodes from the WebUI.

Clear the network cache

You can clear all the network information the XBee Hive stores, that is, eliminate already discovered nodes and empty its network cache to start from scratch. The CLI command to clear the network cache is **xbec network clear**.

After that, the only node in the network cache is the local XBee device.

Example: xbec network clear

```
> xbec network clear

> xbec network show
64-bit address  Node identifier  Role      16-bit address  Firmware  Hardware
-----
0013A200417BD6ED C1-EU8      Coordinator 00 00      1009      XBee 3 Micro and SMT (0x41)
>
```

Export the network

To export the XBee network to a file use **xbec network export** command. Use **xbec network export ?** to display its help and syntax:

```
> xbec network export ?
```

Syntax: export EXPORTDIR [description STRING] [name STRING]

Parameters

```
EXPORTDIR  Export directory path. (Required)
description Network description.
name       Network name.
```

- EXPORTDIR—required—Absolute path of the directory inside the IX15 file system to leave the export file.
- description—optional: Brief description of the network.
- name—optional: Name for the network.

For example, to export the network to **/etc/config/** with the name "My IX15 network" and description "My IX15 Gateway XBee network", enter the following command:

```
> xbec network export /etc/config name "My IX15 network" description "My IX15 Gateway XBee network"
Network exported to '/etc/config/My_IX15_network_021521_130707.xnet'
>
```

Download the *.xnet file following the instructions at [Upload and download files](#).

The exported file can be imported into the XBee Network Assistant to work offline. See [Import an XBee network](#).

Configure individual XBee parameters

We recommend configuring way an XBee by applying a profile. You may still need to read or set some specific value, for that you can use the CLI **get**, **set**, and **execute** commands.

In the corresponding user guide you can find a complete list of AT commands, their description, and the supported value range:

- [Digi XBee 3 Zigbee RF Module User Guide](#)
- [Digi XBee 3 DigiMesh RF Module User Guide](#)
- [Digi XBee 3 802.15.4 RF Module User Guide](#)

Read XBee parameters

To read the value of an XBee setting use the **xbee get** command. This command allows you to get the value of an XBee parameter from the local XBee device or of any remote device in the network.

Use **xbee get ?** to display its help and syntax.

```
> xbee get ?
```

Gets the value of an XBee parameter.

Syntax: get XBEE-ID PARAMETER

Parameters

XBEE-ID XBee ID (MAC or node ID). (Required)
 PARAMETER Parameter. (Required)

- **XBEE-ID**—required—the XBee identifier that can be the 64-bit address or the node identifier.
- **PARAMETER**—required—is the XBee parameter to read.
- The returned value is:
 - A string for the node identifier (**NI**).
 - An integer value in hexadecimal format—including the **0x** prefix—for the rest of the parameters.

For example, to get the value of **D2** (AD2/DIO2 Configuration) for an XBee with the 64-bit address **0013A200DDDDDDDD1**, enter the following command:

Example: xbee get

```
> xbee get 0013A200DDDDDDDD1 D2
0x00

>
```

Note You can auto-complete the XBee identifier and the parameter: press the **Tab** key to cause the command line interface to auto-complete as much of the command and parameter as possible. See [Auto-complete commands and parameters](#).

```
> xbee get 00<Tab>
> xbee get 0013A200DDDDDDDD<Tab>
0013A200DDDDDDDD0 0013A200DDDDDDDD1 0013A200DDDDDDDD2 0013A200DDDDDDDD3
```

```
> xbee get 0013A200DDDDDDDD2 D2
0x00

>
```

Write XBee parameters

To write the value of an XBee setting, use the command **xbee set**. This command allows you to set the value of an XBee parameter for the local XBee or of any remote XBee device in the network.

Use **xbee set ?** to display its help and syntax.

```
> xbee set ?
```

Sets the value of an XBee parameter. Optionally, the value can be set but not saved, or not applied.

Syntax: set XBEE-ID PARAMETER VALUE [no-apply] [no-save]

Parameters

```
XBEE-ID  XBee ID (MAC or node ID). (Required)
PARAMETER Parameter. (Required)
VALUE    Value. (Required)
no-apply no-apply
no-save  no-save
```

- **XBEE-ID**—required—is the XBee identifier, that can be the 64-bit address or the node identifier.
- **PARAMETER**—required—is the XBee parameter to write.
- **VALUE**—required—is the new value of the provided **PARAMETER**. It is interpreted as:
 - A string if it is between single quotes.
 - An integer value without quotes. You can use prefixes to specify its format:
 - **0x** or **0X**: hexadecimal value, for example, 0x0A.
 - **0o** or **0O**: octal value, for example, 0o12.
 - **0b** or **0B**: binary value, for example, 0b1010.
 - **No prefix**: decimal value, for example, 10.
- By default, the value is applied—the new value takes effect immediately—and saved—the new value is internally programmed so it is applied the next time the XBee device boots. Optionally, you can use:
 - no-apply not to apply the value immediately and wait for a specific apply command (**AC**).
 - no-save not to store the value permanently.
- The set command does not return anything when it is successful. Otherwise, the error displays.

For example, to set to 0x01 the value of **D2** (AD2/DIO2 Configuration) of an XBee which its 64-bit address is 0013A200DDDDDDDD0, enter the following command:

Example: xbee set

```
> xbee set 0013A200DDDDDDDD0 D2 0x01

> xbee get 0013A200DDDDDDDD0 D2
0x01

>
```

Execute XBee AT commands

To execute an AT command use **xbee execute**. This command allows you to execute an AT command in the local XBee device or in any remote device in the network.

Use **xbee execute ?** to display its help and syntax.

```
> xbee execute ?
```

Executes an AT command on an XBee.

Syntax: execute XBEE-ID AT-COMMAND [value STRING]

Parameters

XBEE-ID XBee ID (MAC or node ID). (Required)
 AT-COMMAND AT command. (Required)
 value AT command value.

```
>
```

- **XBEE-ID**—required—is the XBee identifier, that can be the 64-bit address or the node identifier.
- **AT-COMMAND**—required—is the AT command to execute.
- **value**—optional: Specify the AT command arguments if they are allowed.

For example, to apply all the current changes, use the **AC** AT command in an XBee with a 64-bit address of 0013A200DDDDDDDD0, enter the following command:

Example: xbee execute

```
> xbee execute 0013A200DDDDDDDD0 AC

>
```

Apply XBee profiles

Applying a profile is the recommended way to configure an XBee or update it. A configuration profile is an **XPRO** file that may contain several items: device firmware, setting values to configure, and a file system.

Upload XBee profiles

XPRO files are uploaded to the **/etc/config/xbee-profiles** directory of the XBee Hive. You can upload profiles to the XBee Hive using:

- The WebUI. See [Manage XBee profiles](#).
- The **scp** Secure Copy command from the CLI. See [Upload and download files](#).

- A utility such as SSH File Transfer Protocol (SFTP) or an SFTP application like FileZilla. See [Upload and download files](#).
- Digi Remote Manager. See [Upload files to a device](#) in the *Digi Remote Manager User Guide*.

Update an XBee

To apply a profile use the **xbee update** command. Use **xbee update ?** to display its help and syntax.

```
> xbee update ?
```

Updates the profile (.xpro) of an XBee.

Syntax: update XBEE-ID PROFILE

Parameters

XBEE-ID	XBee ID (MAC or node ID). (Required)
PROFILE	Profile path and filename. (Required)

```
>
```

- **XBEE-ID**—required—is the XBee identifier, that can be the 64-bit address or the node identifier.
- **PROFILE**—required—is the full path of the **XPRO** file inside the XBee Hive.

For example, to apply the **XPRO** file **/etc/config/xbee-profiles** to an XBee with 64-bit address 0013A200DDDDDD1, enter the following command:

Example: xbee update

```
> xbee update 0013A200DDDDDD1 /etc/config/xbee-profiles/profile_1008.xpro
Applying profile /etc/config/xbee-profiles/profile_1008.xpro (0013A200DDDDDD1 - REMOTE1)
Reading device parameters
Updating remote XBee firmware
Updating remote XBee firmware: 1%
...
Updating remote XBee firmware: 99%
Updating remote XBee firmware: 100%
Updating XBee settings
Updating XBee settings: 10%
Updating XBee settings: 20%
...
Updating XBee settings: 90%
Updating XBee settings: 100%
Success: 100%
```

Note See [Apply XBee profiles](#) for more information on how to perform an update from the WebUI.

Use the scp command

The **scp** command uses Secure Copy Protocol (SCP) to transfer files between the XBee Hive device and a remote host.

Required configuration items

- The hostname or IP address of the remote host.
- The username and password of the user on the remote host.
- Whether the file is being copied to the XBee Hive device from a remote host, or to the remote host from the XBee Hive device.
 - If the file is being copied to the XBee Hive device from a remote host:
 - The path and filename of the file on the remote host that will be copied to the XBee Hive device.
 - The location on the XBee Hive device where the file will be copied.
 - If the file is being copied to a remote host from the XBee Hive device:
 - The path and filename of the file on the XBee Hive device that will be copied to the remote host.
 - The location on the remote host where the file will be copied.

Copy a file from a remote host to the XBee Hive device

To copy a file from a remote host to the XBee Hive device, use the [scp](#) command as follows:

```
> scp host hostname-or-ip user username remote remote-path local local-path to local
```

where:

- *hostname-or-ip* is the hostname or IP address of the remote host.
- *username* is the name of the user on the remote host.
- *remote-path* is the path and filename of the file on the remote host that will be copied to the XBee Hive device.
- *local-path* is the location on the XBee Hive device where the copied file will be placed.

For example:

To copy firmware from a remote host with an IP address of 192.168.4.1 to the /etc/config directory on the XBee Hive device, issue the following command:

```
> scp host 192.168.4.1 user admin remote /home/admin/bin/XBee Hive-25.8.bin local /etc/config/scripts to local
admin@192.168.4.1's password: adminpwd
XBee Hive-25.8.bin          100% 36MB 11.1MB/s   00:03
>
```

Transfer a file from the XBee Hive device to a remote host

To copy a file from the XBee Hive device to a remote host, use the [scp](#) command as follows:

```
> scp host hostname-or-ip user username remote remote-path local local-path to remote
```

where:

- *hostname-or-ip* is the hostname or IP address of the remote host.
- *username* is the name of the user on the remote host.
- *remote-path* is the location on the remote host where the file will be copied.
- *local-path* is the path and filename on the XBee Hive device.

For example:

To copy a support report from the XBee Hive device to a remote host at the IP address of 192.168.4.1:

1. Use the **system support-report** command to generate the report:

```
> system support-report path /var/log/
Saving support report to /var/log/support-report-0040D0133536-24-01-12-12:10:00.bin
Support report saved.
>
```

2. Use the **scp** command to transfer the report to a remote host:

```
> scp host 192.168.4.1 user admin remote /home/admin/temp/ local /var/log/support-report-
00:40:D0:13:35:36-24-01-12-12:10:00.bin to remote
admin@192.168.4.1's password: adminpwd
support-report-0040D0133536-24-01-12-12:10:00.bin
>
```

Display status and statistics using the show command

The XBee Hive **show** command display status and statistics for various features.

For example:

show config

The **show config** command displays all the configuration settings for the device that have been changed from the default settings. This is a particularly useful when troubleshooting the device.

```
> show config

auth tacacs+ service "login"
auth user admin password "$2a$05$WIJQhqu17BgysytkpobKhaeLPtWraGANBcrIEaJX/wJv63JENW/HOu"
add auth user test
add auth user test group end "admin"
add auth user test group end "serial"
auth user test password "$2a$05$RdGYz1sLKbWrqe6cZjlsd.otg03JZR6n9939XV6EYWUSP0tMAzO5W"
network interface lan ipv4 type "dhcp"
network interface lan zone "external"
network interface modem modem apn 0 apn "00000.000"
network interface modem modem apn_lock "true"
schema version "445"

>
```

show system

The **show system** command displays system information and statistics for the device, including CPU usage.

```
> show system

Model          : Digi XBee Hive
Serial Number   : XBee Hivexxxxxxxxxxyyyxx
```

```

SKU           : XBee Hive
Hostname      : XBee Hive
MAC Address   : DF:DD:E2:AE:21:18

Hardware Version : 50001947-01 1P
Firmware Version : 25.8
Alt. Firmware Version : 25.8
Alt. Firmware Build Date : Fri, Jan 12, 2024 12:10:00
Bootloader Version : 19.7.23.0-15f936e0ed

Current Time   : Thu, Jan 11, 2024 12:10:00 +0000
CPU            : 1.4%
Uptime        : 6 days, 6 hours, 21 minutes, 57 seconds (541317s)
Temperature    : 40C
Location      :
Contact       :

```

>

show network

The [show network](#) command displays status and statistics for network interfaces.

```

> show network

Interface    Proto Status Address
-----
setupip      IPv4  up    192.168.210.1/24
setuplinklocalip IPv4  up    169.254.100.100/16
lan          IPv4  up    192.168.2.1
lan          IPv6  up    0:0:0:0:ffff:c0a8:301
loopback     IPv4  up    127.0.0.1/8
wan          IPv4  up    192.168.3.1/24
wan          IPv6  up    fd00:2704::240:ffff:fe80:120/64

```

>

Device configuration using the command line interface

The **config** command allows for device configuration from the command line. All configuration tasks that can be performed by using the WebUI can also be performed by using the **config** command.

There are two ways to invoke the **config** command from the CLI:

- Execute the **config** command and parameters at the root prompt. See [Execute configuration commands at the root Admin CLI prompt](#) for more information.
- Enter configuration mode by executing the **config** command without any parameters. See [Configuration mode](#) for more information.

Execute configuration commands at the root Admin CLI prompt

You can execute the **config** command at the root Admin CLI prompt with any appropriate parameters. When the **config** command is used in this way, changes to the device's configuration are automatically saved when the command is executed.

For example, to disable the SSH service from the root prompt, enter the following command:

```
> config service ssh enable false
>
```

The XBee Hive device's ssh service is now disabled.

Note When the **config** command is executed at the root prompt, certain configuration actions that are available in configuration mode cannot be performed. This includes validating configuration changes, canceling and reverting configuration changes, and performing actions on elements in lists. See [Configuration mode](#) for information about using configuration mode.

Display help for the config command from the root Admin CLI prompt

Display additional configuration commands, as well as available parameters and values, by entering the question mark (?) character after the **config** command.

1. For example:

```
> config ?
```

Will display the following help information:

```
> config ?
```

Additional Configuration

```
-----
application      Custom scripts
auth              Authentication
cloud             Central management
firewall          Firewall
monitoring        Monitoring
network           Network
serial            Serial
service           Services
system            System
vpn               VPN
```

Run "config" with no arguments to enter the configuration editing mode.

```
> config
```

2. You can then display help for the additional configuration commands. For example, to display help for the **config service** command:

```
> config service ?
Services
```

Additional Configuration

```
-----
dns              DNS
```

```
mdns          Service Discovery (mDNS)
multicast     Multicast
ntp           NTP
remote_control Remote control
snmp          SNMP
ssh           SSH
telnet        Telnet
web_admin     Web administration
```

```
> config service
```

3. Next, display help for the **config service ssh** command:

```
> config service ssh ?
```

SSH: An SSH server for managing the device.

Parameters	Current Value
enable	true Enable
key	[private] Private key
port	22 Port

Additional Configuration

```
acl          Access control list
mdns
```

```
> config service ssh
```

4. Lastly, display the allowed values and other information for the **enable** parameter:

```
> config service ssh enable ?
```

Enable: Enable the service.
 Format: true, false, yes, no, 1, 0
 Default value: true
 Current value: true

```
> config service ssh enable
```

Configuration mode

Configuration mode allows you to perform multiple configuration tasks and validate the changes prior to saving them. You can cancel all changes without saving them at any time. Configuration changes do not take effect until the configuration is saved.

Enable configuration mode

To enable configuration mode, at the root prompt, enter the **config** command without any parameters:

```
> config
(config)>
```

When the command line is in configuration mode, the prompt will change to include **(config)**, to indicate that you are currently in configuration mode.

Enter configuration commands in configuration mode

There are two ways to enter configuration commands while in configuration mode:

- Enter the full command string from the config prompt.
For example, to disable the ssh service by entering the full command string at the config prompt:

```
(config)> service ssh enable false
(config)>
```

- Execute commands by moving through the configuration schema.
For example, to disable the ssh service by moving through the configuration and then executing the **enable false** command:

1. At the **config** prompt, enter **service** to move to the **service** node:

```
(config)> service
(config service)>
```

2. Enter **ssh** to move to the **ssh** node:

```
(config service)> ssh
(config service ssh)>
```

3. Enter **enable false** to disable the **ssh** service:

```
(config service ssh)> enable false
(config service ssh)>
```

See [Move within the configuration schema](#) for more information about moving within the configuration.

Save changes and exit configuration mode

To save changes that you have made to the configuration while in configuration mode, use **save**. The save command automatically validates the configuration changes; the configuration will not be saved if it is not valid. Note that you can also validate configuration changes at any time while in configuration mode by using the **validate** command.

```
(config)> save
Configuration saved.
>
```

After using **save** to save changes to the configuration, you will automatically exit configuration mode. To return to configuration mode, type **config** again.

Exit configuration mode without saving changes

You can discard any unsaved configuration changes and exit configuration mode by using the **cancel** command:

```
(config)> cancel
>
```

After using **cancel** to discard unsaved changes to the configuration, you will automatically exit configuration mode.

Configuration actions

In configuration mode, configuration actions are available to perform tasks related to saving or canceling the configuration changes, and to manage items and elements in lists. The commands can be listed by entering a question mark (?) at the **config** prompt.

The following actions are available:

Configuration actions	Description
cancel	Discards unsaved configuration changes and exits configuration mode.
save	Saves configuration changes and exits configuration mode.
validate	Validates configuration changes.
revert	Reverts the configuration to default settings. See Trigger the Config Reset mode using the CLI for more information.
show	Displays configuration settings.
add	Adds a named element, or an element in a list. See Manage elements in lists for information about using the add command with lists.
del	Deletes a named element, or an element in a list. See Manage elements in lists for information about using the del command with lists.
move	Moves elements in a list. See Manage elements in lists for information about using the move command with lists.

Display command line help in configuration mode

Display additional configuration commands, as well as available parameters and values, by entering the question mark (?) character at the **config** prompt. For example:

1. Enter **?** at the **config** prompt:

```
(config)> ?
```

This will display the following help information:

```
(config)> ?
```

Additional Configuration

application	Custom scripts
auth	Authentication
cloud	Central management
firewall	Firewall
monitoring	Monitoring
network	Network
serial	Serial
service	Services
system	System
vpn	VPN

```
(config)>
```

2. You can then display help for the additional configuration commands. For example, to display help for the **config service** command, use one of the following methods:

- At the **config** prompt, enter **service ?**:

```
(config)> service ?
```

- At the **config** prompt:

- a. Enter **service** to move to the **service** node:

```
(config)> service
```

```
(config service)>
```

- b. Enter **?** to display help for the **service** node:

```
(config service)> ?
```

Either of these methods will display the following information:

```
config> service ?
```

Services

Additional Configuration

dns	DNS
mdns	Service Discovery (mDNS)
multicast	Multicast
ntp	NTP
remote_control	Remote control

```
snmp      SNMP
ssh       SSH
telnet    Telnet
web_admin Web administration
```

```
(config)> service
```

3. Next, to display help for the **service ssh** command, use one of the following methods:

- At the **config** prompt, enter **service ssh ?**:

```
(config)> service ssh ?
```

- At the **config** prompt:

- a. Enter **service** to move to the **service** node:

```
(config)> service
(config service)>
```

- b. Enter **ssh** to move to the **ssh** node:

```
(config service)> ssh
(config service ssh)>
```

- c. Enter **?** to display help for the **ssh** node:

```
(config service ssh)> ?
```

Either of these methods will display the following information:

```
(config)> service ssh ?
```

SSH: An SSH server for managing the device.

