Spotlight on IoT Security

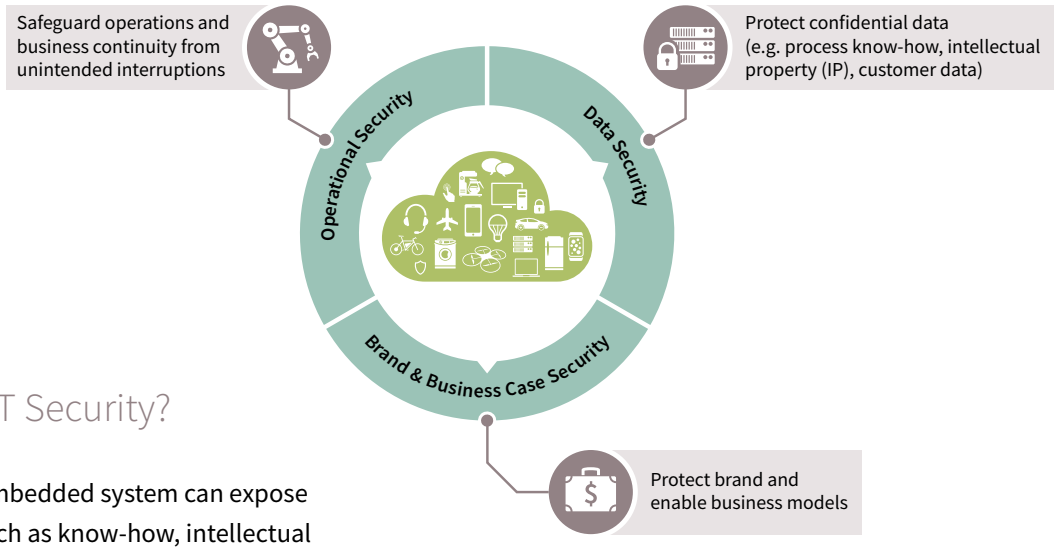
Choose the right security for the Internet of Things

www.infineon.com/IoT-security

Rising concerns about IoT Security

With trends such as the Internet of Things (IoT) and machine-to-machine communication (M2M) mean that the number of connected devices and machines is increasing. Many of these – from small household appliances through large communication networks to complex, industrial automation systems – are controlled by special-purpose, embedded computing systems.

As it continues to gather pace, the networking trend promises greater convenience and comfort for users, plus new business and service models for companies. However, security in this embedded world often lags far behind. Security vulnerabilities are rising dramatically as the attack surface widens and manufacturers struggle to protect sensitive data, intellectual property (IP) and process integrity.



Why do we need IoT Security?

A successful attack on an embedded system can expose confidential information such as know-how, intellectual property, customer data and process intelligence. In addition, it can interrupt operations, compromise business continuity and even endanger a company's brand image, success and very existence.

Challenges

- Protect systems against increasingly sophisticated and determined hacker attacks
- Balance financial constraints with the value of protected assets
- Find reliable, trustworthy functionality that is easy to implement
- Increase system security without compromising usability

Opportunities

- Develop new business and service models
- Carve out an image-building competitive differentiator
- Reduce security investment by building on partner know-how
- Increase production site flexibility through improved control across the supply chain

The answer

With its OPTIGA™ family, Infineon offers **easy-to-integrate**, scalable and customizable turnkey solutions to meet your IoT Security challenges. As a trusted advisor, we help you reduce complexity and implementation costs. Rather than investing in security know-how and infrastructure yourself, you can build on our vast and proven expertise in hardware-based security solutions.

Protection against digital threats

Software alone is not enough to protect embedded systems as it can be read, copied and distributed with relative ease. Secured hardware is needed to reliably store data and software code, detect manipulation and encrypt data for safe storage and processing. You can rely on our solutions to establish a hardware-based root of trust that renders embedded software trustworthy.

