H264 Video Streaming on Avnet MiniZed

Quick Start Guide
04 – 06 – 2018
Version 1.0

Introduction

This document is provided to help user to bring up the H264 Video Streaming demo on the Avnet MiniZed board. The bring-up procedure here is targeted to Linux environment but the basic workflow should be similar in Windows platform, too

Platform Setup

Software

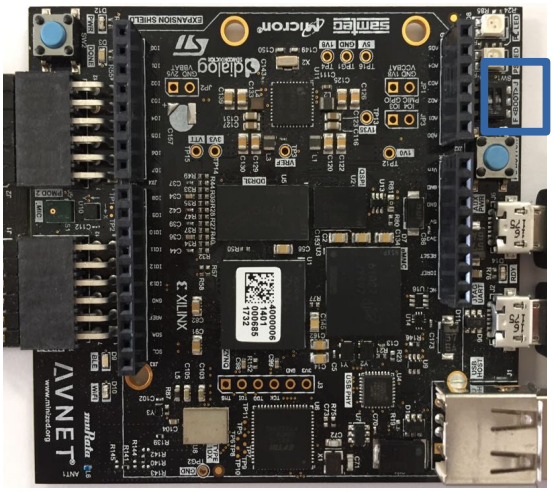
- Ubuntu Linux 14.04.LTS 64-bit OS
  - o Xilinx Software command-Line Tools 2017.1 or later
  - o FTDI USB/UART-JTAG driver

Hardware

- Ubuntu PC with 4G RAM minimun
- Avnet MiniZed
- Avnet TDnext 1.26Mpixel Pmod Camera Kit
- 2xMicro-USB cables
- USB Thumb drive with 1GB FAT partition

Procedures

1. Assemble the hardware. Connect the TDnext Pmod Camera and the USB cable as shown below.



QSPI Boot Mode

2. Copy and extract reference design archive (MiniZed_DPC_H264) to Ubuntu file system home directory. The folder structure is depicted as follow

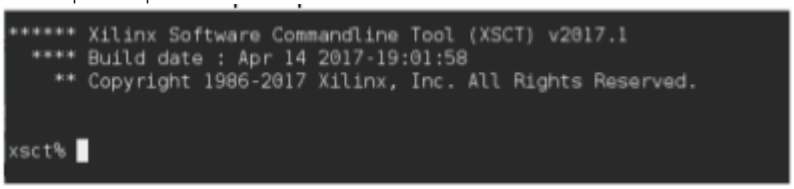
```
MiniZed_DPC_H264
      |--- boot.bin
      |--- bootemmc.bin
      |--- image.ub
      |--- wpa_supplicant.conf
```

File **boot.bin** is a minimal bootfile
File **bootemmc.bin** is a standard bootfile for minized for emmc
File `image.ub` is the prebuilt of kernel image and root file system
File `wpa_supplicant.conf` is the parameters wifi configuration. Change according to your configurations

3. Flash the boot image boot.bin to QSPI. This is a minimal boot image containg the needed binaries to boot up a Linux system on MiniZed. We need this environment to transfer code to eMMC later on

- Set jumper to JTAG boot mode
- Launch Xilinx Software Command-line Tool (XSCT)
  ```
  # cd /opt/Xilinx/SDK/<version>/bin
  # ./xsct
  ```

  Here is the XSCT prompt

  Remark:
  - <version> is the tool version. In this tutorial, we're using XSCT 2017.1 and so <version> = 2017.1
  - Require XSCT version 2017.1 or later to work well with MiniZed JTAG chip

- Navigate to the flash image path **$HOME/MiniZed_DPC_H264/**
  xsct% cd ~/MiniZed_DPC_H264

- Program the QSPI flash
  xsct% exec program_flash -f boot.bin -offset 0 -flash_type qspi_single -verify -cable type xilinx_tcf url TCP:127.0.0.1:3121

  Remark:
  - The text should all go in one line and not have a line break in it. If you want to copy and paste the text into Ubuntu command window, please use the below command in one line

    exec program_flash -f boot.bin -offset 0 -flash_type qspi_single -verify -cable type xilinx_tcf url TCP:127.0.0.1:3121