Parameters	Current Value	
enable	true	Enable
key	[private]	Private key
port	22	Port

Additional Configuration

acl	Access control list
mdns	

```
(config)> service ssh
```

4. Lastly, to display allowed values and other information for the **enable** parameter, use one of the following methods:

- At the **config** prompt, enter **service ssh enable ?**:

```
(config)> service ssh enable ?
```

- At the **config** prompt:

- a. Enter **service** to move to the **service** node:

```
(config)> service
(config service)>
```

- b. Enter **ssh** to move to the **ssh** node:

```
(config service)> ssh
(config service ssh)>
```

- c. Enter **enable ?** to display help for the **enable** parameter:

```
(config service ssh)> enable ?
(config service ssh)>
```

Either of these methods will display the following information:

```
(config)> service ssh enable ?
```

```
Enable: Enable the service.
Format: true, false, yes, no, 1, 0
Default value: true
Current value: true
```

```
(config)> service ssh enable
```

Move within the configuration schema

You can perform configuration tasks at the CLI by moving within the configuration.

- Move forward one node in the configuration by entering the name of an Additional Configuration option:

1. At the **config** prompt, type **service** to move to the **service** node:

```
(config)> service
(config service)>
```

2. Type **ssh** to move to the **ssh** node:

```
(config service)> ssh
(config service ssh)>
```

3. Type **acl** to move to the **acl** node:

```
(config service ssh)> acl
(config service ssh acl)>
```

4. Type **zone** to move to the **zone** node:

```
(config service ssh acl)> zone
(config service ssh acl zone)>
```

You can also enter multiple nodes at once to move multiple steps in the configuration:

```
(config)> service ssh acl zone
(config service ssh acl zone)>
```

- Move backward one node in the configuration by entering two periods (..):

```
(config service ssh acl zone)> ..
(config service ssh acl)>
```

You can also move back multiples nodes in the configuration by typing multiple sets of two periods:

```
(config service ssh acl zone)> .. ...
(config service)>
```

- Move to the root of the config prompt from anywhere within the configuration by entering three periods (...):

```
(config service ssh acl zone)> ...
(config)>
```

Manage elements in lists

While in configuration mode, you can use the **add**, **del**, and **move** action commands to manage elements in a list. When working with lists, these actions require an index number to identify the list item that will be acted on.

Add elements to a list

When used with parameters that contains lists of elements, the **add** command is used to add an element to the list.

For example, to add an authentication method:

1. Display current authentication method by using the **show** command:

```
(config)> show auth method
0 local
(config)>
```

2. Add an authentication method by using the **add index_item** command. For example:

- To add the TACACS+ authentication method to the beginning of the list, use the index number **0**:

```
(config)> add auth method 0 tacacs+
(config)> show auth method
0 tacacs+
1 local
(config)>
```

- To add the TACACS+ authentication method to the end of the list, use the **end** keyword:

```
(config)> add auth method end tacacs+
(config)> show auth method
0 local
1 tacacs+
(config)>
```

The end keyword

As demonstrated above, the **end** keyword is used to add an element to the end of a list. Additionally, the **end** keyword is used to add an element to a list that does not have any elements. For example, to add an authentication group to a user that has just been created:

1. Use the **show** command to verify that the user is not currently a member of any groups:

```
(config)> show auth user new-user group
(config)>
```

2. Use the **end** keyword to add the admin group to the user's configuration:

```
(config)> add auth user new-user group end admin
(config)>
```

3. Use the **show** command again to verify that the admin group has been added to the user's configuration:

```
(config)> show auth user new-user group
0 admin
(config)>
```

Delete elements from a list

When used with parameters that contains lists of elements, the **del** command is used to delete an element in the list.

For example, to delete an authentication method:

1. Use the **show** command to display current authentication method configuration:

```
(config)> show auth method
0 local
1 tacacs+
2 radius
(config)>
```

2. Delete one of the authentication methods by using the **del index_number** command. For example:

- a. To delete the local authentication method, use the index number **0**:

```
(config)> del auth method 0
(config)>
```

- b. Use the **show** command to verify that the local authentication method was removed:

```
(config)> show auth method
0 tacacs+
```

```
1 radius
(config)>
```

Move elements within a list

Use the **move** command to reorder elements in a list.

For example, to reorder the authentication methods:

1. Use the **show** command to display current authentication method configuration:

```
(config)> show auth method
0 local
1 tacacs+
2 radius
(config)>
```

2. To configure the device to use TACACS+ authentication first to authenticate a user, use the **move index_number_1 index_number_2** command:

```
(config)> move auth method 1 0
(config)>
```

3. Use the **show** command again to verify the change:

```
(config)> show auth method
0 tacacs+
1 local
2 radius
(config)>
```

Enter strings in configuration commands

For string parameters, if the string value contains a space, the value must be enclosed in quotation marks. For example, to assign a descriptive name for the device using the **system** command, enter:

```
(config)> system description "Digi XBee Hive"
```

Example: Create a new user by using the command line

In this example, you will use the XBee Hive command line to create a new user, provide a password for the user, and assign the user to authentication groups.

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. At the config prompt, create a new user with the username **user1**:

- Method one: Create a user at the root of the config prompt:

```
(config)> add auth user user1
(config auth user user1)>
```

- Method two: Create a user by moving through the configuration:

- a. At the config prompt, enter **auth** to move to the **auth** node:

```
(config)> auth
(config auth)>
```

- b. Enter **user** to move to the **user** node:

```
(config auth)> user
(config auth user)>
```

- c. Create a new user with the username **user1**:

```
(config auth user)> add user1
(config auth user user1)>
```

4. Configure a password for the user:

```
(config auth user user1)> password pwd1
(config auth user user1)>
```

5. List available authentication groups:

```
(config auth user user1)> show ... group
```

```
admin
acl
  admin
    enable true
  nagios
    enable false
  openvpn
    enable false
    no tunnels
  portal
    enable false
    no portals
  serial
    enable false
    no ports
  shell
    enable false
```

```
serial
acl
  admin
```

```

    enable true
nagios
    enable false
openvpn
    enable false
    no tunnels
portal
    enable false
    no portals
serial
    enable true
    ports
        0 port1
shell
    enable false
(config auth user user1)>

```

6. Add the user to the admin group:

```

(config auth user user1)> add group end admin
(config auth user user1)>

```

7. Save the configuration and apply the change.

```

(config auth user user1)> save
Configuration saved.
>

```

8. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Install Python packages

The XBee Hive device includes support to install Python wheel packages or zip packages coming from the PyCharm IDE. See [Develop Python applications](#) for details on how to develop Python applications.

When installing a zip package, the contents are uncompressed in the `/etc/config/scripts` directory and the requirements are automatically installed.

To install a wheel or zip—see [Develop an application in PyCharm](#)—follow these steps:

1. Upload your package to a directory in your device. See [Upload and download files](#).
2. Access the command line application and run **pyinstall package <path_to_your_package>**.

Example: pyinstall package

```

> pyinstall package /tmp/AWS-basicPubSub.zip
Archive:  /tmp/AWS-basicPubSub.zip
inflating: AWS-basicPubSub/main.py
inflating: AWS-basicPubSub/requirements.txt
Defaulting to user installation because normal site-packages is not
writeable

```

```
Collecting AWSIoTPythonSDK>=1.4.9
|████████████████████████████████████████| 80 kB 2.0 MB/s
Preparing metadata (setup.py) ... done
Using legacy 'setup.py install' for AWSIoTPythonSDK, since package 'wheel'
is not installed.
Installing collected packages: AWSIoTPythonSDK
Running setup.py install for AWSIoTPythonSDK ... done
Successfully installed AWSIoTPythonSDK-1.4.9
>save configuration
cfg.commit()
```

File and requirements are installed in **/etc/config/scripts** directory.

```
> ls /etc/config/scripts/AWS-basicPubSub/
-rw-r----- 1 root root 5091 Nov  2 06:45 main.py
-rw-r----- 1 root root 103 Nov  2 06:45 requirements.txt
>
```

3. Optionally, you can configure your XBee Hive device to automatically run the installed application.

See [Set up the XBee Hive to automatically run your applications](#) for more details.

Command line reference

analyzer clear

Clears the traffic captured by the analyzer.

Syntax

```
analyzer clear <name>
```

Parameters

name: Name of the capture filter to use.

analyzer save

Saves the current captured traffic to a file.

Syntax

```
analyzer save <name> <path>
```

Parameters

name: Name of the capture filter to use.

path: The path and filename to save captured traffic to. If a relative path is provided, /etc/config/analyzer will be used as the root directory for the path and file.

analyzer start

Start a capture session of packets on this devices interfaces.

Syntax

```
analyzer start <name>
```

Parameters

name: Name of the capture filter to use.

analyzer stop

Stops the traffic capture session.

Syntax

```
analyzer stop <name>
```

Parameters

name: Name of the capture filter to use.

cat

View the contents of a file.

Syntax

```
cat <path>
```

Parameters

path: The file to view.

clear dhcp-lease ip-address

Clear the DHCP lease for the specified IP address.

Syntax

```
clear dhcp-lease ip-address <address>
```

Parameters

address: An IPv4 or IPv6 address.

clear dhcp-lease mac

Clear the DHCP lease for the specified MAC address.

Syntax

```
clear dhcp-lease mac ADDRESS
```

Parameters

address: 12-digit, colon-delimited MAC address [00:11:22:AA:BB:CC]

container create

Create a LXC container from a given image. This process creates a copy of the image, so the original image may be deleted after creating the container without breaking the container.

Syntax

```
container create <path> [storage_location <local>]
```

Parameters

path: Filepath for container image to be created. .

storage_location: Location to store the container. (Default: local)

container delete

Delete a LXC container. This will remove the LXC container configuration and the container image.

Syntax

```
container delete <container>
```

Parameters

container: Filepath for container image to be deleted. This process also removes any associated configuration.

cp

Copy a file or directory.

Syntax

```
cp <source> <destination> [force]
```

Parameters

source: The source file or directory to copy.

destination: The destination path to copy the source file or directory to.

force: Do not ask to overwrite the destination file if it exists.

grep

Grep the contents of a file.

Syntax

```
grep <match> <path>
```

Parameters

match: Output all lines in file matching string.

path: The file to grep.

help

Show CLI editing and navigation commands.

Syntax

```
help
```

Parameters

None

ls

List a directory.

Syntax

```
ls <path> [show-hidden]
```

Parameters

path: List files and directories under this path.

show-hidden: Show hidden files and directories. Hidden filenames begin with '.'.

mkdir

Create a directory. Parent directories are created as needed.

Syntax

```
mkdir <path>
```

Parameters

path: The directory path to create.

modem at

Send an AT command to the modem and display the response.

Syntax

```
modem at <cmd> [name STRING]
```

Parameters

cmd: The AT command string.

name: The configured name of the modem to execute this CLI command on.

modem at-interactive

Start an AT command session on the modem's AT serial port.

Syntax

```
modem at-interactive [name STRING]
```

Parameters

name: The configured name of the modem to execute this CLI command on.

modem firmware bundle ota check

Query the Digi firmware server for the latest remote modem firmware version.

Syntax

```
modem firmware bundle ota check [name STRING]
```

Parameters

name: The configured name of the modem to execute this CLI command on.

modem firmware bundle ota download

Downloads modem firmware from the server. The firmware will be downloaded on the device but the modem won't be updated.

Syntax

```
modem firmware bundle ota download [name STRING] [region <global>] [version STRING] [binary STRING]
```

Parameters

name: The configured name of the modem to execute this CLI command on.

region: Firmware region.

version: Firmware version name.

binary: Firmware binary position.

modem firmware bundle ota list

Query the Digi firmware server for a list of modem firmware versions.

Syntax

```
modem firmware bundle ota list [name STRING] [region <global>]
```

Parameters

name: The configured name of the modem to execute this CLI command on.

region: Firmware region.

modem firmware bundle ota update

Perform FOTA (firmware-over-the-air) update. The modem will be updated to the latest modem firmware image unless a specific firmware version is specified.

Syntax

```
modem firmware bundle ota update [name STRING] [region <global>] [version STRING]
```

Parameters

name: The configured name of the modem to execute this CLI command on.

region: Firmware region.

version: Firmware version name.

modem firmware check

Inspect /opt/[MODEM_MODEL]/Custom_Firmware/ directory for new modem firmware file.

Syntax

```
modem firmware check [name STRING]
```

Parameters

name: The configured name of the modem to execute this CLI command on.

modem firmware list

List modem firmware files found in the /opt/[MODEM_MODEL]/ directory.

Syntax

```
modem firmware list [name STRING]
```

Parameters

name: The configured name of the modem to execute this CLI command on.

modem firmware ota check

Query the Digi firmware server for the latest remote modem firmware version.

Syntax

```
modem firmware ota check [name STRING]
```

Parameters

name: The configured name of the modem to execute this CLI command on.

modem firmware ota download

Downloads modem firmware from the server. The firmware will be downloaded on the device but the modem won't be updated.

Syntax

```
modem firmware ota download [name STRING] [version STRING]
```

Parameters

name: The configured name of the modem to execute this CLI command on.

version: Firmware version name.

modem firmware ota list

Query the Digi firmware server for a list of modem firmware versions.

Syntax

```
modem firmware ota list [name STRING]
```

Parameters

name: The configured name of the modem to execute this CLI command on.

modem firmware ota update

Perform FOTA (firmware-over-the-air) update. The modem will be updated to the latest modem firmware image unless a specific firmware version is specified.

Syntax

```
modem firmware ota update [name STRING] [version STRING]
```

Parameters

name: The configured name of the modem to execute this CLI command on.

version: Firmware version name.

modem firmware update

Update modem firmware using local firmware file. The modem will be updated to the firmware specified in the /opt/[MODEM_MODEL]/Custom_Firmware/ directory unless a specific firmware version is specified.

Syntax

```
modem firmware update [name STRING] [version STRING]
```

Parameters

name: The configured name of the modem to execute this CLI command on.

version: Firmware version name.

modem pin change

Change the SIM's PIN code.

Warning: Attempting to use an incorrect PIN code may PUK lock the SIM.

Syntax

```
modem pin change <old-pin> <new-pin> [name STRING]
```

Parameters

old-pin: The SIM's PIN code.

new-pin: The PIN code to change to.

name: The configured name of the modem to execute this CLI command on.

modem pin disable

Disable the PIN lock on the SIM card that is active in the modem.

Warning: Attempting to use an incorrect PIN code may PUK lock the SIM.

Syntax

```
modem pin disable <pin> [name STRING]
```

Parameters

pin: The SIM's PIN code.

name: The configured name of the modem to execute this CLI command on.

modem pin enable

Enable the PIN lock on the SIM card that is active in the modem. The SIM card will need to be unlocked before each use.

Warning: Attempting to use an incorrect PIN code may PUK lock the SIM.

Syntax

```
modem pin enable <pin> [name STRING]
```

Parameters

pin: The SIM's PIN code.

name: The configured name of the modem to execute this CLI command on.

modem pin status

Print the PIN lock status and the number of PIN enable/disable/unlock attempts remaining. The SIM will be PUK locked when there are no remaining retries.

Syntax

```
modem pin status [name STRING]
```

Parameters

name: The configured name of the modem to execute this CLI command on.

modem pin unlock

Temporarily unlock the SIM card with a PIN code. Set the PIN field in the modem interface's configuration to unlock the SIM card automatically before use.

Warning: Attempting to use an incorrect PIN code may PUK lock the SIM.

Syntax

```
modem pin unlock <pin> [name STRING]
```

Parameters

pin: The SIM's PIN code.

name: The configured name of the modem to execute this CLI command on.

modem puk status

Print the PUK status and the number of PUK unlock attempts remaining.

Syntax

```
modem puk status [name STRING]
```

Parameters

name: The configured name of the modem to execute this CLI command on.

modem puk unlock

Unlock the SIM with a PUK code from the SIM provider.

Syntax

```
modem puk unlock <puk> <new-pin> [name STRING]
```

Parameters

puk: The SIM's PUK code.

new-pin: The PIN code to change to.

name: The configured name of the modem to execute this CLI command on.

modem reset

Reset the modem hardware (reboot it). This can be useful if the modem has stopped responding to the network or is behaving inconsistently.

Syntax

```
modem reset [name STRING]
```

Parameters

name: The configured name of the modem to execute this CLI command on.

modem scan

List of carriers present in the network.

Syntax

```
modem scan [name STRING] [timeout INTEGER]
```

Parameters

name: The configured name of the modem to execute this CLI command on.

timeout: The amount of time in seconds to wait for modem scan to complete. (Default: 300)

modem sim-slot

Show or change the modem's active SIM slot. This applies only to modems with multiple SIM slots.

Syntax

```
modem sim-slot <slot> [name STRING]
```

Parameters

slot: The SIM slot to change to.

name: The configured name of the modem to execute this CLI command on.

modem sms send

Send an SMS message to the provided phone number (MSISDN).

Syntax

```
modem sms send <msisdn> <message> [name STRING]
```

Parameters

msisdn: Destination phone number (MSISDN).

message: Message to send.

name: The configured name of the modem to execute this CLI command on.

modem sms send-binary

Send a binary SMS message to the provided phone number (MSISDN).

Syntax

```
modem sms send-binary <msisdn> <message> [name STRING]
```

Parameters

msisdn: Destination phone number (MSISDN).

message: Message to send.

name: The configured name of the modem to execute this CLI command on.

monitoring metrics upload

Immediately upload current device health metrics. Functions as if a scheduled upload was triggered.

Syntax

```
monitoring metrics upload
```

Parameters

None

monitoring

Commands to clear the device's status or systems.

monitoring metrics

Device metrics commands.

upload

Immediately upload current device health metrics. Functions as if a scheduled upload was triggered.

Parameters

None

monitoring metrics upload

Immediately upload current device health metrics. Functions as if a scheduled upload was triggered.

Syntax

```
monitoring metrics upload
```

Parameters

None

more

View a file.

Syntax

```
more <path>
```

Parameters

path: The file to view.

mv

Move a file or directory.

Syntax

```
mv <source> <destination> [force]
```

Parameters

source: The source file or directory to move.

destination: The destination path to move the source file or directory to.

force: Do not ask to overwrite the destination file if it exists.

ping

Ping a host using ICMP echo.

Syntax

```
ping <host> [interface STRING] [source STRING] [ipv6] [size INTEGER] [count INTEGER] [broadcast]
```

Parameters

host: The name or address of the remote host to send ICMP ping requests to. If broadcast is enabled, can be the broadcast address.

interface: The network interface to send ping packets from when the host is reachable over a default route. If not specified, the system's primary default route will be used.

source: The ping command will send a packet with the source address set to the IP address of this interface, rather than the address of the interface the packet is sent from.

ipv6: If a hostname is defined as the value of the 'host' parameter, use the hosts IPV6 address.

size: The number of bytes sent in the ICMP ping request. (Minimum: 0, Default: 56)

count: The number of ICMP ping requests to send before terminating. (Minimum: 1, Default: 100)

broadcast: Enable broadcast ping functionality.

poweroff

Power off the system.

Syntax

```
poweroff
```

Parameters

None

powerctrl

Power control commands.

powerctrl state poweroff

Enter in poweroff or suspend.

powerctrl state suspend

Enter in suspend.

pyinstall

Pyinstall commands

pyinstall package STRING

Install a Python package.