Our OPTIGA™ portfolio achieves this by supporting the following three key security-critical functions:

- **Authentication**
  Our OPTIGA™ security ICs authenticate people and devices so information is exchanged between authorized individuals and devices only
- **Encryption**
  Our security controllers protect sensitive information by encrypting it and securely storing the secret keys
- **Integrity**
  Our security chips check platform, machine and device integrity to identify manipulation and detecting unauthorized changes

By building a root of trust in security architectures, our semiconductor-based solutions create immense value for consumers and enterprises – giving all stakeholders the peace of mind needed to fully leverage the potential offered by the Internet of Things.

Reaching beyond product-based security

Drawing on our 30-year, proven track record in security, our mission extends beyond inspiring our customers with reliable, tangible security products.

We build trust beyond product-based security in a number of ways. Firstly, we focus on process security. Concrete measures include security-certified design environments, dedicated security infrastructure with biometric access and a secured production environment to protect key programming in particular.

Secondly, our security experts put our market-leading products through rigorous testing. This allows us to keep track of attack trends, continuously adapt our product concepts and proactively manage the product lifecycle.

And last but not least, we have our products as well as our development and manufacturing processes certified by third parties. Most of our products have successfully completed the strict Common Criteria certification process with the German authorities.

These measures combine to give our customers easy-to-grasp proof points that empower them, in turn, to build trust among their customers.

Broad market spectrum

We understand that security needs are as varied as they are complex. Scaling from basic, single-function authentication solutions to robust certified security controllers for advanced platform integrity checks, we have developed the market's widest portfolio to support individual security needs across a broad market spectrum.

IoT Security

Smart home security

Here we enable protection of everything from the toaster sensor to the overarching control system – for example by:

- Securing communication between the smart home gateway and the server
- Authenticating home automation components
- Protecting against counterfeit home automation components

We add value to today's smart home by offering flexibility and cost savings for all implementations, building trust in new applications with ground-up, proven security capabilities and thus paving the way for new business and service models.

Automotive security

We are making cars safer and protecting sensitive user data – for example by:

- Securing communication over telematics systems
- Authenticating infotainment systems to enable media service models
- Securing remote maintenance information and firmware updates

We build confidence in the connected car with optimized security solutions that synergize our long-standing automotive expertise with our extensive security know-how. This also gives you the chance to capture new business and service models.

ICT security

Our scalable portfolio safeguards communications and access across everything from small network switches up to enterprise-scale networks – for example by:

- Protecting data through secured communication between networking devices
- Securing software updates and protecting software
- Checking integrity of devices with router-enabled network access

As a trusted partner in the ICT field, we keep our customers ahead with easy access to the latest security solutions, backed by integration and device management support delivered through our wide partner network. With our trustworthy security solutions, you can develop new business and service models.

Industrial security

We are helping manufacturers to safeguard long-term success by securing everything from machine sensors to control systems – for example by:

- Securing communication between the automation system and IT platform to protect sensitive data and IP
- Authenticating sensors and devices in the automation network
- Securing software or firmware updates to protect IP and prevent operational interruptions

Our synergized industrial and security expertise builds confidence in the modern smart factory with a scalable portfolio to match individual requirements. Easy access to our established security know-how and infrastructure allows you to rein in your security investment.

Use cases in focus

With a proven portfolio of exceptional depth and breadth, we cover just about every conceivable use case scenario. The following outlines the most typical scenarios that can benefit from our tailored offering.

Device authentication

Authentication is the process of identifying users, computers, devices and machines in networks, and restricting access to authorized persons and non-manipulated devices. Hardware-based security can support authentication by providing secured storage for a device's credentials (cryptographic keys or passwords). We have developed a broad portfolio of OPTIGA™ products that build a root of trust in hardware devices to allow the secured authentication of devices and systems looking to connect to clouds, servers and other devices.

Secured communication

In typical embedded system architectures, devices and systems are connected across heterogeneous networks employing various standard and proprietary protocols. To protect communication against eavesdropping and message falsification, for instance, it must be secured between these systems. Our OPTIGA™ family enables secured communications by storing the keys and certificates used in communication protocols as well as supporting cryptographic operations.

Secured data protection

Embedded devices often store sensitive user data. The confidentiality of this data can be protected by encrypting it and storing it in a secured location. The challenge lies in securely storing cryptographic keys. Data can be easily decrypted if an attacker manages to read out the keys. Our OPTIGA™ Trust and OPTIGA™ TPM families overcome this problem by encrypting data and storing cryptographic keys securely.