Here is the prompt message after successful programming

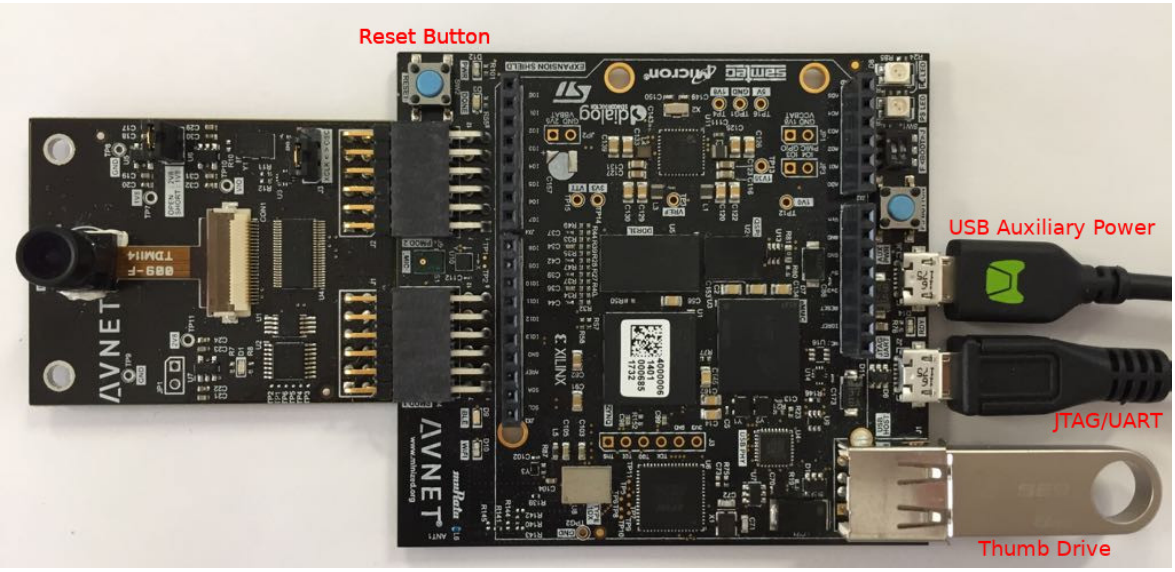
```
**** SW Build 1846317 on Fri Apr 14 18:54:47 MDT 2017
  ** Copyright 1986-2017 Xilinx, Inc. All Rights Reserved.

Connecting to hw_server @ TCP:127.0.0.1:3121

WARNING: Failed to connect to hw_server at TCP:127.0.0.1:3121
Attempting to launch hw_server at TCP:127.0.0.1:3121

Connected to hw_server @ TCP:127.0.0.1:3121
Available targets and devices:
Target 0 : jsn-openjtag2-1234-oj1A
        Device 0: jsn-openjtag2-1234-oj1A-4ba00477-0

Retrieving Flash info...

Initialization done, programming the memory
BOOT_MODE REG = 0x00000000
f probe 0 0 0
Performing Erase Operation...
Erase Operation successful.
INFO: [Xicom 50-44] Elapsed time = 5 sec.
Performing Program Operation...
0%...10%...100%
Program Operation successful.
INFO: [Xicom 50-44] Elapsed time = 15 sec.
Performing Verify Operation...
0%...10%...50%...60%...100%
INFO: [Xicom 50-44] Elapsed time = 21 sec.
Verify Operation successful.

Flash Operation Successful
xsct%
```

- At this point, MiniZed is ready to boot from QSPI
- Set jumper to QSPI boot mode
- Cycle the power and verify that you can see Linux boot up message in UART console.
- If everything all right, we can proceed to next step.

4. System can boot up properly and we can access the eMMC on MiniZed. It's the time to put all the needed binaries for this demo into the USB thumb drive. We can then transfer them from the thumb drive to the eMMC card.