Parameters

STRING

Absolute path of the .zip or .whl file.

Syntax: **STRING**

pyinstall

Pyinstall commands.

Syntax

```
pyinstall <package>
```

Parameters

package: Path and filename of the package to install (.zip, .whl).

reboot

Reboot the system.

Parameters

None

rm

Remove a file or directory.

Syntax

```
rm <path> [force]
```

Parameters

path: The path to remove.

force: Force the file to be removed without asking.

scp

Copy a file or directory over SSH.

Syntax

```
scp <local> <remote> <host> <user> <to> [port INTEGER] [legacy]
```

Parameters

local: The path and name of the file on the local device to copy to or from.

remote: The path and name of the file on the remote host to copy to or from.

host: The hostname or IP address of the remote host.

user: The username to use when connecting to the remote host.

to: Determine whether to copy the file from the local device to the remote host, or from the remote host to the local device.

port: The SSH port to use to connect to the remote host. (Minimum: 1, Maximum: 65535, Default: 22)

legacy: Use the original SCP protocol for file transfers instead of the SFTP protocol.

config directory: show command

Show a summary of changes made to the default configuration in a format that can be copied and pasted.

Note This same information can be displayed using the [show config](#) command, but the display is not suitable for copying and pasting.

Syntax

```
> config  
(config)> show
```

Parameters

None

show analyzer

Show packets from a specified analyzer capture.

Syntax

```
show analyzer <name>
```

Parameters

name: Name of the capture filter to use.

show arp

Show ARP tables. If no IP version is specified IPv4 & IPV6 will be displayed.

Syntax

```
show arp [ipv4] [ipv6] [verbose]
```

Parameters

ipv4: Display IPv4 routes. If no IP version is specified IPv4 & IPV6 will be displayed.

ipv6: Display IPv6 routes. If no IP version is specified IPv4 & IPV6 will be displayed.

verbose: Display more information (less concise, more detail).

show bluetooth-scanner log

Show the Bluetooth™ scanner output log.

Syntax

```
show bluetooth-scanner log
```

Parameters

None

show bluetooth-scanner nearby

Show Bluetooth™ devices detected during the most recent update interval.

Syntax

```
show bluetooth-scanner nearby
```

Parameters

None

show bluetooth-scanner static-candidate

Show Bluetooth™ devices detected during the most recent observation period but not evaluated as static.

Syntax

```
show bluetooth-scanner static-candidate
```

Parameters

None

show bluetooth-scanner static-confirmed

Show Bluetooth™ devices that have been evaluated as static.

Syntax

```
show bluetooth-scanner static-confirmed
```

Parameters

None

show cloud

Show drm status & statistics.

Syntax

```
show cloud
```

Parameters

None

show config

Show a summary of changes made to the default configuration. The changes shown are not suitable for pasting into a CLI session.

Syntax

```
show config [cli_format]
```

Parameters

cli_format: Show the exact CLI commands required to configure the device from a default configuration. The changes shown are suitable for pasting into a CLI session, although individual output lines maybe context sensitive and unable to be entered in isolation.

show containers

Show container status & statistics.

Syntax

```
show containers [container STRING]
```

Parameters

container: Display more details and config data for a specific container.

show dhcp-lease

Show DHCP leases.

Syntax

```
show dhcp-lease [all] [verbose]
```

Parameters

all: Show all leases (active and inactive (not in etc/config/dhcp.*lease)).

verbose: Display more information (less concise, more detail).

show dns

Show DNS servers and associated domains.

Syntax

```
show dns
```

Parameters

None

show eth

Show ethernet status & statistics.

Syntax

```
show eth [name STRING]
```

Parameters

name: Display more details and configuration data for a specific ethernet instance.

show event

Show event list (high level).

Syntax

```
show event [table <status|error|info>] [number INTEGER]
```

Parameters

table: Type of event log to be displayed (status, error, info).

number: Number of lines to retrieve from log. (Minimum: 1, Default: 20)

show hotspot

Show hotspot statistics.

Syntax

```
show hotspot [name STRING] [ip STRING]
```

Parameters

name: The configured instance name of the hotspot.

ip: IP address of a specific client, to limit the status display to only this client.

show ipsec

Show IPsec status & statistics.

Syntax

```
show ipsec [tunnel STRING] [all] [verbose]
```

Parameters

tunnel: Display more details and config data for a specific IPsec tunnel.

all: Display all tunnels including disabled tunnels.

verbose: Display status of one or all tunnels in plain text.

show l2tp lac

Show L2TP access concentrator status & statistics.

Syntax

```
show l2tp lac [name STRING]
```

Parameters

name: Display more details for a specific L2TP access concentrator.

show l2tp lns

Show L2TP network server status & statistics.

Syntax

```
show l2tp lns [name STRING]
```

Parameters

name: Display more details for a specific L2TP network server.

show l2tpeth

Show L2TPv3 ethernet tunnel session status and statistics.

Syntax

```
show l2tpeth [name STRING]
```

Parameters

name: Display more details for a specific L2TPv3 ethernet tunnel session.

show location

Show location information.

Syntax

```
show location [geofence]
```

Parameters

geofence: Show geofence information.

show log

Show system log (low level).

Syntax

```
show log [number INTEGER] [filter <critical|warning|debug|info>]
```

Parameters

number: Number of lines to retrieve from log. (Minimum: 1, Default: 20)

filter: Filters for type of log message displayed (critical, warning, info, debug). Note, filters from the number of messages retrieved not the whole log (this can be very time consuming). If you require more messages of the filtered type, increase the number of messages retrieved using 'number'.

show manufacture

Show manufacturer information.

Syntax

```
show manufacture [verbose]
```

Parameters

verbose: Display more information (less concise, more detail).

show modbus-gateway

Show modbus gateway status & statistics.

Syntax

```
show modbus-gateway [verbose]
```

Parameters

verbose: Display more information (less concise, more detail).

show modem

Show modem status & statistics.

Syntax

```
show modem [name STRING] [verbose] [esim-profiles]
```

Parameters

name: The configured name of the modem to execute this CLI command on.

verbose: Display more information (less concise, more detail).

esim-profiles: Display eSIM profiles.

show mqtt

Show MQTT broker information.

Syntax

```
show mqtt [verbose]
```

Parameters

verbose: Display more information (less concise, more detail).

show nemo

Show NEMO status and statistics.

Syntax

```
show nemo [name STRING]
```

Parameters

name: Display more details and configuration data for a specific NEMO instance.

show network

Show network interface status & statistics.

Syntax

```
show network [interface STRING] [all] [verbose]
```

Parameters

interface: Display more details and config data for a specific network interface.

all: Display all interfaces including disabled interfaces.

verbose: Display more information (less concise, more detail).

show ntp

Show NTP status & statistics.

Syntax

```
show ntp
```

Parameters

None

show openvpn client

Show OpenVPN client status & statistics.

Syntax

```
show openvpn client [name STRING] [all]
```

Parameters

name: Display more details and config data for a specific OpenVPN client.

all: Display all clients including disabled clients.

show openvpn server

Show OpenVPN server status & statistics.

Syntax

```
show openvpn server [name STRING] [all]
```

Parameters

name: Display more details and config data for a specific OpenVPN server.

all: Display all servers including disabled servers.

show route

Show IP routing information.

Syntax

```
show route [ipv4] [ipv6] [verbose]
```

Parameters

ipv4: Display IPv4 routes.

ipv6: Display IPv6 routes.

verbose: Display more information (less concise, more detail).

show scep-client

Show SCEP client status and statistics.

Syntax

```
show scep-client [name STRING]
```

Parameters

name: Display more details and configuration data for a specific SCEP client instance.

show scripts

Show scheduled system scripts.

Syntax

```
show scripts
```

Parameters

None

show serial

Show serial status & statistics.

Syntax

```
show serial [port STRING]
```

Parameters

port: Display more details and config data for a specific serial port.

show surelink interface

Show SureLink status & statistics for network interfaces.

Syntax

```
show surelink interface [name STRING] [all]
```

Parameters

name: The name of a specific network interface.

all: Show all network interfaces.

show surelink ipsec

Show SureLink status & statistics for IPsec tunnels.

Syntax

```
show surelink ipsec [tunnel STRING] [all]
```

Parameters

tunnel: The name of a specific IPsec tunnel.

all: Show all IPsec tunnels.

show surelink openvpn

Show SureLink status & statistics for OpenVPN clients.

Syntax

```
show surelink openvpn [client STRING] [all]
```

Parameters

client: The name of the OpenVPN client.

all: Show all OpenVPN clients.

show surelink state

Show SureLink state & fail counts for each network interfaces.

Syntax

```
show surelink state
```

Parameters

None

show system

Show system status & statistics.

Syntax

```
show system [verbose]
```

Parameters

verbose: Display more information (disk usage, etc).

show usb

Show USB information.

Syntax

```
show usb
```

Parameters

None

show version

Show firmware version.

Syntax

```
show version [verbose]
```

Parameters

verbose: Display more information (build date).

show vrrp

Show VRRP status & statistics.

Syntax

```
show vrrp [name STRING] [all] [verbose]
```

Parameters

name: Display more details and config data for a specific VRRP instance.

all: Display all VRRP instances including disabled instances.

verbose: Display all VRRP status and statistics including disabled instances.

show wan-bonding

Show WAN Bonding information.

Syntax

```
show wan-bonding [verbose]
```

Parameters

verbose: Display more information directly from the WAN Bonding bndutil tool.

show web-filter

Show web filter status & statistics.

Syntax

```
show web-filter
```

Parameters

None

show wifi ap

Display details for Wi-Fi access points.

Syntax

```
show wifi ap [name STRING] [all]
```

Parameters

name: Display more details for a specific Wi-Fi access point.

all: Display all Wi-Fi access points including disabled Wi-Fi access points.

show wifi client

Display details for Wi-Fi client mode connections.

Syntax

```
show wifi client [name STRING] [all]
```

Parameters

name: Display more details for a specific Wi-Fi client mode connection.

all: Display all Wi-Fi clients including disabled Wi-Fi client mode connections.

show wifi-scanner

Show Wi-Fi scanner information.

wifi-scanner blocklist

Show transmitters that have been evaluated as static and not included in the output log.

Parameters

None

wifi-scanner candidates

Show transmitters detected during the most recent observation period but not evaluated as static.

Parameters

None

wifi-scanner log

Show output log for the last update interval.

Parameters

None

show wifi-scanner blocklist

Show transmitters that have been evaluated as static and not included in the output log.

Syntax

```
show wifi-scanner blocklist
```

Parameters

None

show wifi-scanner candidates

Show transmitters detected during the most recent observation period but not evaluated as static.

Syntax

```
show wifi-scanner candidates
```

Parameters

None

show wifi-scanner log

Show output log for the last update interval.

Syntax

```
show wifi-scanner log
```

Parameters

None

show xbee

Show XBee status & statistics.

Syntax

```
show xbee [verbose]
```

Parameters

verbose: Display more information (less concise, more detail).

iperf

Perform a speedtest to a remote host using nuttcp or iPerf. The system's primary default route will be used. The speed test will take approximately 30 seconds to complete.

Syntax

```
iperf <host> [size INTEGER] [mode <nuttcp|iperf>] [output <text|json>]
```

Parameters

host: The name or address of the remote speed test host/server.

size: The number of kilobytes sent in the speed test packets. (Minimum: 0, Default: 1000)

mode: The type of speed test protocol to run. (Default: nuttcp)

output: The format of output to display the speed test results as. (Default: text)

ssh

Use SSH protocol to log into a remote server.

Syntax

```
ssh <host> <user> [port INTEGER] [command STRING]
```

Parameters

host: The hostname or IP address of the remote host.

user: The username to use when connecting to the remote host.

port: The SSH port to use to connect to the remote host. (Minimum: 1, Maximum: 65535, Default: 22)

command: The command that will be automatically executed once the SSH session to the remote host is established.

system backup

Save the device's configuration to a file. Archives are full backups including generated SSH keys and dynamic DHCP lease information. Command backups are a list of CLI commands required to build the device's configuration.

Syntax

```
system backup [type <cli-config|archive>] [path STRING] [passphrase STRING]
```

Parameters

type: The type of backup file to create. Archives are full backups including generated SSH keys and dynamic DHCP lease information. CLI configuration backups are a list of CLI commands used to build the device's configuration. (Default: archive)

path: The file path to save the backup to. (Default: /var/log/)

passphrase: Encrypt the archive with a passphrase.

system cloud register

Register with Digi Remote Manager account.

Syntax

```
system cloud register <username> <password> [group STRING]
```

Parameters

username: Digi Remote Manager username.

password: Digi Remote Manager password.

group: Group to add device in Digi Remote Manager.

system custom-default-config current

Install the current configuration as a custom-default-config.bin file and generates the SHA file.

Syntax

```
system custom-default-config current
```

Parameters

None

system custom-default-config file

Sets up a backup file as a custom-default-config.bin file and generates the SHA file.

Syntax

```
system custom-default-config file <path>
```

Parameters

path: Backup file to set up as a custom-default-config.bin file.

system custom-default-config remove

Removes the current custom-default-config.bin and SHA file.

Syntax

```
system custom-default-config remove
```

Parameters

None

system disable-cryptography

Erase the device's configuration and reboot into a limited mode with no cryptography available. The device's shell will be accessible over Telnet (port 23) at IP address 192.168.210.1. To return the device to normal operation, perform the configuration erase procedure with the device's ERASE button twice consecutively.

Syntax

```
system disable-cryptography
```

Parameters

None

system duplicate-firmware

Duplicate the running firmware to the alternate partition so that the device will always boot the same firmware version.

Syntax

```
system duplicate-firmware
```

Parameters

None

system factory-erase

Reverts all configuration settings on the device: config settings, user files, event and system logs, user-configured and known-working APNs. If the reset behavior is configured [system erase_ button once], it determines the type of erase that will occur: Config Reset (default behavior), Keep Known-Working APNs, or Factory Reset.

Syntax

```
system factory-erase [force]
```

Parameters

force: Do not prompt for confirmation before erasing the configuration and rebooting the device.

system find-me

Find Me function to flash LEDs on this device to help users locate the unit.

Syntax

```
system find-me <state>
```

Parameters

state: Find Me control to flash cellular-related LEDs.

system firmware ota check

Query the Digi firmware server for the latest device firmware version.

Syntax

```
system firmware ota check
```

Parameters

None

system firmware ota list

Query the Digi firmware server for a list of device firmware versions.

Syntax

```
system firmware ota list
```

Parameters

None

system firmware ota update

Perform FOTA (firmware-over-the-air) update. The device will be updated to the latest firmware version unless the version argument is used to specify the firmware version.

Syntax

```
system firmware ota update [version STRING]
```

Parameters

version: Firmware version name.

system firmware update

Update the current firmware image. Upon reboot the new firmware will be run.

Syntax

```
system firmware update <file>
```

Parameters

file: Firmware filename and path.

system power ignition off_delay

Update the current ignition off delay without changing the configuration.

Syntax

```
system power ignition off_delay <off_delay>
```

Parameters

off_delay: Ignition power off delay. Format: number{h|m|s}, Max: 18h. (Minimum: 0s, Maximum: 18h)

system restore

Restore the device's configuration from a backup archive or CLI commands file.

Syntax

```
system restore <path> [passphrase STRING]
```

Parameters

path: The path to the backup file.

passphrase: Decrypt the archive with a passphrase.

system script start

Run a manual script. Scripts that are disabled, not a manual script, or already running can not be run.

Syntax

```
system script start <script>
```

Parameters

script: Script to start.

system script stop

Stop an active running script. Scripts scheduled to run again will still run again. (Disable a script to prevent it from running again.).

Syntax

```
system script stop <script>
```

Parameters

script: Script to stop.

system serial clear

Clears the serial log.

Syntax

```
system serial clear <port>
```

Parameters

port: Serial port.

system serial copy

Copy serial settings from a port to a list of ports.

Syntax

```
system serial copy <source> <destination> [all] [label] [base] [serial] [session] [monitor] [service] [hangup]
[autoconnect] [framing] [modem] [ppp_dialin] [udp] [logging]
```

Parameters

source: The serial port to copy settings from.

destination: A list of serial ports to copy settings to. Example: 1-4,8-10 or all.

all: Copy all serial port settings.

label: Copy label setting.

base: Copy enable, mode, sharing, and signal settings.

serial: Copy baudrate, data bits, parity, stop bits, and flow control settings.

session: Copy escape, history, port sharing, and idle timeout settings.

monitor: Copy signal change monitoring settings.

service: Copy SSH, TCP, and Telnet service settings.

hangup: Copy hangup on signal loss settings.

autoconnect: Copy autoconnect settings.

framing: Copy data framing settings.

modem: Copy modem emulator settings.

ppp_dialin: Copy PPP dial-in settings.

udp: Copy UDP serial settings.

logging: Copy logging settings.

system serial ipport

Set sequential IP port numbers for a service on a list of ports.

Syntax

```
system serial ipport <destination> <service> <base>
```

Parameters

destination: A list of serial ports to set IP port numbers. Example: 1-4,8-10 or all.

service: The service type to set IP port numbers.

base: Set service IP port numbers to base port + serial port number. (Minimum: 1, Maximum: 65535)

system serial restart

Delete and restart the serial log.

Syntax

```
system serial restart <port>
```

Parameters

port: Serial port.

system serial save

Saves the current serial log to a file.

Syntax

```
system serial save <port> <path>
```

Parameters

port: Serial port.

path: The path and filename to save captured traffic to. If a relative path is provided, /etc/config/serial will be used as the root directory for the path and file.

system serial show

Displays the serial log on the screen.

Syntax

```
system serial show <port>
```

Parameters

port: Serial port.

system storage format

Format a device to the selected filesystem type.

Syntax

```
system storage format <device> <fstype>
```

Parameters

device: Storage device type.

fstype: Format to this filesystem type.

system storage mount

Mount a partition on the device.

Syntax

```
system storage mount <device> [partition INTEGER]
```

Parameters

device: Storage device type.

partition: The partition number to mount. (Minimum: 1, Default: 1)

system storage show

Display information about external devices.

Syntax

```
system storage show
```

Parameters

None

system storage unmount

Unmount the device.

Syntax

```
system storage unmount <device>
```

Parameters

device: Storage device type.

system support-report

Save a support report to a file and include with support requests.

Syntax

```
system support-report [path STRING]
```

Parameters

path: The file path to save the support report to. (Default: /var/log/)

system time set

Set the local date and time using the timezone set in the system.time.timezone config setting.

Syntax

```
system time set <datetime>
```

Parameters

datetime: The date in year-month-day hour:minute:second format (e.g "2021-09-26 12:24:48").

system time sync

Set the local time to the first enabled time source that returns valid time information.

Syntax

```
system time sync
```

Parameters

None

system time test

Test each enabled time source. This test will not affect the device's current local date and time.

Syntax

```
system time test
```

Parameters

None

tail

Tail a file to see its contents.

Syntax

```
tail <path> [timeout INTEGER] [filter STRING] [match STRING]
```

Parameters

path: The file to tail.

timeout: The amount of time in seconds to tail the file. (Default: 10)

filter: Only see output that contains this string.

match: Stop tail when this string is detected in output.

telnet

Use Telnet protocol to log into a remote server.

Syntax

```
telnet <host> [port INTEGER]
```

Parameters

host: The hostname or IP address of the remote host.

port: The telnet port to use to connect to the remote host. (Minimum: 1, Maximum: 65535, Default: 23)

traceroute

Print the route packets trace to network host.