Boot process and device integrity protection

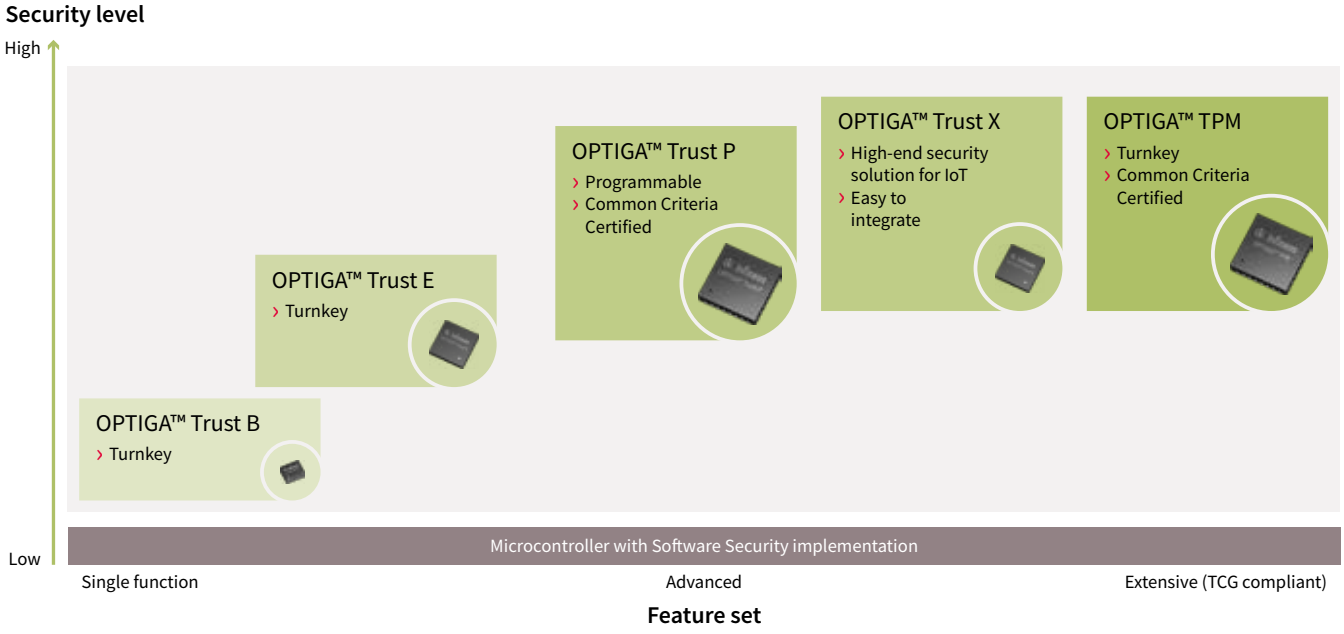
To secure embedded devices, the integrity of the device needs to be protected in order to prevent unauthorized changes. Protecting the boot process of the device is a key factor here. Also known as secured, verified or trusted boot, boot access protection blocks unauthorized booting of computing devices to stop compromised devices from exchanging data over the Internet of Things. With the OPTIGA™ family, we deliver a range of security ICs to enhance boot protection and take the complexity out of integrity metrics management.

Secured software and firmware updates

Software and firmware in embedded systems need to be updated on a regular basis. However, it can be challenging to protect both the software itself as well as the system that is being updated. Updates protected by software only are at risk as software can typically be read, analyzed and modified to compromise the update or system. However, software can become trustworthy by combining it with secured hardware. Secured hardware from our OPTIGA™ family protects the processing and storage of code by means of encryption, fault and manipulation detection, and secured code and data storage.

Meeting today's and tomorrow's security challenges with OPTIGA™

Our OPTIGA™ family of security solutions is designed for easy integration into embedded systems. These hardware-based security solutions scale from basic authentication functionality to complex implementations to meet your individual and changing needs, while maximizing the return on your investment. Both our OPTIGA™ Trust and OPTIGA™ TPM product families provide proven and reliable IoT Security performance.