- Copy the follow files and folder to the root of the USB thumb drive
  - `bootemmc.bin`
  - `image.ub`
  - `wpa_supplicant.conf`

- Connect an extra USB cable for auxiliary power input and plug in the USB thumb drive to MiniZed. Press the Reset button



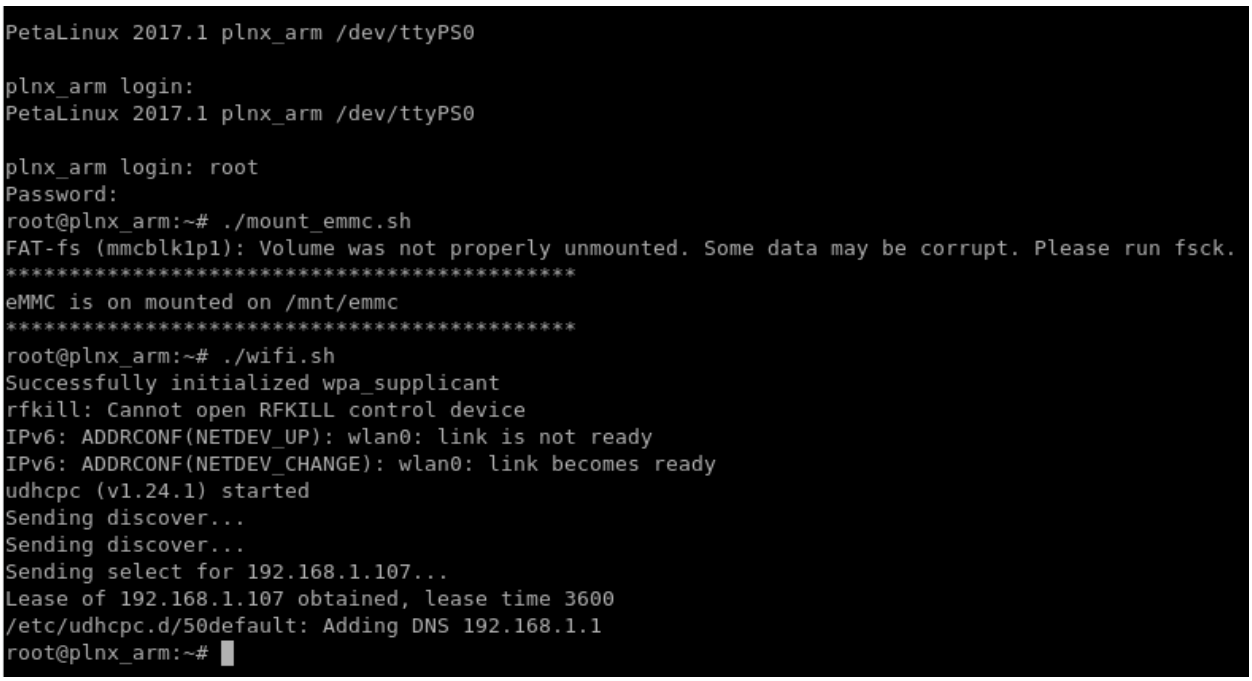
- Waiting for the Linux boot up end. Login with the following credentials
  Login: root
  Password: root

- Run this commands:

```
# mkdir /mnt/usb
# mount /dev/sda1 /mnt/usb
# mkdir /mnt/emmc
# mount /dev/mmcblk1p1 /mnt/emmc
# cp /mnt/usb/wpa_supplicant.conf /mnt/emmc/
# cp /mnt/usb/image.ub /mnt/emmc/
# cp /mnt/usb/bootemmc.bin /mnt/emmc/
# flashcp -v /mnt/emmc/bootemmc.bin /dev/mtd0
# umount /mnt/usb
# umount /mnt/emmc
# shutdown -r now
```

- Waiting for the Linux boot up end. Login with the same as before
- Mount emmc volume
  `# ./mount_emmc.sh`

- Connect wifi
  `# ./wifi.sh`



- Run Demo

  # dpch264App 192.168.xxx.xxx 10000 0 500 1000 1400 28 0

  - dpch264App — App name
  - 192.168.xxx.xxx — change according your local IP address
  - 10000 — udp port
  - 0 — non change this parameter
  - 500 — non change this parameter
  - 1000 — non change this parameter
  - 1400 — non change this parameter
  - 28 — QP for H264 Encoder (range 15 to 50)
  - 0 — non change this parameter

5. On your PC run ffplay for watch realtime UDP streaming

ffplay -framerate 60 udp://:10000 -fflags nobuffer

...so sit back, relax, and enjoy