Syntax

```
tracert <host> [ipv6] [gateway STRING] [interface STRING] [first_ttl INTEGER] [max_ttl INTEGER] [port
INTEGER] [nqueries INTEGER] [src_addr STRING] [tos INTEGER] [waittime INTEGER] [pausemseccs
INTEGER] [packetlen INTEGER] [debug] [dontfragment] [icmp] [nomap] [bypass]
```

Parameters

host: The host that we wish to trace the route packets for.

ipv6: If a hostname is defined as the value of the 'host' parameter, use the hosts IPV6 address.

gateway: Tells tracert to add an IP source routing option to the outgoing packet that tells the network to route the packet through the specified gateway.

interface: Specifies the interface through which tracert should send packets. By default, the interface is selected according to the routing table.

first_ttl: Specifies with what TTL to start. (Minimum: 1, Default: 1)

max_ttl: Specifies the maximum number of hops (max time-to-live value) tracert will probe. (Minimum: 1, Default: 30)

port: Specifies the destination port base tracert will use (the destination port number will be incremented by each probe). A value of -1 specifies that no specific port will be used. (Minimum: -1, Default: -1)

nqueries: Sets the number of probe packets per hop. A value of -1 indicated. (Minimum: 1, Default: 3)

src_addr: Chooses an alternative source address. Note that you must select the address of one of the interfaces. By default, the address of the outgoing interface is used.

tos: For IPv4, set the Type of Service (ToS) and Precedence value. Useful values are 16 (low delay) and 8 (high throughput). Note that in order to use some TOS precedence values, you have to be super user. For IPv6, set the Traffic Control value. A value of -1 specifies that no value will be used. (Minimum: -1, Default: -1)

waittime: Determines how long to wait for a response to a probe. (Minimum: 1, Default: 5)

pausemseccs: Minimal time interval between probes. (Minimum: 0, Default: 0)

packetlen: Total size of the probing packet. Default 60 bytes for IPv4 and 80 for Ipv6. A value of -1 specifies that the default value will be used. (Minimum: -1, Default: -1)

debug: Enable socket level debugging.

dontfragment: Do not fragment probe packets.

icmp: Use ICMP ECHO for probes.

nomap: Do not try to map IP addresses to host names when displaying them.

bypass: Bypass the normal routing tables and send directly to a host on an attached network.

xbee

XBee commands.

xbee execute XBEE-ID AT-COMMAND [value]

Execute an AT command in an XBee node.

Parameters***XBEE-ID***

The XBee identifier (MAC or node identifier) of the XBee to execute the command.

Syntax: STRING

AT-COMMAND

The AT command to execute.

Syntax: STRING

value

The value of the command to execute.

Syntax: Decimal number, hexadecimal number with prefix 0x, or string between quotes.

Optional: True

xbec get XBEE-ID PARAMETER [decimal]

Read a parameter from an XBee node.

Parameters***XBEE-ID***

The XBee identifier (MAC or node identifier) of the XBee to read the parameter from.

Syntax: STRING

PARAMETER

The parameter name to read.

Syntax: STRING

decimal

Show the read value in decimal, otherwise in hexadecimal.

Syntax: BOOLEAN

Default: False

Optional: True

xbec network clear

Clear the XBee network cache.

Parameters

None

xbec network export EXPORTDIR [description STRING] [name STRING]

Export the XBee network to a file.

Parameters***EXPORTDIR***

Absolute path of the directory to create the xnet file.

Syntax: STRING

description

A brief description of the network.

Syntax: STRING

Optional: True

name

The name for the XBee network.

Syntax: STRING

Optional: True

xbec network discover [async]

Discover the XBee network.

Parameters

async

Leave the discovery process in background and returns the prompt immediately

Syntax: BOOLEAN

Default: False

Optional: True

xbec network show

Show network cache in table format.

Parameters

None

xbec set XBEE-ID PARAMETER VALUE [no-apply] [no-save]

Write a parameter value in a XBee node.

Parameters

XBEE-ID

The XBee identifier (MAC or node identifier) of the XBee to write the parameter to.

Syntax: STRING

PARAMETER

The parameter name to write.

Syntax: STRING

VALUE

The new value of the parameter.

Syntax: Decimal number, hexadecimal number with prefix 0x, or string between quotes.

no-apply

Do not apply the change.

Syntax: BOOLEAN

Default: False

Optional: True

no-save

Do not write to flash the change.

Syntax: BOOLEAN

Default: False

Optional: True

xbee update XBEE-ID PROFILE

Update the XBee with a profile.

Parameters***XBEE-ID***

The XBee identifier (MAC or node identifier) of the XBee to update.

Syntax: STRING

PROFILE

The path to the profile to update.

Syntax: STRING

xbee execute

Executes an AT command on an XBee.

Syntax

```
xbee execute <xbee-id> <at-command> [value STRING]
```

Parameters

xbee-id: XBee ID (MAC or node ID).

at-command: AT command.

value: Optional value for the AT command.

xbee get

Gets the value of an XBee parameter.

Syntax

```
xbee get <xbee-id> <parameter> [decimal]
```

Parameters

xbee-id: XBee ID (MAC or node ID).

parameter: Parameter.

decimal: decimal.

xbee set

Sets the value of an XBee parameter. Optionally, the value can be set but not saved, or not applied.

Syntax

```
xbee set <xbee-id> <parameter> <value> [no-apply] [no-save]
```

Parameters

xbee-id: XBee ID (MAC or node ID).

parameter: Parameter.

value: Value.

no-apply: no-apply.

no-save: no-save.

xbee update

Updates the profile (.xpro) of an XBee.

Syntax

```
xbee update <xbee-id> <profile>
```

Parameters

xbee-id: XBee ID (MAC or node ID).

profile: Profile path and filename.

Diagnostics

This chapter contains the following topics:

Perform a speedtest	986
Generate a support report	986
View system and event logs	991
Configure syslog servers	996
Configure options for the event and system logs	998
Configure an email notification for a system event	1003
Configure an SNMP trap for a system event	1004
Analyze network traffic	1005
Use the ping command to troubleshoot network connections	1023
Use the traceroute command to diagnose IP routing problems	1023

Perform a speedtest

To perform a speedtest:

Command line

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. Use the **iperf** command to generate the report:

```
> iperf host
```

where *host* is the hostname or IP address of a speedtest host. For example:

```
> iperf speedtest.accns.com
Tx (upload) average: 50.1110 Mbps
Tx latency: 31.45 ms
Rx (download) average: 44.7588 Mbps
Rx latency: 30.05 ms
>
```

3. To output the result in json format, use the **output** parameter:

```
> iperf host output json
{"tx_avg": "51.8510", "tx_avg_units": "Mbps", "tx_latency": "31.07",
"tx_latency_units": "ms", "rx_avg": "39.5770", "rx_avg_units": "Mbps",
"rx_latency": "34.19", "rx_latency_units": "ms" }
>
```

4. To change the size of the speedtest packet, use the **size** parameter:

```
> iperf host size int
```

5. By default, the speedtest uses *nuttcp* for the mode. To change this setting from *nuttcp* to *iperf*, use the **mode** parameter:

```
> iperf host mode iperf
```

6. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

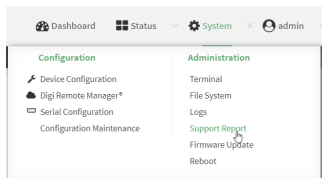
Generate a support report

To generate and download a support report:

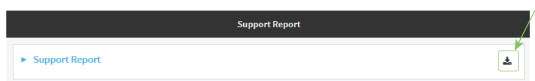


Web

1. Log into the XBee Hive WebUI as a user with full Admin access rights.
2. On the main menu, click **System**. Under **Administration**, click **Support Report**.



3. Click  to generate and download the support report.



Attach the support report to any support requests.

Command line

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. Use the **system support-report** command to generate the report:

```
> system support-report path /var/log/
Saving support report to /var/log/support-report-0040D0133536-24-01-12-12:10:00.bin
Support report saved.
>
```

3. Use the **scp** command to transfer the report to a remote host:

```
> scp host 192.168.4.1 user admin remote /home/admin/temp/ local /var/log/support-report-
00:40:D0:13:35:36-24-01-12-12:10:00.bin to remote
admin@192.168.4.1's password: adminpwd
support-report-0040D0133536-24-01-12-12:10:00.bin
>
```

4. Type **exit** to exit the Admin CLI.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

See [Support report overview](#) for an overview of what is contained in the support report.

Support report overview

Generating a Support Report

Support reports provide a snapshot of a device's current settings and connection status at the time of the report's generation. The relevant log files are packaged into a **.bin** file that can be downloaded from the local (web) UI. For more information about generating support reports, see [Generate a support report](#).

Note Information logged on the device will be erased when the device is powered off or rebooted to avoid unnecessary wear to the flash memory. See [Configure options for the event and system logs](#) for more information on how to enable persistent system logs.

Use 7-Zip or any other file-archiving utility to extract a support report. Its contents are organized into the following directories:

/etc

This folder most notably contains a running list of the cellular connections that have been registered by the device's radio.

Directory	Filename	Notes
/etc	version	Active firmware version
/etc/config	mn.json	Cellular connections logged as having been engaged by the radio; establishes previous APN associations

/opt

Information stored here persists between reboots and system resets.

Directory	Filename	Notes
/opt/log_last	messages	With persistent system logs enabled, syslog info will be stored in the /opt directory which isn't erased after reboots or system resets

/tmp

Output from a series of diagnostic queries is stored in a randomly generated sub-directory within /tmp. When combing through these logs, pay particular attention to config_dump-public (to verify local device settings) and mmcli-dump (to validate the cellular connection status).

Directory	Filename	Notes
/tmp/##		*# is generated at random
	arp_nv	The table of IP-address to MAC-address translations used by the address resolution protocol (ARP)
	arptables_nv-L	The tables of ARP packet filter rules in the Linux kernel
	cat_procmeminfo	A breakdown of memory utilization at the time when the support report was generated
	config_dump-public	The device's current settings, scrubbed of passwords and preshared keys
	conntrack-L	A list of all currently tracked connections through the

Directory	Filename	Notes
		system
	conntrack_-S	A summary of currently tracked connections
	date	Local system time. If the device isn't online when the support report is generated, the date will be based on the date/month/year that the firmware running on the device was created (e.g. 18.4.54.41 was created 2018-07-05)
	df_-h	A report of the file system disk space usage
	event_list	A list of events leveraged for syslog messages
	fw_printenv	The entire environment for the bootloader U-Boot
	ip_addr_list	IP addresses listed per interface
	ip_route_list	Default routing information per interface
	ip6tables_-nv_-L	A list of IPv6 routing tables
	ip6tables_-nv_-L_-t_mangle	Firewall table used when handling mangled/fragmented IPv6 packets
	ip6tables_-nv_-L_-t_nat	Firewall table used to direct NAT'd traffic
	iptables_-nv_-L	A list of IPv4 firewall tables
	iptables_-nv_-L_-t_mangle	Firewall table used when handling mangled/fragmented IPv4 packets
	iptables_-nv_-L_-t_nat	Firewall table used to direct NAT'd traffic
	s_-RlhA_etcconfig	An index of items in /etc/config (and its sub-directories)
	ls_-RlhA_opt	An index of items in /opt (and its sub-directories)
	ls_-RlhA_tmp	An index of items in /tmp (and its sub-directories)
	ls_-RlhA_var	An index of items in /var (and its sub-directories)
	lsusb	A list of USB ports and any connected peripherals
	mmcli-dump	A repository of critical information about the cellular radio based off of the cited modem-manager output and defined set of AT commands
	netstat_-i	Interface statistics for transmitted/ received packets
	netstat_-na	List of both listening and non-listening network sockets on the device

Directory	Filename	Notes
	ps_l	A snapshot of the current processes running at the time of generating the report
	runt_json	Storage for active/ engaged system variables
	sprite_config_dump	Not used for cellular devices
	ubus-dump	A log of ubus calls for network devices and interfaces
	uptime	The device's uptime at the time of generating the report, along with CPU load averages for the past 1, 5, and 15 minutes

/var/log

The running system log is stored in "messages" until reaching a set line count (1,000 lines by default). Once this limit is exceeded, that file is renamed to "messages.0" and a new running log is written to the now-empty "messages" log.

Directory	Filename	Notes
/var/log	messages	Current syslog information
	messages.0	Rollover syslog information

/var/run

This directory can be disregarded for most troubleshooting/ diagnostic purposes.

Directory	Filename	Notes
/var/run	all files	Runtime settings for the device -- referenced in the syslog data gathered in /tmp (see above)

View system and event logs

You can review system and event logs.

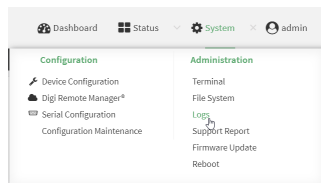
- [System logs](#)
- [Event logs](#)

See [Configure options for the event and system logs](#) for information about configuring the information displayed in event and system logs.

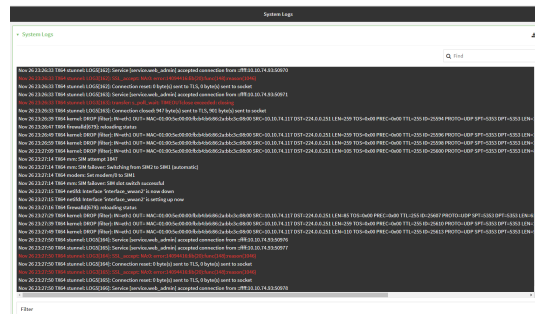
View System Logs



1. Log into the XBee Hive WebUI as a user with full Admin access rights.
2. On the main menu, click **System > Logs**.



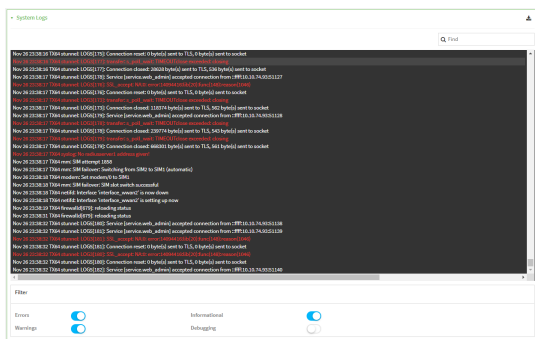
The system log displays:



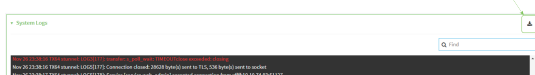
3. Limit the display in the system log by using the **Find** search tool.



- Use filters to configure the types of information displayed in the system logs.



- Click  to download the system log.



Command line

- Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

- Use the **show log** command at the Admin CLI prompt:

```
> show log
```

```
Timestamp    Message
```

```
Nov 26 21:54:34 XBee Hive netifd: Interface 'interface_wan' is setting up now
```

```
Nov 26 21:54:35 XBee Hive firewallld[621]: reloading status
```

```
...
```

```
>
```

- (Optional) Use the **show log number *num*** command to limit the number of lines that are displayed. For example, to limit the log to the most recent ten lines:

```
> show log number 10
```

```
Timestamp    Message
```

```
Nov 26 21:54:34 XBee Hive netifd: Interface 'interface_wan' is setting up now
```

```
Nov 26 21:54:35 XBee Hive firewallld[621]: reloading status
```

```
...
```

```
>
```

- (Optional) Use the **show log filter *value*** command to limit the number of lines that are displayed. Allowed values are **critical**, **warning**, **info**, and **debug**. For example, to limit the event list to only info messages:


```
> show log filter info
```

```
Timestamp    Type    Category Message
```

```
Nov 26 22:01:26 info    user    name=admin~service=cli~state=opened~remote=192.168.1.2
```

```
Nov 26 22:01:25 info    user    name=admin~service=cli~state=closed~remote=192.168.1.2
```

```
...
```

```
>
```

5. Type **exit** to exit the Admin CLI.

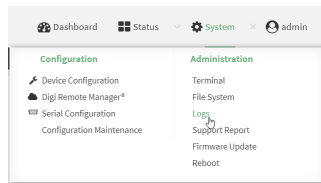
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

View Event Logs

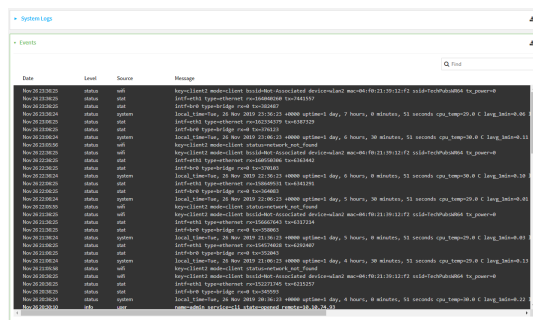


Log into the XBee Hive WebUI as a user with full Admin access rights.

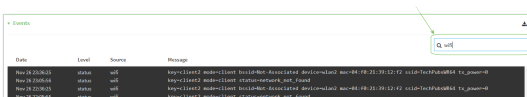
1. On the main menu, click **System > Logs**.



2. Click **System Logs** to collapse the system logs viewer, or scroll down to **Events**.
3. Click **Events** to expand the event viewer.



4. Limit the display in the event log by using the **Find** search tool.



- Click  to download the event log.



Command line

- Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

- Use the **show event** command at the Admin CLI prompt:

```
> show event
```

```
Timestamp    Type  Category Message
-----
Nov 26 21:42:37 status stat   intf=eth1~type=ethernet~rx=11332435~tx=5038762
Nov 26 21:42:35 status system local_time=Thu, 08 Aug 2019 21:42:35 +0000~uptime=3 hours, 0
minutes, 48 seconds
...
>
```

- (Optional) Use the **show event number *num*** command to limit the number of lines that are displayed. For example, to limit the event list to the most recent ten lines:

```
> show event number 10
```

```
Timestamp    Type  Category Message
-----
Nov 26 21:42:37 status stat   intf=eth1~type=ethernet~rx=11332435~tx=5038762
Nov 26 21:42:35 status system local_time=Thu, 08 Aug 2019 21:42:35 +0000~uptime=3 hours, 0
minutes, 48 seconds
...
>
```

- (Optional) Use the **show event table *value*** command to limit the number of lines that are displayed. Allowed values are **error**, **info**, and **status**. For example, to limit the event list to only info messages:

```
> show event table info
```

```
Timestamp    Type  Category Message
-----
Nov 26 22:01:26 info  user  name=admin~service=cli~state=opened~remote=192.168.1.2
Nov 26 22:01:25 info  user  name=admin~service=cli~state=closed~remote=192.168.1.2
...
>
```

5. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Configure syslog servers

You can configure remote syslog servers for storing event and system logs.

Web

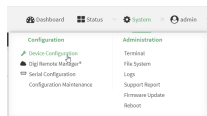
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

Remote Manager:

- a. Locate your device as described in [Use Digi Remote Manager to view and manage your device](#).
- b. Click the **Device ID**.
- c. Click **Settings**.
- d. Click to expand **Config**.

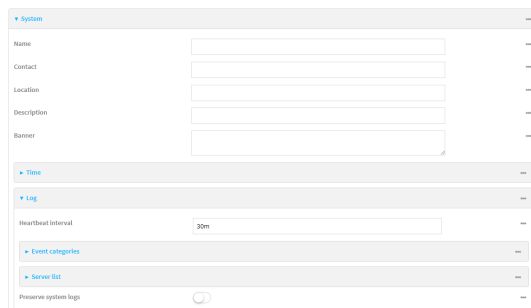
Local Web UI:

- a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

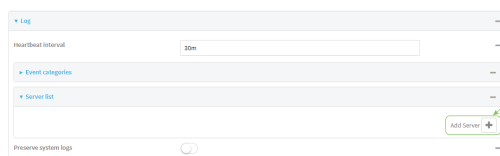


The **Configuration** window is displayed.