OPTIGA™ Trust family

Trust anchor for embedded systems

Our OPTIGA™ Trust family of turnkey or programmable solutions gives you the benefit of easy and convenient integration whilst offering you the most suitable security level to protect your business model, process know-how and IP. You can rely on OPTIGA™ Trust products to protect your embedded systems against counterfeiting, unauthorized products, intentional attacks and unintentional operator errors.

OPTIGA™ Trust B

Authentication solution for improved security and reduced system costs

OPTIGA™ Trust B (SLE 95250) is a robust cryptographic solution for embedded systems requiring easy-to-integrate, reliable authentication features. This security solution is designed to help system and device manufacturers safeguard the authenticity, integrity and safety of their original products. As a turnkey solution, it provides enhanced protection against aftermarket counterfeit replacements, thus helping to maintain OEM authenticity and safeguard the user experience.

Key features

- Strong cost efficient asymmetric cryptography with ECC 131-bit key length
- OPTIGA™ Digital Certificate (ODC) with device personalization (unique key pair per chip)
- Turnkey solution including host-side software for easy integration
- 512 bit user NVM
- Easy-to-implement single-wire host interface
- Size-optimized TSNP-6-9 package (1.1 x 1.5 mm)

Key benefits

- Lower system costs due to single- chip solution
- Increased security with asymmetric cryptography and chip-individual keys
- Easy integration thanks to full turnkey design

Applications

- Battery authentication
- IoT edge devices
- Consumer accessories
- IP & PCB design protection
- Original replacement parts
- Medical & diagnostic equipment

OPTIGA™ Trust E

Easy, cost-effective security solution for high-value goods

OPTIGA™ Trust E (SLS 32AIA) is a high-end turnkey security controller with full system integration support for easy and cost-effective deployment. It supports a broad range of use cases focused on the protection of services, business models and user experience. One-way authentication mechanisms uniquely identify objects and protect PKI networks.

Key features

- High-end security controller with advanced cryptographic algorithms implemented in hardware (ECC256)
- Turnkey solution with OS, Applet and complete host-side integration support
- I2C interface and PG-USON-10 package (3 x 3 mm)
- Up to 3 Kbytes user memory
- Standard and extended temperature range -40° to +85°C
- Compliant to USB Type-C standard

Key benefits

- Reduced design-in and integration effort
- Protection of IP and data
- Protection of business models and company image
- Safeguarding of quality and safety

Fields of application

- Embedded systems networked over the IoT
- Industrial control and automation
- Medical devices & consumer electronics
- Smart homes
- PKI networks

OPTIGA™ Trust X

The optimized solution for IoT Security

OPTIGA™ Trust X (SLS 32AIA) is a turnkey security solution for industrial automation systems, smart homes, consumer devices or medical devices. This high-end security controller comes with full system integration support for easy and cost effective deployment of high-end security for your assets. Integrated in your device, the OPTIGA™ Trust X supports the protection of your brand and business case, differentiates your product from your competitors, and adds value to your product making it stronger against cyber-attacks. It covers a broad range of use cases necessary to protect the authenticity, integrity and confidentiality in your device: mutual authentication, secure communication, data store protection, life-cycle management, secure updates and platform integrity protection.

Key features

- High-end security controller
- Turnkey solution
- Full system integration support
- Cryptographic tool box
- Standard & extended temperature range (-40 to +105°C)
- USON-10 package (3 x 3 mm)

Key benefits

- Enhanced security for connected devices (IoT)
- Easy integration
- Cost-effective deployment
- Enabling new features & business models

Applications

- Industrial control and automation
- Consumer electronics
- Smart home
- Medical devices

OPTIGA™ Trust P

Programmable trust anchor for embedded systems

OPTIGA™ Trust P (SLJ 52ACA) is a high-security, feature-rich solution. As a fully programmable chip, it is a highly flexible and robust solution supporting the full range of functions from authentication and secured updates through key generation and access control. This hardware security microcontroller provides advanced and efficient protection against side-channel, fault-induction, and physical attacks.