3. Click **System > Log**.



4. Add and configure a remote syslog server:
 - a. Click to expand **Server list**.
 - b. For **Add Server**, click **+**



The log server configuration window is displayed.

Log servers are enabled by default. To disable, toggle off **Enable**.

- c. Type the host name or IP address of the **Server**.
 - d. Select the event categories that will be sent to the server. By default, all event categories are enabled. You can disable logging for error, informational, and status event categories by clicking to toggle off the category.
 - e. For **Syslog egress port**, type the port number to use for the syslog server. The default is **514**.
 - f. For **Protocol**, select the IP protocol to use for communication with the syslog server. Available options are **TCP** and **UDP**. The default is **UDP**.
5. Click **Apply** to save the configuration and apply the change.

Command line

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. (Optional) To configure remote syslog servers:

- a. Add a remote server:

```
(config)> add system log remote end
(config system log remote 0)>
```

- b. Enable the server:

```
(config system log remote 0)> enable true
(config system log remote 0)>
```

- c. Set the host name or IP address of the server:

```
(config system log remote 0)> server hostname
(config system log remote 0)>
```

- d. The event categories that will be sent to the server are automatically enabled when the server is enabled.

- To disable informational event messages:

```
(config system log remote 0)> info false
(config system log remote 0)>
```

- To disable status event messages:

```
(config system log remote 0)> status false
(config system log remote 0)>
```

- To disable informational event messages:

```
(config system log remote 0)> error false
(config system log remote 0)>
```

4. Set the port number to use for the syslog server:

```
(config system log remote 0)> port value
(config system log remote 0)>
```

where *value* is any integer between **1** and **65535**. The default is **514**.

5. Set the IP protocol to use for communication with the syslog server:

```
(config system log remote 0)> protocol value
(config system log remote 0)>
```

where *value* is either **tcp** or **udp**. The default is **udp**.

6. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

7. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Configure options for the event and system logs

The default configuration for event and system logging is:

- The heartbeat interval, which determines the amount of time to wait before sending a heartbeat event if no other events have been sent, is set to 30 minutes.
- All event categories are enabled.

To change or disable the heartbeat interval, or to disable event categories, and to perform other log configuration:



Web

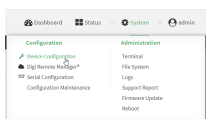
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

Remote Manager:

- a. Locate your device as described in [Use Digi Remote Manager to view and manage your device](#).
- b. Click the **Device ID**.
- c. Click **Settings**.
- d. Click to expand **Config**.

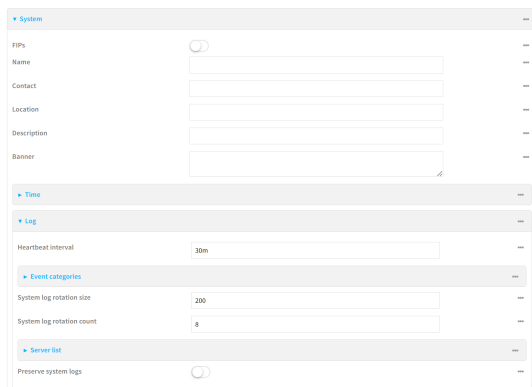
Local Web UI:

- a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



The **Configuration** window is displayed.

3. Click **System > Log**.



4. (Optional) To change the **Heartbeat interval** from the default of 30 minutes, type a new value. The heartbeat interval determines the amount of time to wait before sending a heartbeat event if no other events have been sent.

Allowed values are any number of weeks, days, hours, minutes, or seconds, and take the format **number{w|d|h|m|s}**.

For example, to set **Heartbeat interval** to ten minutes, enter **10m** or **600s**.

To disable the **Heartbeat interval**, enter **0s**.

5. (Optional) To disable event categories, or to enable them if they have been disabled:
 - a. Click to expand **Event Categories**.
 - b. Click an event category to expand.

- c. Depending on the event category, you can enable or disable different types of events.
 - **Enable error events:** Enable to generate an event whenever an error occurs.
 - **Enable status events:** Enable to generate periodic reports of the current status. These events are generated at specific time intervals, rather than when changes occur, and are only sent if a change has occurred since the previous report. Status events may also be generated in response to remote control commands.
 - **Status interval:** The minimum time interval between periodic status events. The limitation does not apply to events generated in response to remote control commands. Set this field to blank to only send events generated in response to remote control command.
Syntax: *number{w|d|h|m|s}*
Default: 30m (30 minutes)
 This field works with the **Enable status events** option.
 - **Enable informational events:** Enable to generate an event whenever a significant change occurs.
 - **Enable email notifications:** Enable to email a system log event notification to a specified email address. The email address must also be specified before a notification can be sent. To configure, see [Configure an email notification for a system event](#).
 - **Enable SNMP traps:** Enable to save system log event information to an SNMP trap. At least one SNMP destination must be defined before event information can be saved. To configure, see [Configure an SNMP trap for a system event](#).
6. (Optional) See [Configure syslog servers](#) for information about configuring remote syslog servers to which log messages will be sent.
7. (Optional) To change the system log settings from the defaults, type in a new value.
 - **System log rotation size:** Specify the maximum size (measured in kilobytes) the system log file can reach before log rotation. When the specified size is reached, the system log rotates.
 Default is 200 kb. Minimum is 10 kb.
 - **System log rotation count:** Specify the number of system log files to keep.
 Default is 8. Minimum is 1; maximum is 20.
8. Enable **Preserve system logs** to save the current session's system log after a reboot. By default, the XBee Hive device erases system logs each time the device is powered off or rebooted.

Note You should only enable **Preserve system logs** temporarily to debug issues. Once you are finished debugging, immediately disable **Preserve system logs** to avoid unnecessary wear to the flash memory.

9. (Optional) Configure **Email notifications** to send an email notification of a system event. See [Configure an email notification for a system event](#).
10. (Optional) Configure **SNMP traps** destinations for a XBee Hive to save system event information. See [Configure an SNMP trap for a system event](#).

11. Click **Apply** to save the configuration and apply the change.

Command line

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. (Optional) To change the heartbeat interval from the default of 30 minutes, set a new value. The heartbeat interval determines the amount of time to wait before sending a heartbeat event if no other events have been sent.

```
(config)> system log heartbeat_interval value
(config)>
```

where *value* is any number of weeks, days, hours, minutes, or seconds, and takes the format **number{w|d|h|m|s}**.

For example, to set the **heartbeat interval** to ten minutes, enter either **10m** or **600s**:

```
(config)> system log heartbeat_interval 600s
(config)>
```

To disable the heartbeat interval, set the value to **0s**

4. Enable preserve system logs functionality to save the current session's system log after a reboot. By default, the XBee Hive device erases system logs each time the device is powered off or rebooted.

Note You should only enable **Preserve system logs** temporarily to debug issues. Once you are finished debugging, immediately disable **Preserve system logs** to avoid unnecessary wear to the flash memory.

```
(config)> system log persistent true
(config)>
```

5. (Optional) To disable event categories, or to enable them if they have been disabled:
 - a. Use the question mark (?) to determine available event categories:

```
(config)> system log event ?
```

Event categories: Settings to enable individual event categories.

Additional Configuration

arping	ARP ping
config	Configuration

dhcpserver	DHCP server
firmware	Firmware
location	Location
modem	Modem
netmon	Active recovery
network	Network interfaces
openvpn	OpenVPN
portal	Captive portal
remote	Remote control
restart	Restart
serial	Serial
sms	SMS commands
speed	Speed
stat	Network statistics
user	User
watchdog	Watchdog
wifi	Wi-Fi
wol	Wake-On-LAN

```
(config)> system log event
```

- b. Depending on the event category, you can enable or disable informational events, status events, and error events. Some categories also allow you to set the status interval, which is the time interval between periodic status events. For example, to configure DHCP server logging:
- i. Use the question mark (?) to determine what events are available for DHCP server logging configuration:

```
(config)> system log event dhcpserver ?
```

```
...
```

DHCP server: Settings for DHCP server events. Informational events are generated when a lease is obtained or released. Status events report the current list of leases.

Parameters	Current Value	
info	true	Enable informational events
status	true	Enable status events
status_interval	30m	Status interval

```
(config)> system log event dhcpserver
```

- ii. To disable informational messages for the DHCP server:

```
(config)> system log event dhcpserver info false
```

```
(config)>
```

- iii. To change the status interval:

```
(config)> system log event dhcpserver status_interval value
(config)>
```

where *value* is any number of weeks, days, hours, minutes, or seconds, and takes the format ***number*{w|d|h|m|s}**.

For example, to set the **status interval** to ten minutes, enter either **10m** or **600s**:

```
(config)> system log event dhcpserver status_interval 600s
(config)>
```

6. (Optional) See [Configure syslog servers](#) for information about configuring remote syslog servers to which log messages will be sent.
7. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

8. Type **exit** to exit the Admin CLI.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Configure an email notification for a system event

You can configure the XBee Hive to send an email notification of a system event.

Step 1: Configure the SMTP server that is used to send email notifications when a system log event occurs by enabling the **Email notifications** system log feature.

Step 2: Review the system log event categories and select the type of information that you want to save to the system log: errors, informational events, or status events, depending on the event category. To ensure the notification is sent, enable the **Enable email notification** option for the event category.

1. [Log in to the web UI](#).
2. Click **System > Device Configuration**. The **Configuration** page displays.
3. Expand **System > Log**.
4. Expand **Email notifications**.
5. Click **Enable**. The slider is blue when enabled.
 - a. From the **Server type** list box, select the method used to connect and authenticate with the SMTP server.
 - b. In the **SMTP server name** field, enter the host name or IP address of the SMTP server.
 - c. In the **SMTP server port** field, enter the TCP port of the SMTP server.
 - d. In the **Server user name** field, enter the server login name.
 - e. In the **Server password** field, enter the server password.
 - f. In the **Email from address** field, enter the email address that should be placed in the **From** field on an email.

- g. In the **Email to address** field, enter the email address that should be placed in the **To** field on an email.
 - h. In the **Email subject** field, enter the text for the subject line of the email.
6. Click **Apply** to save the configuration and apply the change.
7. Review the system log event categories and select the type of information that you want to save to the system log, and enable the **Enable email notification** option. To configure these options, see [Configure options for the event and system logs](#).

Configure an SNMP trap for a system event

You can configure an SNMP trap destination for a XBee Hive to save system event information.

Step 1: Configure an SNMP trap by enabling the **SNMP traps** system log feature.

Step 2: Review the system log event categories and select the type of information that you want to save to the system log and the SNMP trap: errors, informational events, or status events, depending on the event category. To ensure the log information is saved to an SNMP trap, enable the **Enable SNMP traps** option for the event category.

1. [Log in to the web UI](#).
2. Click **System > Device Configuration**. The **Configuration** page displays.
3. Expand **System > Log**.
4. Expand **SNMP traps**.
5. Click **Enable**. The slider is blue when enabled.
6. Add a destination.
 - a. Click **Add Destination**.
 - b. In the **Host Name** field, enter the host name or IP address of the SNMP destination.
 - c. In the **Port** field, enter the UDP port of the SNMP destination. The default is **162**.
 - d. In the **Community name** field, enter the SNMP destination community name. The default is **public**.
 - e. Repeat this process to add an additional destination, if needed.
7. Click **Apply** to save the configuration and apply the change.
8. Review the system log event categories and select the type of information that you want to save to the system log, and enable the **Enable SNMP traps** option. To configure these options, see [Configure options for the event and system logs](#).

Analyze network traffic

The XBee Hive device includes a network analyzer tool that captures data traffic on any interface and decodes the captured data traffic for diagnostics. You can capture data traffic on multiple interfaces at the same time and define capture filters to reduce the captured data. You can capture up to 10 MB of data traffic in two 5 MB files per interface.

To perform a more detailed analysis, you can download the captured data traffic from the device and view it using a third-party application.

Note Data traffic is captured to RAM and the captured data is lost when the device reboots unless you save the data to a file. See [Save captured data traffic to a file](#).

This section contains the following topics:

Configure packet capture for the network analyzer	1006
Example filters for capturing data traffic	1015
Capture packets from the command line	1016
Stop capturing packets	1017
Show captured traffic data	1018
Save captured data traffic to a file	1019
Download captured data to your PC	1020
Clear captured data	1021

Configure packet capture for the network analyzer

To use the network analyzer, you must create one or more packet capture configuration.

Required configuration items

- The interface used by this packet capture configuration.

Additional configuration items

- The filter expression for this packet capture configuration.
- Schedule the analyzer to run based on a specified event or at a particular time:
 - The events or time that will trigger the analyzer to run, using this capture configuration.
 - The amount of time that the analyzer session will run.
 - The frequency with which captured events will be saved.

To configure a packet capture configuration:

Web

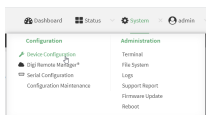
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

Remote Manager:

- a. Locate your device as described in [Use Digi Remote Manager to view and manage your device](#).
- b. Click the **Device ID**.
- c. Click **Settings**.
- d. Click to expand **Config**.

Local Web UI:

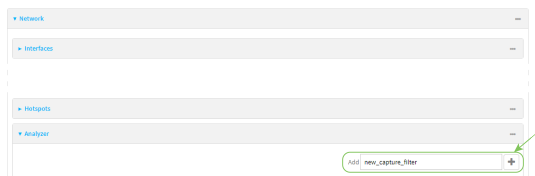
- a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



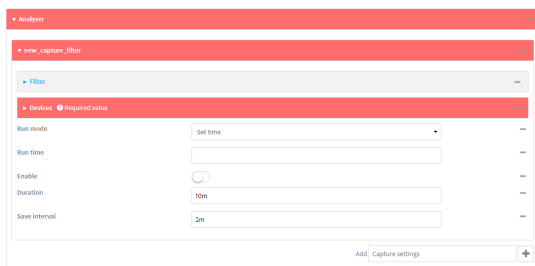
The **Configuration** window is displayed.

3. Click **Network > Analyzer**.

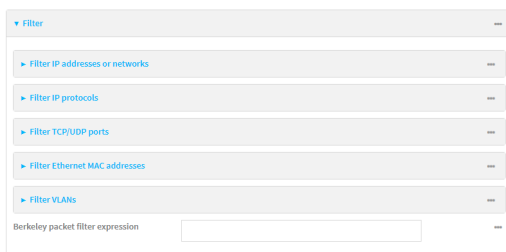
4. For **Add Capture settings**, type a name for the capture filter and click .



The new capture filter configuration is displayed.

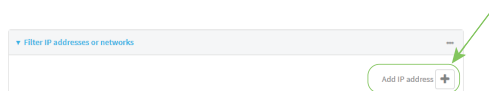


5. (Optional) Add a filter type:
- Click to expand **Filter**.



You can select from preconfigured filters to determine which types of packets to capture or ignore, or you can create your own Berkeley packet filter expression.

- To create a filter that either captures or ignores packets from a particular IP address or network:
 - Click to expand **Filter IP addresses or networks**.
 - Click  to add an IP address/network.



- For **IP address or network**, type the IPv4 or IPv6 address (and optional netmask).
- For **Source or destination IP address**, select whether the filter should apply to packets when the IP address/network is the source, the destination, or both.
- Click **Ignore this IP address or network** if the filter should ignore packets from this IP address/network. By default, this option is disabled, which means that the filter will capture packets from this IP address/network.
- Click  to add additional IP address/network filters.

- c. To create a filter that either captures or ignores packets that use a particular IP protocol:
 - i. Click to expand **Filter IP protocols**.
 - ii. Click  to add an IP protocol.
 - iii. For **IP protocol to capture or ignore**, select the protocol. If **Other protocol** is selected, type the number of the protocol.
 - iv. Click **Ignore this protocol** if the filter should ignore packets that use this protocol. By default, this option is disabled, which means that the filter will capture packets that use this protocol.
 - v. Click  to add additional IP protocols filters.
- d. To create a filter that either captures or ignores packets from a particular port:
 - i. Click to expand **Filter TCP/UDP port**.
 - ii. Click  to add a TCP /UDP port.
 - iii. For **IP TCP/UDP port to capture or ignore**, type the number of the port to be captured or ignored.
 - iv. For **TCP or UDP port**, select the type of transport protocol.
 - v. For **Source or destination TCP/UDP port**, select whether the filter should apply to packets when the port is the source, the destination, or both.
 - vi. Click **Ignore this TCP/UDP port** if the filter should ignore packets that use this port. By default, this option is disabled, which means that the filter will capture packets that use this port.
 - vii. Click  to add additional port filters.
- e. To create a filter that either captures or ignores packets from one or more specified MAC addresses:
 - i. Click to expand **Filter Ethernet MAC addresses**.
 - ii. Click  to add a MAC address.
 - iii. For **Ethernet MAC address**, type the MAC address to be captured or ignored.
 - iv. For **Source or destination Ethernet MAC address**, select whether the filter should apply to packets when the Ethernet MAC address is the source, the destination, or both.
 - v. Click **Ignore this MAC address** if the filter should ignore packets that use this port. By default, this option is disabled, which means that the filter will capture packets that use this port.
 - vi. Click  to add additional MAC address filters.
- f. To create a filter that either captures or ignores packets from one or more VLANs:
 - i. Click to expand **Filter VLANs**.
 - ii. Click  to add a VLAN.
 - iii. For **The VLAN to capture or ignore**, type the number of the VLAN.
 - iv. Click **Ignore this VLAN** if the filter should ignore packets that use this port. By default, this option is disabled, which means that the filter will capture packets that use this port.
 - v. Click  to add additional VLAN filters.

- g. For **Berkeley packet filter expression**, type a filter using Berkeley Packet Filter (BPF) syntax. See [Example filters for capturing data traffic](#) for examples of filters using BPF syntax.
6. Add one or more interface to the capture filter:
 - a. Click to expand **Device**.
 - b. Click  to add an interface to the capture setting instance.



- c. For **Device**, select an interface.
 - d. Repeat to add additional interfaces to the capture filter.
7. (Optional) For **Berkeley packet filter expression**, type a filter using Berkeley Packet Filter (BPF) syntax. See [Example filters for capturing data traffic](#) for examples of filters using BPF syntax.
8. (Optional) Schedule the analyzer to run, using this capture filter, based on a specified event or at a particular time:
 - a. For **Run mode**, select the mode that will be used to run the capture filter. Available options are:
 - **On boot**: The capture filter will run once each time the device boots.
 - **Interval**: The capture filter will start running at the specified interval, within 30 seconds after the configuration change is saved.
 - If **Interval** is selected, in **Interval**, type the interval.
Allowed values are any number of weeks, days, hours, minutes, or seconds, and take the format **number{w|d|h|m|s}**.
For example, to set **Interval** to ten minutes, enter **10m** or **600s**.
 - **Set time**: Runs the capture filter at a specified time of the day.
 - If **Set Time** is selected, specify the time that the capture filter should run in **Run time**, using the format **HH:MM**.
 - **During system maintenance**: The capture filter will run during the system maintenance time window.
 - b. **Enable** the capture filter schedule.
 - c. For **Duration**, type the amount of time that the scheduled analyzer session will run.
Allowed values are any number of weeks, days, hours, minutes, or seconds, and take the format **number{w|d|h|m|s}**.
For example, to set **Duration** to ten minutes, enter **10m** or **600s**.
 - d. For **Save interval**, type the frequency with which captured events will be saved.
Allowed values are any number of weeks, days, hours, minutes, or seconds, and take the format **number{w|d|h|m|s}**.
For example, to set **Save interval** to ten minutes, enter **10m** or **600s**.
9. Click **Apply** to save the configuration and apply the change.

Command line

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Add a new capture filter:

```
(config)> add network analyzer name
(config network analyzer name)>
```

4. Add an interface to the capture filter:

```
(config network analyzer name)> add device end device
(config network analyzer name)>
```

Determine available devices and the proper syntax.

To determine available devices and proper syntax, use the space bar autocomplete feature:

```
(config network analyzer name)> add device end <space>
(config network analyzer name)> add interface end /network/
```

Repeat to add additional interfaces.

5. (Optional) Set a filter for the capture filter:
 - a. To create a filter that either captures or ignores packets from a particular IP address or network:
 - i. Add a new IP address/network filter:

```
(config network analyzer name)> add filter address end
(config network analyzer name filter address 0)>
```

- ii. Set the IPv4 or IPv6 address (and optional netmask):

```
(config network analyzer name filter address 0)> address ip_address[/netmask]
(config network analyzer name filter address 0)>
```

- iii. Set whether the filter should apply to packets when the IP address/network is the source, the destination, or both:

```
(config network analyzer name filter address 0)> match value
(config network analyzer name filter address 0)>
```

where *value* is one of:

- **source:** The filter will apply to packets when the IP address/network is the source.
- **destination:** The filter will apply to packets when the IP address/network is the destination.

- **either:** The filter will apply to packets when the IP address/network is either the source or the destination.

- iv. (Optional) Set the filter should ignore packets from this IP address/network:

```
(config network analyzer name filter address 0)> ignore true
(config network analyzer name filter address 0)>
```

By default, this option is set to **false**, which means that the filter will capture packets from this IP address/network.

- v. Repeat these steps to add additional IP address filters.
- b. To create a filter that either captures or ignores packets that use a particular IP protocol:
 - i. Add a new IP protocol filter:

```
(config network analyzer name)> add filter protocol end
(config network analyzer name filter protocol 0)>
```

- ii. Use the **?** to determine available protocols and the appropriate format:

```
(config network analyzer name filter protocol 0)> protocol ?
```

IP protocol to capture or ignore: IP protocol to capture or ignore.

Format:

```
ah
esp
gre
icmp
icmpv6
igmp
ospf
other
tcp
udp
vrrp
```

Current value:

```
(config network analyzer name filter protocol 0)>
```

- iii. Set the protocol:

```
(config network analyzer name filter protocol 0)> protocol value
(config network analyzer name filter protocol 0)>
```

- iv. If other is set for the protocol, set the number of the protocol:

```
(config network analyzer name filter protocol 0)> protocol_other value
(config network analyzer name filter protocol 0)>
```

where *value* is an integer between 1 and 255 and represents the the number of the protocol.

- v. (Optional) Set the filter should ignore packets from this protocol:

```
(config network analyzer name filter protocol 0)> ignore true
(config network analyzer name filter protocol 0)>
```

By default, is option is set to **false**, which means that the filter will capture packets from this protocol.

- vi. Repeat these steps to add additional protocol filters.
- c. To create a filter that either captures or ignores packets from a particular port:
- i. Add a new port filter:

```
(config network analyzer name)> add filter port end
(config network analyzer name filter port 0)>
```

- ii. Set the transport protocol that should be filtered for the port:

```
(config network analyzer name filter port 0)> protocol value
(config network analyzer name filter port 0)>
```

where *value* is one of **tcp**, **udp**, or **either**. The default is **either**.

- iii. Set whether the filter should apply to packets when the port is the source, the destination, or both:

```
(config network analyzer name filter port 0)> match value
(config network analyzer name filter port 0)>
```

where *value* is one of:

- **source**: The filter will apply to packets when the port is the source.
- **destination**: The filter will apply to packets when the port is the destination.
- **either**: The filter will apply to packets when the port is either the source or the destination.

- iv. (Optional) Set the filter should ignore packets from this port:

```
(config network analyzer name filter port 0)> ignore true
(config network analyzer name filter port 0)>
```

By default, is option is set to **false**, which means that the filter will capture packets from this port.

- v. Repeat these steps to add additional port filters.
- d. To create a filter that either captures or ignores packets from one or more specified MAC addresses:
- i. Add a new MAC address filter:

```
(config network analyzer name)> add filter mac_address end
(config network analyzer name filter mac_address 0)>
```

- ii. Set the MAC address that should be captured or ignored:

```
(config network analyzer name filter mac_address 0)> address value
(config network analyzer name filter mac_address 0)>
```

where *value* is the MAC address to be filtered, using colon-hexadecimal notation with lower case, for example, **00:aa:11:bb:22:cc**.

- iii. Set whether the filter should apply to packets when the MAC address is the source, the destination, or both:

```
(config network analyzer name filter mac_address 0)> match value
(config network analyzer name filter mac_address 0)>
```

where *value* is one of:

- **source**: The filter will apply to packets when the MAC address is the source.
- **destination**: The filter will apply to packets when the MAC address is the destination.
- **either**: The filter will apply to packets when the MAC address is either the source or the destination.

- iv. (Optional) Set the filter should ignore packets from this port:

```
(config network analyzer name filter mac_address 0)> ignore true
(config network analyzer name filter mac_address 0)>
```

By default, this option is set to **false**, which means that the filter will capture packets from this MAC address.

- v. Repeat these steps to add additional MAC addresses.

- e. To create a filter that either captures or ignores packets from one or more specified VLANs:

- i. Add a new VLAN filter:

```
(config network analyzer name)> add filter vlan end
(config network analyzer name filter vlan 0)>
```

- ii. Set the VLAN that should be captured or ignored:

```
(config network analyzer name filter vlan 0)> vlan value
(config network analyzer name filter vlan 0)>
```

where *value* is number of the VLAN.

- iii. (Optional) Set the filter should ignore packets from this VLAN:

```
(config network analyzer name filter vlan 0)> ignore true
(config network analyzer name filter vlan 0)>
```

By default, this option is set to **false**, which means that the filter will capture packets from this MAC address.

- iv. Repeat these steps to add additional VLANs.

- f. To create a filter using Berkeley Packet Filter (BPF) syntax:

```
(config network analyzer name)> filter custom value
(config network analyzer name)>
```

where *value* is a filter using Berkeley Packet Filter (BPF) syntax. Values that contain spaces must be enclosed in double quotes (").

See [Example filters for capturing data traffic](#) for examples of filters using BPF syntax.

6. (Optional) Schedule the analyzer to run, using this capture filter, based on a specified event or at a particular time:
 - a. Enable scheduling for this capture filter:

```
(config network analyzer name)> schedule enable true
(config network analyzer name)>
```

- b. Set the mode that will be used to run the capture filter:

```
(config network analyzer name)> when mode
(config network analyzer name)>
```

where *mode* is one of the following:

- **boot**: The script will run once each time the device boots.
- **interval**: The script will start running at the specified interval, within 30 seconds after the configuration change is saved. If **interval** is selected, set the interval:

```
(config add network analyzer name)> on_interval value
(config add network analyzer name)>
```

where *value* is any number of weeks, days, hours, minutes, or seconds, and takes the format **number{w|d|h|m|s}**.

For example, to set **on_interval** to ten minutes, enter either **10m** or **600s**:

```
(config network analyzer name)> on_interval 600s
(config network analyzer name)>
```

- **set_time**: Runs the script at a specified time of the day. If **set_time** is set, set the time that the script should run, using the format *HH:MM*:

```
(config network analyzer name)> run_time HH:MM
(config network analyzer name)>
```

- **maintenance_time**: The script will run during the system maintenance time window.

- c. Set the amount of time that the scheduled analyzer session will run:

```
(config network analyzer name)> duration value
(config network analyzer name)>
```

where *value* is any number of weeks, days, hours, minutes, or seconds, and takes the format **number{w|d|h|m|s}**.

For example, to set **duration** to ten minutes, enter either **10m** or **600s**:

```
(config network analyzer name)> save_interval 600s
(config network analyzer name)>
```

- d. Set the frequency with which captured events will be saved:

```
(config network analyzer name)> save_interval value
(config network analyzer name)>
```

where *value* is any number of weeks, days, hours, minutes, or seconds, and takes the format ***number*{*w*|*d*|*h*|*m*|*s*}**.

For example, to set **save_interval** to ten minutes, enter either **10m** or **600s**:

```
(config network analyzer name)> save_interval 600s
(config network analyzer name)>
```

7. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

8. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Example filters for capturing data traffic

The following are examples of filters using Berkeley Packet Filter (BPF) syntax for capturing several types of network data. See <https://biot.com/capstats/bpf.html> for detailed information about BPF syntax.

Example IPv4 capture filters

- Capture traffic to and from IP host 192.168.1.1:

```
ip host 192.168.1.1
```

- Capture traffic from IP host 192.168.1.1:

```
ip src host 192.168.1.1
```

- Capture traffic to IP host 192.168.1.1:

```
ip dst host 192.168.1.1
```

- Capture traffic for a particular IP protocol:

```
ip proto protocol
```

where *protocol* is a number in the range of **1** to **255** or one of the following keywords: **icmp**, **icmp6**, **igmp**, **pim**, **ah**, **esp**, **vrp**, **udp**, or **tcp**.

- Capture traffic to and from a TCP port 80:

```
ip proto tcp and port 80
```

- Capture traffic to UDP port 53:

```
ip proto udp and dst port 53
```

- Capture traffic from UDP port 53:

```
ip proto udp and src port 53
```

- Capture to and from IP host 10.0.0.1 but filter out ports 22 and 80:

```
ip host 10.0.0.1 and not (port 22 or port 80)
```

Example Ethernet capture filters

- Capture Ethernet packets to and from a host with a MAC address of 00:40:D0:13:35:36:

```
ether host 00:40:D0:13:35:36
```

- Capture Ethernet packets from host 00:40:D0:13:35:36:

```
ether src 00:40:D0:13:35:36:
```

- Capture Ethernet packets to host 00:40:D0:13:35:36:

```
ether dst 00:40:D0:13:35:36
```

Capture packets from the command line

You can start packet capture at the command line with the [analyzer start](#) command. Alternatively, you can schedule the network analyzer to run based on a specified event or at a particular time. See [Configure packet capture for the network analyzer](#) for information about scheduling packet capturing.

Additional analyzer commands allow you to:

- [Stop capturing packets.](#)
- [Save captured data traffic to a file.](#)
- [Clear captured data.](#)

Required configuration items

- A configured packet capture. See [Configure packet capture for the network analyzer](#) for packet capture configuration information.

To start packet capture from the command line:

Command line

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. Type the following at the Admin CLI prompt:

```
> analyzer start name capture_filter
>
```

where *capture_filter* is the name of a packet capture configuration. See [Configure packet capture for the network analyzer](#) for more information.

To determine available packet capture configurations, use the ?:

```
> analyzer start name ?
```

name: Name of the capture filter to use.

Format:

```
test_capture
```

```
capture_ping
```

```
> analyzer start name
```

You can capture up to 10 MB of data traffic in two 5 MB files per interface.

Note Data traffic is captured to RAM and the captured data is lost when the device reboots unless you save the data to a file. See [Save captured data traffic to a file](#).

Stop capturing packets

You can stop packet capture at the command line with the [analyzer stop](#) command.

To stop packet capture from the command line:

Command line

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. Type the following at the Admin CLI prompt:

```
> analyzer stop name capture_filter
>
```

where *capture_filter* is the name of a packet capture configuration. See [Configure packet capture for the network analyzer](#) for more information.

To determine available packet capture configurations, use the ?:

```
> analyzer stop name ?
```

name: Name of the capture filter to use.

Format:

test_capture
capture_ping

> analyzer stop name

Show captured traffic data

To view captured data traffic, use the [show analyzer](#) command. The command output show the following information for each packet:

- The packet number.
- The timestamp for when the packet was captured.
- The length of the packet and the amount of data captured.
- Whether the packet was sent or received by the device.
- The interface on which the packet was sent or received.
- A hexadecimal dump of the packet of up to 256 bytes.
- Decoded information of the packet.

To show captured data traffic:

Command line

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. Type the following at the Admin CLI prompt:

```
> show analyzer name capture_filter
```

```
Packet 1 : Sept-29-2023 12:10:00.287682, Length 60 bytes (Captured Length 60 bytes)
```

```
Received on interface eth1
```

```
00 40 ff 80 01 20 b4 b6 86 21 b5 73 08 00 45 00  .@... ..!s..E.
00 28 3d 36 40 00 80 06 14 bc 0a 0a 4a 82 0a 0a  .(=6@... ....J..
4a 48 cd ae 00 16 a4 4b ff 5f ee 1f d8 23 50 10  JH.....K ._...#P.
08 02 c7 40 00 00 00 00 00 00 00 00 00 00 00  ...@.....
```

```
Ethernet Header
```

```
Destination MAC Addr : 00:40:D0:13:35:36
```

```
Source MAC Addr : fb:03:53:05:11:2f
```

```
Ethernet Type : IP (0x0800)
```

```
IP Header
```

```
IP Version : 4
```

```
Header Length : 20 bytes
```

```
ToS : 0x00
```

```

Total Length      : 40 bytes
ID                : 15670 (0x3d36)
Flags             : Do not fragment
Fragment Offset   : 0 (0x0000)
TTL               : 128 (0x80)
Protocol          : TCP (6)
Checksum          : 0x14bc
Source IP Address : 10.10.74.130
Dest. IP Address  : 10.10.74.72
TCP Header
Source Port       : 52654
Destination Port  : 22
Sequence Number   : 2756443999
Ack Number        : 3995064355
Data Offset       : 5
Flags             : ACK
Window            : 2050
Checksum          : 0xc740
Urgent Pointer    : 0
TCP Data
00 00 00 00 00 00      .....

```

>

where *capture_filter* is the name of a packet capture configuration. See [Configure packet capture for the network analyzer](#) for more information.

To determine available packet capture configurations, use the ?:

```
> show analyzer name ?
```

name: Name of the capture filter to use.

Format:

```
test_capture
capture_ping
```

```
> show analyzer name
```

Save captured data traffic to a file

Data traffic is captured to RAM and when the device reboots, the data is lost. To retain the captured data, first save the data to a file and then upload the file to a PC.

To save captured traffic data to a file, use the [analyzer save](#) command:

Command line

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. Type the following at the Admin CLI prompt:

```
> analyzer save filename filename path path
>
```

where:

- *filename* is the name of the file that the captured data will be saved to.

Determine filenames already in use:

Use the tab autocomplete feature to determine filenames that are currently in use:

```
> analyzer save name <tab>
test1_analyzer_capture test2_analyzer_capture
> analyzer save name
```

- *path* is the path and filename to save captured traffic to. If a relative path is provided, /etc/config/analyzer will be used as the root directory for the path and file.

To transfer the file to your PC, see [Download captured data to your PC](#).

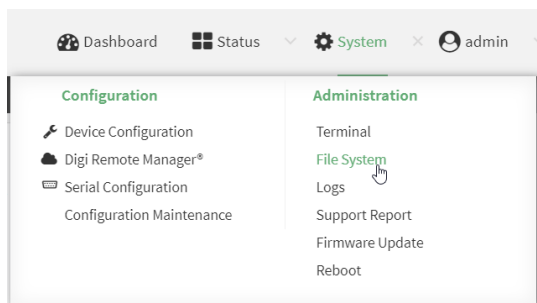
Download captured data to your PC

After saving captured data to a file (see [Save captured data traffic to a file](#)), you can download the file from the WebUI or from the command line by using the [scp](#) (secure copy file) command.



Log into the XBee Hive WebUI as a user with full Admin access rights.

1. On the menu, click **System**. Under **Administration**, click **File System**.



The **File System** page appears.



2. Highlight the **etc** directory and click [↗](#) to open the directory. Navigate to **/etc/config/analyzer**.

Manage files in the local file system of this device.

/etc/config		
Name	Size	Last modified
analyzer	4.0K	2022-10-14 14:33:57 +0000
hotspot	4.0K	2022-10-14 14:33:57 +0000
scripts	4.0K	2022-09-30 14:22:13 +0000
serial	4.0K	2022-10-14 14:33:48 +0000
ubridge	4.0K	2022-10-14 14:33:57 +0000

> default device configuration

Upload new default device configuration to /opt/custom-default-config.bin

3. Select the saved analyzer report you want to download and click (download).

Command line

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. Type **scp** to use the Secure Copy program to copy the file to your PC:

```
> scp host hostname-or-ip user username remote remote-path local local-path to remote
```

where:

- *hostname-or-ip* is the hostname or IP address of the remote host.
- *username* is the name of the user on the remote host.
- *remote-path* is the location on the remote host where the file will be copied.
- *local-path* is the path and filename on the XBee Hive device.

For example:

To download the traffic saved in the file **/etc/config/analyzer/eth0.pcpng** to a PC with the IP **192.168.210.2**, for a user named **maria**, to the **/home/maria** directory:

```
> scp host 192.168.210.2 user maria remote /home/maria local /etc/config/analyzer/eth0.pcpng to remote
```

maria@192.168.210.2's password:

```
eth0.pcpng 100% 11KB 851.3KB/s 00:00
```

Clear captured data

To clear captured data traffic in RAM, use the **analyzer clear** command:

Command line

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. Type the following at the Admin CLI prompt:

```
> analyzer clear name capture_filter
>
```

where *capture_filter* is the name of a packet capture configuration. See [Configure packet capture for the network analyzer](#) for more information.

To determine available packet capture configurations, use the ?:

```
> analyzer clear name ?
```

name: Name of the capture filter to use.

Format:

test_capture

capture_ping

```
> analyzer clear name
```

Note You can remove data traffic saved to a file using the [rm](#) command.

Use the ping command to troubleshoot network connections

Use the [ping](#) command to troubleshoot connectivity problems.

Ping to check internet connection

To check your internet connection:

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the Admin CLI prompt, type the ping command followed by the host name or IP address of the server to be pinged:

```
> ping 8.8.8.8
PING 8.8.8.8 (8.8.8.8) 56(84) bytes of data.
64 bytes from 8.8.8.8: icmp_seq=1 ttl=54 time=11.1 ms
64 bytes from 8.8.8.8: icmp_seq=2 ttl=54 time=10.8 ms
64 bytes from 8.8.8.8: icmp_seq=3 ttl=54 time=10.7 ms
...
>
```

3. Type **exit** to exit the Admin CLI.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Stop ping commands

To stop pings when the number of pings to send (the **count** parameter) has been set to a high value, enter **Ctrl+C**.

Use the traceroute command to diagnose IP routing problems

Use the **traceroute** command to diagnose IP routing problems. This command traces the route to a remote IP host and displays results. The **traceroute** command differs from [ping](#) in that traceroute shows where the route fails, while ping simply returns a single error on failure.

See the [traceroute](#) command description for command syntax and examples. The **traceroute** command has several parameters. Only **host** is required.

- **host**: The IP address of the destination host.
- **bypass**: Send directly to a host on an attached network.
- **debug**: Enable socket level debugging.
- **dontfragment**: Do not fragment probe packets.
- **first_ttl**: Specifies with what TTL to start. (Default: 1)
- **gateway**: Route the packet through a specified gateway.
- **icmp**: Use ICMP ECHO for probes.
- **interface**: Specifies the interface.