Key features

- High-end security controller with advanced cryptographic algorithms implemented in hardware (ECC521, RSA2048, TDES, AES)
- Common Criteria EAL 5+ (high) certification
- Programmable JavaCard operating system with reference applets for a variety of use cases and host-side support
- 150 KB user memory
- Small footprint VQFN-32 SMD package (5 x 5 mm)
- ISO7816 UART interface

Key benefits

- Secured and certified solution
- Increased flexibility based on programmable solution with reference applets to simplify customization and integration
- Protection of system integrity, communication and data

Applications

- Industrial control systems
- Healthcare equipment and networks
- Consumer electronics
- Home security and automation

OPTIGA™ TPM

Standardized, feature-rich security solution

OPTIGA™ TPM (Trusted Platform Module) is a standardized security controller that protects the integrity and authenticity of devices and systems in embedded networks. Built on proven technologies and supporting the latest TPM 2.0 standard, OPTIGA™ TPM highlights include secured storage for keys, certificates and passwords as well as dedicated key management. As the established, trusted market and innovation leader in the Trusted Computing space, we offer a broad portfolio of certified OPTIGA™ TPM security controllers based on the Trusted Computing Group (TCG) standard to suit all needs.

Key features

- High-end security controller with advanced cryptographic algorithms implemented in hardware (e.g. RSA2048, ECC256, SHA-256)
- Common Criteria (EAL4+) and FIPS security certification
- Flexible integration with SPI, I2C or LPC interface support
- Extended temperature range (-40 to +85°C) for a variety of applications
- Easy to integrate with wide range open source support

Key benefits

- Reduced risk based on proven technology
- Fast time to market through concept reuse
- Flexibility thanks to wide range of security functions as well as dedicated key management
- Easy integration into all platform architectures and operating systems

Applications

- PC and embedded computing
- Network equipment
- Industrial control systems
- Home security and automation
- Energy generation and distribution systems
- Automotive electronics

Overview of OPTIGA™ TPM family

SLB 9645	SLB 9660	SLB 9665	SLB 9670	SLB 9670
› TPM 1.2 › I2C interface › Based on EAL4+ certified TPM 1.2 hardware and firmware	› TPM 1.2 › LPC interface › TCG and Common Criteria EAL4+ › FIPS 140-2 certified	› TPM 2.0 › LPC interface › TCG and Common Criteria EAL4+ › FIPS 140-2 certified	› TPM 1.2 › SPI interface › TCG and Common Criteria EAL4+ › FIPS 140-2 certified	› TPM 2.0 › SPI interface › TCG and Common Criteria EAL4+ › FIPS 140-2 certified

Security

Secure implemen-tation

Time to market

Scalability

Performance

Innovation

Logistical benefits

Costs

Why security?

Security is evolving from a business imperative into a business advantage. Deployed correctly, it offers a genuine competitive differentiator:

- Security can protect your business model and your IP, helping to avoid service disruptions and quality issues e.g. due to counterfeit products, manipulated updates or stolen data. This, in turn, builds trust in your brand and reputation, fueling growth and profitability.
- Certified security capabilities and the promise of smooth, predictable operations can even pave the way for new business models.
- The latest security technologies can save you deployment costs and benefit your bottom line by avoiding unplanned downtime.

Why hardware-based security?

Hardware-based security solutions clearly outperform software-only approaches through dedicated, protected features. In addition, certified hardware solutions accelerate time-to-solution with the added acknowledgement of independent evaluations. Discrete solutions not only offer strong tamper resistance, scalability and dynamic innovation cycles, they also facilitate implementation by reducing design and production complexity as they e.g. do not require a secured production environment. This translates into cost savings as you do not need to invest in a dedicated infrastructure and specialist know-how to deliver the highest levels of standards-compliant security to your customers.

Why choose Infineon?

Infineon has been pioneering the security market for more than 30 years. Every year, we ship more than 2 billion security controller ICs – proof positive that we have the expertise, experience and problem-solving capabilities to meet and exceed our customers' expectations over time. A strong R&D and quality commitment, a rich support and partner network spanning a wide ecosystem, and active industry engagement make us the partner of choice across the widest range of industries. Customers the world over know they can rely on us to take the complexity out of today's security challenges with solutions combining convenience with ease of implementation.

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