- **ipchecksums**: Calculate ip checksums.
- **max_ttl**: Specifies the maximum number of hops. (Default: 30)
- **nomap**: Do not map IP addresses to host names
- **nqueries**: Sets the number of probe packets per hop. (Default: 3)
- **packetlen**: Total size of the probing packet. (Default: -1)
- **pausesecs**: Minimal time interval between probes (Default: 0)
- **port**: Specifies the destination port. (Default: -1)
- **src_addr**: Chooses an alternative source address.
- **tos**: Set Type of Service. (Default: -1)
- **verbose**: Verbose output.
- **waittime**: Max wait for a response to a probe. (Default: 5)

Example

This example shows using **traceroute** to verify that the Digi XBee Hive Gateway device can route to host **8.8.8.8** (www.google.com) through the default gateway. The command output shows that **15** routing hops were required to reach the host:

1. Select the device in Remote Manager and click **Actions > Open Console**, or log into the XBee Hive local command line as a user with full Admin access rights.
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the Admin CLI prompt, use the **traceroute** command to view IP routing information:

```
> traceroute 8.8.8.8
traceroute to 8.8.8.8 (8.8.8.8), 30 hops max, 52 byte packets
 1 192.168.8.1 (192.168.8.1) 0 ms 0 ms 0 ms
 2 10.10.10.10 (10.10.10.10) 0 ms 2 ms 2 ms
 3 * 10.10.8.23 (10.10.8.23) 1 ms 1 ms
 4 96.34.84.22 (96.34.84.22) 1 ms 1 ms 1 ms
 5 96.34.81.190 (96.34.81.190) 2 ms 2 ms 2 ms
 6 ***
 7 96.34.2.12 (96.34.2.12) 11 ms 11 ms 11 ms
 8 ***
 9 8.8.8.8 (8.8.8.8) 11 ms 11 ms 11 ms
>
```

By entering a **whois** command on a Unix device, the output shows that the route is as follows:

1. **192/8**: The local network of the XBee Hive device.
2. **192.168.8.1**: The local network gateway to the Internet.
3. **96/8**: Charter Communications, the network provider.
4. **216/8**: Google Inc.

Stop the traceroute process

To stop the traceroute process, enter **Ctrl-C**.

Server Command Interface (SCI)

This section describes using SCI with the XBee Hive.

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Discover and retrieve the XBee network

The Digi Remote Manager API allows you to remotely retrieve the XBee network of your XBee Hive. You can retrieve the current discovered network, perform a new discovery or clear the network before discovering it. To do so:

1. **Login** to Digi Remote Manager: remotemanager.digi.com/ui/login.
2. Click the **API Explorer** button located in the left menu.
3. In the right panel, configure the **request type** to be **POST** and use **/ws/sci** as the request **URL**.
4. Fill the **Request Body** field with the following content:

```
<sci_request version="1.0">
  <send_message cache="false">
    <targets>
      <device id="DEVICE_ID"/>
    </targets>
    <rci_request version="1.1">
      <do_command target="zigbee">
        <discover start="1" size="255" option="discover"/>
      </do_command>
    </rci_request>
  </send_message>
</sci_request>
```

Where:

- **DEVICE_ID** is the Device ID of the XBee Hive registered in your Digi Remote Manager account.
- The **discover attributes** are configured as follows:
 - **addr** attribute specifies the 64-bit address of the XBee device to discover/retrieve. If not specified, a full discover of the network is performed.
 - **start** attribute specifies the starting index of the XBee devices to retrieve.
 - **size** attribute specifies the maximum number of XBee devices to retrieve.
 - **option** attribute specifies the type of discover to execute:
 - **clear** to clear the network cache before performing the discover.
 - **discover** to perform a standard network discover.
 - **current** to retrieve the current network information without running the discover.
- 5. Click the **Send** button next to the **URL** field.
- 6. After a while, the **Response Body** field is populated with the response from the XBee Hive containing a list of devices in the network:

```
<sci_reply version="1.0">
  <send_message>
    <device id="DEVICE_ID">
      <rci_reply version="1.1">
        <do_command target="zigbee">
          <discover>
            <device index="1">
```

```

<type>0</type>
<ext_addr>00:13:A2:00:41:AF:13:43!</ext_addr>
<net_addr>0x0000</net_addr>
<node_id>COORDINATOR</node_id>
<hw_version>0x41</hw_version>
<fw_version>0x100a</fw_version>
</device>
<device index="2">
<type>1</type>
<ext_addr>00:13:A2:00:41:95:C6:58!</ext_addr>
<net_addr>0xC93A</net_addr>
<node_id>ROUTER_1</node_id>
<hw_version>0x42</hw_version>
<fw_version>0x100a</fw_version>
</device>
<device index="3">
<type>1</type>
<ext_addr>00:13:A2:00:41:AE:30:3D!</ext_addr>
<net_addr>0x87F4</net_addr>
<node_id>ROUTER_2</node_id>
<hw_version/>
<fw_version/>
</device>
</discover>
</do_command>
</rci_reply>
</device>
</send_message>
</sci_reply>

```

Retrieve XBee device settings

The Digi Remote Manager API allows you to remotely retrieve the value of a predefined set of settings for an XBee device in a network. To do so:

1. **Login** to Digi Remote Manager: remotemanager.digi.com/ui/login.
2. Click the **API Explorer** button located in the left menu.
3. In the right panel, configure the **request type** to be **POST** and use **/ws/sci** as the request **URL**.
4. Fill the **Request Body** field with the following content:

```

<sci_request version="1.0">
<send_message>
<targets>
<device id="DEVICE_ID"/>
</targets>
<rci_request version="1.1">
<do_command target="zigbee">
<query_setting addr="0013A2004195C658"/>
</do_command>
</rci_request>
</send_message>
</sci_request>

```

Where:

- **DEVICE_ID** is the Device ID of the XBee Hive registered in your Digi Remote Manager account.
 - The **query_setting attributes** are configured as follows:
 - **addr** attribute specifies the 64-bit address of the XBee device to retrieve its settings. If omitted, the address of the XBee Hive's XBee device is used.
5. Click the **Send** button next to the **URL** field.
 6. After a while, the **Response Body** field is populated with the response from the XBee Hive containing the list of settings and values for the XBee device:

```

<sci_reply version="1.0">
<send_message>
  <device id="DEVICE_ID">
    <rci_reply version="1.1">
      <do_command target="zigbee">
        <query_setting addr="0013A2004195C658">
          <radio>
            <aggregation>255</aggregation>
            <api_enable>1</api_enable>
            <api_options>0</api_options>
            <channel>0x17</channel>
            <channel_mask/>
            <coord_enable>0</coord_enable>
            <dest_addr_high>0x00000000</dest_addr_high>
            <dest_addr_low>0x00000000</dest_addr_low>
            <device_options>0x40</device_options>
            <device_type>0x00120000</device_type>
            <dio0_config>1</dio0_config>
            <dio1_config>0</dio1_config>
            <dio2_config>0</dio2_config>
            <dio3_config>0</dio3_config>
            <dio4_config>0</dio4_config>
            <dio5_config>1</dio5_config>
            <dio6_config>0</dio6_config>
            <dio7_config>1</dio7_config>
            <dio8_config>1</dio8_config>
            <dio9_config>1</dio9_config>
            <dio10_config>1</dio10_config>
            <dio11_config>0</dio11_config>
            <dio12_config>0</dio12_config>
            <dio13_config>1</dio13_config>
            <dio14_config>1</dio14_config>
            <dio15_config>0</dio15_config>
            <dio16_config>0</dio16_config>
            <dio17_config>0</dio17_config>
            <dio18_config>0</dio18_config>
            <dio19_config>0</dio19_config>
            <dio_detect>0x0000</dio_detect>
            <dio_sample_rate>0</dio_sample_rate>
            <discover_options>0x00</discover_options>
            <discover_timeout>60</discover_timeout>
            <encrypt_enable>0</encrypt_enable>
            <encrypt_options>0x02</encrypt_options>
            <join_time>255</join_time>
            <join_notification>0</join_notification>
            <join_verification>1</join_verification>
            <link_key>0x00</link_key>
          </radio>
        </query_setting>
      </do_command>
    </rci_reply>
  </device id>
</send_message>
</sci_reply>

```

```

<network_key>0x00</network_key>
<net_addr>0xc93a</net_addr>
<node_id>ROUTER_1</node_id>
<pan_id>0x00000000deadbeef</pan_id>
<power_level>4</power_level>
<pwm0_config>0</pwm0_config>
<pwm1_config>0</pwm1_config>
<scan_channels>0x7fff</scan_channels>
<scan_duration>3</scan_duration>
<serial_parity>0</serial_parity>
<serial_rate>7</serial_rate>
<serial_stop_bits>0</serial_stop_bits>
<sleep_count>1</sleep_count>
<sleep_mode>0</sleep_mode>
<sleep_options>0x00</sleep_options>
<sleep_time>32</sleep_time>
<sleep_wake_time>5000</sleep_wake_time>
</radio>
</query_setting>
</do_command>
</rci_reply>
</device>
</send_message>
</sci_reply>

```

The settings returned by this API execution are a subset of all the settings contained in the XBee firmware. Some devices may not have all these settings available, in that case, the unavailable settings return an empty value. To retrieve the value of a specific setting not contained in this list, see [Execute arbitrary commands](#).

Configure XBee device settings

Retrieve XBee device settings

The Digi Remote Manager API allows you to remotely set the value of a predefined set of settings for an XBee device of your network. To do so:

1. **Login** to Digi Remote Manager: remotemanager.digi.com/ui/login.
2. Click the **API Explorer** button located in the left menu.
3. In the right panel, configure the **request type** to be **POST** and use **/ws/sci** as the request **URL**.
4. Fill the **Request Body** field with the following content:

```

<<sci_request version="1.0">
<send_message>
  <targets>
    <device id="DEVICE_ID"/>
  </targets>
  <rci_request version="1.1">
    <do_command target="zigbee">
      <set_setting addr="0013A2004195C658">
        <radio>
          <node_id>NEW_NODE_ID_VALUE</node_id>
        </radio>
      </set_setting>
    </do_command>
  </rci_request>
</send_message>
</>

```

```

</set_setting>
</do_command>
</rci_request>
</send_message>
</sci_request>

```

Where:

- **DEVICE_ID** is the Device ID of the XBee Hive registered in your Digi Remote Manager account.
 - **NEW_NODE_ID_VALUE** is the new value of the **node_id** setting.
 - The **set_setting** attributes are configured as follows:
 - **addr** attribute specifies the 64-bit address of the XBee device to set its settings. If omitted, the address of the XBee Hive's XBee device is used.
 - You can add new setting entries to the request inside the **radio** tag following this pattern:
 <SETTING_TAG>NEW_SETTING_VALUE</SETTING_TAG>
 The available tags of the settings that can be changed are listed in the answer of the **query_setting** request, explained in [Retrieve XBee device settings](#).
5. Click the **Send** button next to the **URL** field.
 6. After a while, the **Response Body** field is populated with the response from the XBee Hive with an empty **radio** tag if the request was successful:

```

<sci_reply version="1.0">
<send_message>
<device id="DEVICE_ID">
<rci_reply version="1.1">
<do_command target="zigbee">
<set_setting addr="0013A2004195C658">
<radio/>
</set_setting>
</do_command>
</rci_reply>
</device>
</send_message>
</sci_reply>

```

Execute arbitrary commands

You can remotely execute arbitrary commands in an XBee network by using the XBee Hive API. The command to execute can be one of the following types:

- Read the value of any XBee setting.
- Change the value of any XBee setting.
- Execute a special command in the XBee and get the output.

To remotely execute any arbitrary command in an XBee device from the network using XBee Hive, login to Digi Remote Manager and access the API explorer:

1. **Login** to Digi Remote Manager: remotemanager.digi.com/ui/login.
2. Click the **API Explorer** button located in the left menu.

3. In the right panel, configure the **request type** to be **POST** and use **/ws/sci** as the request URL.

Depending on the command to execute, you need to fill the **Request Body** field with different content.

Read the value of an XBee setting

Fill the **Request Body** field with the following content:

```
<sci_request version="1.0">
  <send_message>
    <targets>
      <device id="DEVICE_ID"/>
    </targets>
    <rci_request version="1.1">
      <do_command target="zigbee">
        <radio_command addr="0013A2004195C658" id="NI" format="string" timeout="10" />
      </do_command>
    </rci_request>
  </send_message>
</sci_request>
```

Where:

- **DEVICE_ID** is the Device ID of the XBee Hive registered in your Digi Remote Manager account.
- The **radio_command** attributes are configured as follows:
 - **addr** attribute specifies the 64-bit address of the XBee device to read the setting from. If omitted, the address of the XBee Hive's XBee device is used.
 - **id** attribute is the identifier of the setting to read, in this case **NI**.
 - **format** is the format in which the current setting value will be returned:
 - **string** to receive the setting value in string format.
 - **integer** to receive the setting value in integer format.
 - **binary** to receive the setting value in binary format with hexadecimal representation. If the format attribute is omitted, this is the default format used.
 - **timeout** is the time in seconds to wait for answer. If omitted, the configured XBee device read timeout is used.

Click the **Send** button next to the **URL** field.

After a while, the **Response Body** field is populated with the response from the XBee Hive containing the value of the requested setting:

```
<sci_reply version="1.0">
  <send_message>
    <device id="DEVICE_ID">
      <rci_reply version="1.1">
        <do_command target="zigbee">
          <radio_command addr="0013A2004195C658" format="string" id="NI">ROUTER_1</radio_command>
        </do_command>
      </rci_reply>
    </device>
  </send_message>
</sci_reply>
```

```
</send_message>
</sci_reply>
```

Set the value of an XBee setting

Fill the **Request Body** field with the following content:

```
<sci_request version="1.0">
  <send_message>
    <targets>
      <device id="DEVICE_ID"/>
    </targets>
    <rci_request version="1.1">
      <do_command target="zigbee">
        <radio_command addr="0013A2004195C658" id="NI" format="string" timeout="10">NEW_NODE_NI_
VALUE</radio_command>
      </do_command>
    </rci_request>
  </send_message>
</sci_request>
```

Where:

- **DEVICE_ID** is the Device ID of the XBee Hive registered in your Digi Remote Manager account.
- The **set_setting attributes** are configured as follows:
 - **addr** attribute specifies the 64-bit address of the XBee device to set the setting to. If omitted, the address of the gateway's XBee device is used.
 - **id** attribute is the identifier of the setting to write, in this case **NI**.
 - **format** is the format in which the setting value is written:
 - **string** if the setting value is written in string format.
 - **integer** if the setting value is written in integer format.
 - **binary** if the setting value is written in binary format with hexadecimal representation.
 - **timeout** is the time in seconds to wait for answer. If omitted, the configured XBee device read timeout is used.

Click the **Send** button next to the **URL** field.

After a while, the **Response Body** field populates with the response from the XBee Hive containing an empty **radio_command** tag if the request was successful:

```
<sci_reply version="1.0">
  <send_message>
    <device id="DEVICE_ID">
      <rci_reply version="1.1">
        <do_command target="zigbee">
          <radio_command addr="0013A2004195C658" format="string" id="NI"/>
        </do_command>
      </rci_reply>
    </device>
  </send_message>
</sci_reply>
```

Execute a special XBee command

Fill the **Request Body** field with the following content:

```
<sci_request version="1.0">
  <send_message>
    <targets>
      <device id="DEVICE_ID"/>
    </targets>
    <rci_request version="1.1">
      <do_command target="zigbee">
        <radio_command addr="0013A2004195C658" id="ND" timeout="10" />
      </do_command>
    </rci_request>
  </send_message>
</sci_request>
```

Where:

- **DEVICE_ID** is the Device ID of the XBee Hive registered in your Digi Remote Manager account.
- The **set_setting attributes** are configured as follows:
 - **addr** attribute specifies the 64-bit address of the XBee device to execute the command in. If omitted, the address of the XBee Hive's XBee device is used.
 - **id** attribute is the identifier of the command to execute, in this case **ND**.
 - **timeout** is the time in seconds to wait for answer. If omitted, the configured XBee device read timeout is used.

In this case, there is not **format** attribute and the command output is always returned in **binary** format represented in hexadecimal.

Click the **Send** button next to the **URL** field.

After a while, the **Response Body** field populates with the response from the XBee Hive containing the result of the command execution:

```
<sci_reply version="1.0">
  <send_message>
    <device id="DEVICE_ID">
      <rci_reply version="1.1">
        <do_command target="zigbee">
          <radio_command addr="0013A2004195C658"
id="ND">0x00000013a20041af134344415649445f434f4f5244494e41544f5200ffe0000c105101e</radio_
command>
        </do_command>
      </rci_reply>
    </device>
  </send_message>
</sci_reply>
```

Update an XBee device profile

It is possible to remotely update the profile of an XBee device on your network using the Digi Remote Manager API. Before updating the profile, you need to make sure that the profile to update is located in the XBee Hive file system so that it can be applied. To remotely update the profile of an XBee device:

1. **Login** to Digi Remote Manager: remotemanager.digi.com/ui/login.
2. Click the **API Explorer** button located in the left menu.
3. In the right panel, configure the **request type** to be **POST** and use **/ws/sci** as the request **URL**.
4. Fill the **Request Body** field with the following content:

```
<sci_request version="1.0">
<send_message>
  <targets>
    <device id="DEVICE_ID"/>
  </targets>
  <rci_request version="1.1">
    <do_command target="zigbee">
      <fw_update target="0013A2004195C658" file="/etc/config/xbee-profiles/ROUTER_1.xpro"/>
    </do_command>
  </rci_request>
</send_message>
</sci_request>
```

Where:

- **DEVICE_ID** is the Device ID of the XBee Hive registered in your Digi Remote Manager account.
 - The **fw_update attributes** are configured as follows:
 - **target** attribute specifies the 64-bit address of the XBee device to apply the profile to. If omitted, the address of the XBee Hive's XBee device is used.
 - **file** attribute specifies the full path in the XBee Hive of the profile to apply to the XBee device.
5. Click the **Send** button next to the **URL** field.
 6. After a while, the **Response Body** field will be filled with the response from the XBee Hive containing an empty **fw_update** tag if the process succeeds:

```
<sci_reply version="1.0">
<send_message>
  <device id="DEVICE_ID">
    <rci_reply version="1.1">
      <do_command target="zigbee">
        <fw_update target="0013A2004195C658"/>
      </do_command>
    </rci_reply>
  </device>
</send_message>
</sci_reply>
```

Reset an XBee device to factory defaults

The Digi Remote Manager API allows you to remotely reset any XBee device of a network to its factory default settings. To do so:

1. **Login** to Digi Remote Manager: remotemanager.digi.com/ui/login.
1. Click the **API Explorer** button located in the left menu.

2. In the right panel, configure the **request type** to be **POST** and use **/ws/sci** as the request **URL**.
3. Fill the **Request Body** field with the following content:

```
<sci_request version="1.0">
  <send_message>
    <targets>
      <device id="DEVICE_ID"/>
    </targets>
    <rci_request version="1.1">
      <do_command target="zigbee">
        <set_factory_default addr="0013A2004195C658"/>
      </do_command>
    </rci_request>
  </send_message>
</sci_request>
```

Where:

DEVICE_ID is the Device ID of your XBee Gateway registered in your Digi Remote Manager account.

The **fw_update attributes** are configured as follows:

addr attribute specifies the 64-bit address of the XBee device to reset to factory defaults. If omitted, the address of the gateway's XBee device is used.

Click the **Send** button next to the **URL** field.

After a while, the **Response Body** field will be filled with the response from the XBee Hive containing an empty **set_factory_default** tag if the process succeed:

```
<sci_reply version="1.0">
  <send_message>
    <device id="DEVICE_ID">
      <rci_reply version="1.1">
        <do_command target="zigbee">
          <set_factory_default addr="0013A2004195C658"/>
        </do_command>
      </rci_reply>
    </device>
  </send_message>
</sci_reply>
```

Troubleshooting

This section covers common issues and troubleshooting information for the XBee Hive.

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System log

Configure XBee log level

You can configure the logging level of the XBee interface from the **Device Configuration** page:

1. Access the XBee Hive local web interface.
 - a. Use an Ethernet cable to connect the XBee Hive to your local laptop or PC.
The factory Setup IP address is **192.168.2.1**.
 - b. Login to the XBee Hive WebUI as a user with full admin access rights.
The default user name is **admin** and the default password is the unique password printed on the label packaged with your device.
2. Go to the **Configuration** window.
 - a. On the menu, click **System**.
 - b. Under **Configuration**, click **Device Configuration**. The Configuration window is displays.
3. Set the log level.
 - a. Click **XBee**.
 - b. Select the log level from the list. The default is **info**.
4. Click **Apply** to save the configuration and apply the changes.
The **Apply** button is located at the top of the WebUI page. You may need to scroll to the top of the page to locate it.

Display the system log

To view system log from the WebUI, follow these steps:

1. Access the XBee Hive local web interface.
 - a. Use an Ethernet cable to connect the XBee Hive to your local laptop or PC.
The factory Setup IP address is **192.168.2.1**.
 - b. Login to the XBee Hive WebUI as a user with full admin access rights.
The default user name is **admin** and the default password is the unique password printed on the label packaged with your device.
2. Go to the Logs window.
 - a. On the menu, click **System**.
 - b. Under **Administration**, click **Logs**.
3. Under the **System Logs** category you can:
 - a. Review the complete log.
 - b. Filter by level.
 - c. Search for specific entries.
 - d. Download the log file.

It is also possible to access the log from the CLI with the **show log** command.

Note For more information, see [Configure options for the event and system logs](#), [View system and event logs](#) and [Display status and statistics using the show command](#).

Recover the local XBee

If the local XBee of an XBee Hive does not respond because, for example, it has damaged firmware or the update process failed, the XBee Hive automatically tries to restore communication at startup. **To recover a non-responding local XBee, reboot your XBee Hive.**

This recovery process:

1. Tries to restore the communication with the XBee.
2. If it is not possible, the XBee Hive applies a default profile called **xbee_gateway_default** located at `/etc/config/xbee-profiles/xbee_gateway_default.xpro`.

This default profile programs a Zigbee firmware, restores XBee settings to factory defaults, and applies some settings values, such as the network ID—0x1234—the node identifier—GATEWAY—or the XBee role—coordinator. If this is not suitable, you can:

- Replace this profile with your own, so it is applied if the XBee is not responsive. You can use the [WebUI](#) or upload from the [CLI](#).
- Once the recovery process finishes, apply your custom profile manually or programmatically, from the [WebUI](#) or upload from the [CLI](#) or using the [XBee API](#).

xbeemgmt tool

The **xbeemgmt** tool can also recover the local XBee with a custom profile. This tool is only accessible from the shell:

1. Upload the custom profile to use in the recovery process to the XBee Hive. You can use the [WebUI](#) or upload from the [CLI](#).
2. Access the CLI. See [Access the command line interface](#).
3. Disable the XBee service.

```
config xbee enable false
```

4. If you do not have shell access, run the following commands:

```
config auth group admin acl shell enable true
exit
```

5. Depending on the device configuration, you may be presented with another menu, for example:

Access selection menu:

```
a: Admin CLI
s: Shell
q: Quit
```

Select access or quit [admin] :

Type **s** or **shell** to access the XBee Hive shell.

6. Enable the XBee interface:

```
# xbee on
```

7. Launch the **xbeemgmt** tool with the port that the XBee is attached to—**/dev/ttyXBee**—and the absolute path of the custom profile to use in the process:

```
# xbeemgmt recover /dev/ttyXBee /etc/config/xbee-profiles/my_custom_profile.xpro
```

8. When the process finishes, reboot the XBee Hive.

FAQ

This section contains the following topics:

Get the XBee Hive IP	1041
A remote XBee is not listed in the XBee Hive network	1041
PyCharm FAQ: My XBee Hive is not listed in Digi Device Selector	1041

Get the XBee Hive IP

Use the CLI over the serial port to learn the IP assigned to your XBee Hive:

1. Access to the CLI. See [Access the command line interface](#).
2. At the CLI prompt, you can get:

- The Ethernet interface IP:

```
> show network interface eth
>
```

- The Cellular IP:

```
> show network interface modem
>
```

A remote XBee is not listed in the XBee Hive network

If a particular remote XBee device is not listed as a known node, you can:

- If the remote XBee is a sleeping node, ensure that it is properly configured. Follow the recommendations in [Configure a sleeping network to work with the XBee Hive](#).
- Perform a network discovery from the [WebUI](#) or the [CLI](#).
- Configure active discovery from the [WebUI](#) or the [CLI](#).
- Configure the remote XBee to periodically send I/O samples to the XBee Hive. See:
 - [XBee 3 Zigbee: Periodic I/O sampling](#)
 - [XBee 3 DigiMesh: Periodic I/O sampling](#)
 - [XBee 3 802.15.4: Periodic I/O sampling](#)
- Program a MicroPython application on the remote node that sends data to the XBee Hive. See [the Digi MicroPython Programming Guide](#).
- For Zigbee, configure the remote XBee to announce itself when joining. See [JN \(Join Notification\)](#).

PyCharm FAQ: My XBee Hive is not listed in Digi Device Selector

If an XBee Hive does not appear on the list of the Digi Device Selector:

- Ensure that your device has the mDNS service enabled and is on the same network as the computer. See [Set up the XBee Hive for Python development](#).
- Or click the link **Click here to add it manually** to specify the IP address, port, username, and password. To determine the XBee Hive IP address, see [Get the XBee Hive IP](#).

Safety warnings

English



Ensure that the power cord is connected to a socket-outlet with earthing connection.



To comply with FCC/IC RF exposure limits at least 20 cm separation distance must be maintained between any antenna of the unit and any part of the user at all times.



This appliance does not contain any user-serviceable parts. Never open the equipment. For safety reasons, the equipment should be opened only by qualified personnel.



The unit must be powered off where blasting is in progress, where explosive atmospheres are present, or near medical or life support equipment. Do not power on the unit in any aircraft.



Operation of this equipment in a residential environment could cause radio interference.



For ambient temperatures above 60° C, this equipment must be installed in a Restricted Access Location only.

Bulgarian--български



Уверете се, че захранващият кабел е свързан към контакт със заземителна връзка.



За да се спази FCC / IC границите на излагане на радиочестота, трябва да се поддържа поне 20 cm разстояние на разделяне между която и да е антена на устройството и която и да е част от потребителя по всяко време.



Този уред не съдържа части, които обслужват потребителя. Никога не отваряйте оборудването. От съображения за безопасност оборудването трябва да се отваря само от квалифициран персонал.



Уредът трябва да се изключи там, където се извършва взривяване, където има експлозивна атмосфера или в близост до медицинско оборудване или оборудване за поддържане на живота. Не включвайте устройството в самолет.



Работата с това оборудване в жилищна среда може да причини радиосмущения.



За околни температури над 60 ° C, това оборудване трябва да се инсталира само на място с ограничен достъп.

Croatian--Hrvatski



Provjerite je li kabel za napajanje spojen na utičnicu s uzemljenjem.



Da bi se udovoljilo FCC / IC ograničenjima izlaganja RF, mora se održavati najmanje 20 cm udaljenosti odvojenosti od bilo koje antene uređaja i bilo kojeg dijela korisnika u svakom trenutku.



Ovaj uređaj ne sadrži dijelove koje korisnik može servisirati. Nikada ne otvarajte opremu. Iz sigurnosnih razloga opremu bi trebalo otvarati samo kvalificirano osoblje.



Uređaj se mora isključiti tamo gdje je u tijeku miniranje, gdje su prisutne eksplozivne atmosfere ili u blizini medicinske opreme ili opreme za održavanje života. Nemojte uključivati jedinicu ni u jednom zrakoplovu.



Rad ove opreme u stambenom okruženju mogao bi prouzročiti radio smetnje.



Za okolne temperature iznad 60 ° C, ova oprema mora biti instalirana samo na mjestu s ograničenim pristupom.

French--Français



Assurez-vous que le cordon d'alimentation est connecté à une prise de courant avec mise à la terre.



Pour se conformer aux limites d'exposition RF FCC/IC, une distance de séparation d'au moins 20 cm doit être maintenue entre toute antenne de l'unité et toute partie de l'utilisateur à tout moment.



Cet appareil ne contient aucune pièce réparable par l'utilisateur. Ne jamais ouvrir l'équipement. Pour des raisons de sécurité, l'équipement ne doit être ouvert que par du personnel qualifié.



L'unité doit être éteinte là où le dynamitage est en cours, où des atmosphères explosives sont présentes, ou à proximité d'équipements médicaux ou de survie. N'allumez pas l'appareil dans un avion.



L'utilisation de cet équipement dans un environnement résidentiel peut provoquer des interférences radio.



Pour des températures ambiantes supérieures à 60 °C, cet équipement doit être installé uniquement dans un emplacement à accès restreint.

Greek--Ελληνικά



Βεβαιωθείτε ότι το καλώδιο τροφοδοσίας είναι συνδεδεμένο σε πρίζα με σύνδεση γείωσης.



Για συμμόρφωση με τα FCC / IC RF όρια έκθεσης πρέπει να διατηρείται τουλάχιστον 20 cm απόσταση διαχωρισμού μεταξύ οποιασδήποτε κεραίας της μονάδας και οποιουδήποτε μέρους του χρήστη ανά πάσα στιγμή.



Αυτή η συσκευή δεν περιέχει εξαρτήματα που μπορούν να επισκευαστούν από το χρήστη. Μην ανοίγετε ποτέ τον εξοπλισμό. Για λόγους ασφαλείας, ο εξοπλισμός πρέπει να ανοίγει μόνο από εξειδικευμένο προσωπικό.



Η μονάδα πρέπει να είναι απενεργοποιημένη όταν βρίσκεται σε εξέλιξη η έκρηξη, όπου υπάρχουν εκρηκτικές ατμόσφαιρες ή κοντά σε ιατρικό εξοπλισμό ή εξοπλισμό υποστήριξης της ζωής. Μην ενεργοποιείτε τη μονάδα σε κανένα αεροσκάφος.



Η λειτουργία αυτού του εξοπλισμού σε οικιστικό περιβάλλον μπορεί να προκαλέσει παρεμβολές ραδιοφώνου.



Για θερμοκρασίες περιβάλλοντος άνω των 60 ° C, αυτός ο εξοπλισμός πρέπει να εγκατασταθεί μόνο σε θέση περιορισμένης πρόσβασης

Hungarian--Magyar



Győződjön meg arról, hogy a tápkábel csatlakozik egy földelő csatlakozóaljzathoz.



Az FCC / IC rádiófrekvenciás expozíciós határértékeinek betartása érdekében a berendezés bármely antennája és a felhasználó bármely része között legalább 20 cm távolságot kell tartani.



Ez a készülék nem tartalmaz a felhasználó által javítható alkatrészeket. Soha ne nyissa ki a berendezést. Biztonsági okokból a berendezést csak szakképzett személyzet nyithatja meg.



Az egységet ki kell kapcsolni, ha robbantás folyik, ahol robbanásveszélyes környezet van, vagy orvosi vagy életmentő berendezések közelében. Semmilyen repülőgépen ne kapcsolja be az egységet.



A berendezés lakókörnyezetben történő működtetése rádiózavarokat okozhat.



60 ° C feletti környezeti hőmérséklet esetén ezt a berendezést csak korlátozott hozzáférésű helyre kell telepíteni.

Italian--Italiano



Assicurarsi che il cavo di alimentazione sia collegato ad una presa con messa a terra.



Per rispettare i limiti di esposizione RF FCC/IC è necessario mantenere sempre una distanza di separazione di almeno 20 cm tra qualsiasi antenna dell'unità e qualsiasi parte dell'utente.



Questo apparecchio non contiene parti riparabili dall'utente. Non aprire mai l'apparecchiatura. Per motivi di sicurezza, l'apparecchiatura deve essere aperta solo da personale qualificato.



L'unità deve essere spenta dove sono in corso esplosioni, dove sono presenti atmosfere esplosive o vicino ad apparecchiature mediche o di supporto vitale. Non accendere l'unità in nessun aereo.



Il funzionamento di questa apparecchiatura in un ambiente residenziale potrebbe causare interferenze radio.



Per temperature ambiente superiori a 60° C, questa apparecchiatura deve essere installata solo in un luogo ad accesso limitato.

Latvian--Latvietis



Pārliecinieties, ka strāvas vads ir pievienots kontaktligzdai ar zemējuma savienojumu.



Lai ievērotu FCC / IC radiofrekvenču iedarbības robežas, vienmēr jābūt vismaz 20 cm attālumam starp jebkuru ierīces antenu un jebkuru lietotāja daļu.



Šajā ierīcē nav nevienas lietotāja apkalpojamas daļas. Nekad neatveriet aprīkojumu. Drošības apsvērumu dēļ aprīkojumu drīkst atvērt tikai kvalificēts personāls.



Iekārtai jābūt izslēgtai, ja notiek spridzināšana, sprādzienbīstama vide vai medicīnas vai dzīvības uzturēšanas aprīkojuma tuvumā. Nevienā lidmašīnā neieslēdziet ierīci.



Šis ierīces darbība dzīvojamā vidē var izraisīt radio traucējumus.



Ja apkārtējā temperatūra pārsniedz 60 ° C, šī iekārta jāuzstāda tikai ierobežotas piekļuves vietā.

Lithuanian--Lietuvis



Iztikinkite, kad maitinimo laidas yra prijungtas prie lizdo su žeminiu.



Kad būtų laikomasi FCC / IC radijo dažnių apšvitos ribų, tarp bet kurios įrenginio antenos ir bet kurios vartotojo dalies visada turi būti išlaikytas bent 20 cm atstumas.



Šiame prietaise nėra naudotojui prižiūrimų dalių. Niekada neatidarykite įrangos. Saugumo sumetimais įrangą turėtų atidaryti tik kvalifikuotas personalas.



Įrenginys turi būti išjungtas ten, kur vyksta sprogdinimas, sprogi aplinka arba šalia medicinos ar gyvybės palaikymo įrangos. Neįjunkite įrenginio jokiuose orlaiviuose.



Naudojant šią įrangą gyvenamojoje aplinkoje, gali kilti radijo trukdžių.



Esant aukštesnei nei 60 ° C aplinkos temperatūrai, ši įranga turi būti montuojama tik riboto patekimo vietoje.

Polish--Polskie



Upewnij się, że przewód zasilający jest podłączony do gniazdka z uziemieniem.



Aby zachować zgodność z limitami ekspozycji FCC/IC RF, między anteną urządzenia a jakkolwiek częścią użytkownika musi być zachowana odległość co najmniej 20 cm.



To urządzenie nie zawiera żadnych części, które mogą być naprawiane przez użytkownika. Nigdy nie otwieraj urządzenia. Ze względów bezpieczeństwa urządzenie powinno być otwierane wyłącznie przez wykwalifikowany personel.



Urządzenie musi być wyłączone w miejscach, w których trwają prace wybuchowe, w atmosferze wybuchowej lub w pobliżu sprzętu medycznego lub podtrzymującego życie. Nie włączaj urządzenia w żadnym samolocie.



Praca tego sprzętu w środowisku mieszkalnym może powodować zakłócenia radiowe.



W przypadku temperatur otoczenia powyżej 60°C urządzenie to należy instalować wyłącznie w miejscach o ograniczonym dostępie.

Portuguese--Português



Certifique-se de que o cabo de alimentação esteja conectado a uma tomada com conexão de aterramento.



Para cumprir os limites de exposição à RF da FCC / IC, pelo menos 20 cm de distância de separação deve ser mantida entre qualquer antena da unidade e qualquer parte do usuário o tempo todo.



Este aparelho não contém peças cuja manutenção possa ser feita pelo usuário. Nunca abra o equipamento. Por razões de segurança, o equipamento deve ser aberto apenas por pessoal qualificado.



A unidade deve ser desligada onde houver detonações em andamento, onde houver presença de atmosferas explosivas ou próximo a equipamentos médicos ou de suporte à vida. Não ligue a unidade em nenhuma aeronave.



A operação deste equipamento em um ambiente residencial pode causar interferência de rádio.



Para temperaturas ambientes acima de 60 ° C, este equipamento deve ser instalado apenas em locais de acesso restrito.

Slovak--Slovák



Uistite sa, že je napájací kábel pripojený k zásuvke so zemniacim pripojením.



Aby boli dodržané limity vystavenia vysokofrekvenčným lúčom FCC / IC, musí byť medzi anténou jednotky a akoukoľvek časťou používateľa neustále udržiavaná vzdialenosť najmenej 20 cm.



Toto zariadenie neobsahuje žiadne diely opraviteľné používateľom. Nikdy neotvárajte zariadenie. Z bezpečnostných dôvodov by malo zariadenie otvárať iba kvalifikovaný personál.



Jednotka musí byť vypnutá tam, kde prebiehajú trhacie práce, kde je prítomné výbušné prostredie, alebo v blízkosti lekárskeho prístroja alebo zariadenia na podporu života. Jednotku nezapínajte v žiadnom lietadle.



Prevádzka tohto zariadenia v obytnom prostredí by mohla spôsobiť rádiové rušenie.



Pri teplotách okolia nad 60 ° C musí byť toto zariadenie inštalované iba na mieste s obmedzeným prístupom.

Slovenian--Esloveno



Prepričajte se, da je napajalni kabel priključen v vtičnico z ozemljitvenim priključkom.



Da bi izpolnili omejitve izpostavljenosti FCC / IC RF, mora biti med katero koli anteno enote in katerim koli delom uporabnika ves čas vzdrževana najmanj 20 cm razdalja.



Ta naprava ne vsebuje nobenih delov, ki bi jih lahko uporabljal uporabnik. Nikoli ne odpirajte opreme. Iz varnostnih razlogov naj opremo odpira samo usposobljeno oseba.



Enoto je treba izklopiti tam, kjer poteka razstreljevanje, kjer so prisotne eksplozivne atmosfere ali v bližini medicinske opreme ali opreme za vzdrževanje življenja. Enote ne vklopite v nobenem letalu.



Delovanje te opreme v stanovanjskem okolju lahko povzroči radijske motnje.



Pri temperaturah okolice nad 60 ° C mora biti ta oprema nameščena samo na lokaciji z omejenim dostopom.

Spanish--Español



Asegúrese de que el cable de alimentación esté conectado a una toma de corriente con conexión a tierra.



Para cumplir con los límites de exposición a RF de la FCC / IC, se debe mantener una distancia de separación de al menos 20 cm entre cualquier antena de la unidad y cualquier parte del usuario en todo momento.



Este aparato no contiene ninguna pieza que pueda reparar el usuario. Nunca abra el equipo. Por razones de seguridad, el equipo debe ser abierto únicamente por personal calificado.



La unidad debe estar apagada donde se estén realizando explosiones, cuando haya atmósferas explosivas o cerca de equipos médicos o de soporte vital. No encienda la unidad en ningún avión.



El funcionamiento de este equipo en un entorno residencial puede provocar interferencias de radio.



Para temperaturas ambiente superiores a 60 ° C, este equipo debe instalarse únicamente en una ubicación de acceso restringido.
