Recovering U-boot on a ConnectCard i.MX28 module via USB

1 Document History

Date	Version	Change Description	
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2 Table of Contents

1 Document History 2
2 Table of Contents 3
3 Introduction 4
3.1 Problem Solved 4
3.2 Audience 4
3.3 Assumptions 4
4 Basics and Preparations 4
4.1 Obtaining Device Driver and sb_loader 4
4.2 Preparing Hardware 4
4.3 Boot in to recovery 4
4.3 Boot in to recovery 5
4.4 Install drivers 5
4.5 Using sb_loader.exe to serve U-boot image 7
4.6 Updating FLASH on the module 7
5 Conclusion 7

3 Introduction

- In this application note we will discuss how to boot the ConnectCard for i.MX28 module from a USB port using a U-boot file stored on a Windows PC

3.1 Problem Solved

- This document will provide guidance on recovery of a ConnectCard for i.MX28 with corrupt U-boot in FLASH.

3.2 Audience

Developer that has a ConnectCard for i.MX28 module with corrupted U-boot in FLASH who wants to recover it and restore its functionality.

3.3 Assumptions

Reader is familiar with basics of Linux and Windows command shells, and knows how to update U-boot and other images from FLASH using U-boot running on the target.

4 Basics and Preparations

The ConnectCard for i.MX28 is capable of booting from a U-boot image served via a USB OTG port from a PC. The PC needs to have an i.MX28 USB device driver installed, and a special program from Freescale called sb_loader, which is used to communicate with the i.MX28 processor and load U-boot into SDRAM.

4.1 Obtaining Device Driver and sb_loader

Navigate to this page and register a free account with Freescale if you have not done so before:
http://www.freescale.com/webapp/sps/site/prod_summary.jsp?code=IMX28_SW

Click on the link on the left stating: i.MX Manufacturing Toolkit.
At the time this document was written, the most current version was Mfgtools-Rel-1.6.2.032.zip. Accept the agreement, download and extract the zip file.
You will find USB driver here:
Mfgtools-Rel-1.6.2.032\Drivers\iMX_BulkIO_Driver\
SB_loader tool here:
Mfgtools-Rel-1.6.2.032\Utils\sb_loader\

4.2 Preparing Hardware

Connect your development board's USB OTG port (micro USB connector J7) to your PC USB port with a USB to micro USB cable.
Connect the serial cable between the development board J54 DUART (Console) and the serial port of your PC. Start and configure your terminal emulation software to use 115200 8,N,1.

Connect your network cable to the normal network port on your development board ENET0 J55, and the other end to your network or a PC running a TFTP server that will be used later to serve the new U-boot image to be programmed to the module's FLASH.

4.3 Boot into recovery

Power off the board with power switch first.
Press and hold SW23 (Recovery) button. While holding it, flip the power switch to the on position.
You can leave SW25 in default (NAND OFF, OFF) position for this experiment – the Recovery button will override it.
Alternatively, you can bootstrap the module to boot from USB using SW25, but then the white ribbon LCD cable has to be attached to the module and to the development board for this to work as bootstrapping pins are also routed through it.

Boot Mode	SW25 P1	SW25 P2
NAND FLASH	OFF/OPEN	OFF/OPEN
USB	OFF/OPEN	ON/CLOSE
SD	ON/CLOSE	OFF/OPEN
JTAG	ON/CLOSE	ON/CLOSE

If your final design does not include the video cable, you may still boot from USB using the recovery button as I mentioned above. This is explained in Chapter 3 of the ConnectCard i.MX28 Hardware Manual that can be found here:

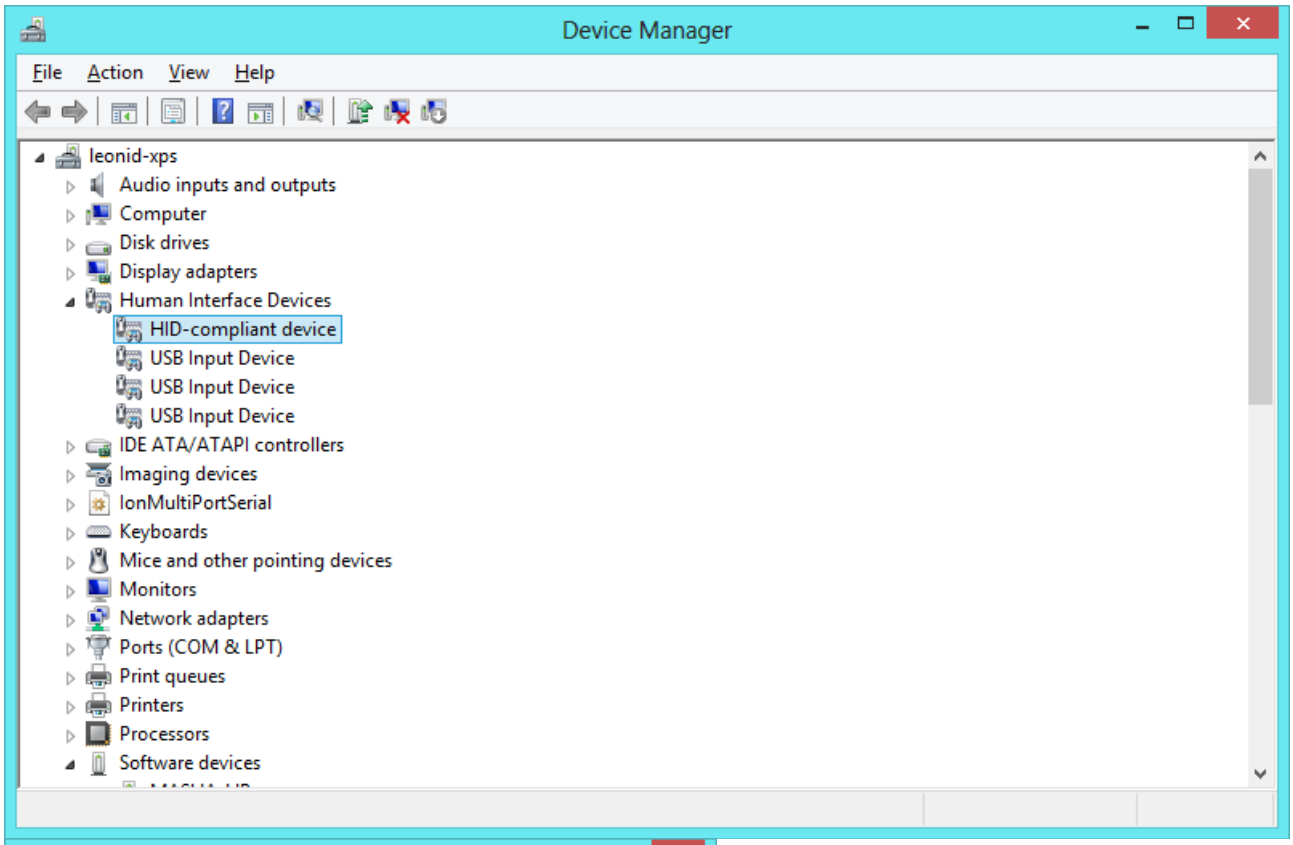
http://ftp1.digi.com/support/documentation/CC_i_MX28_Updates.htm

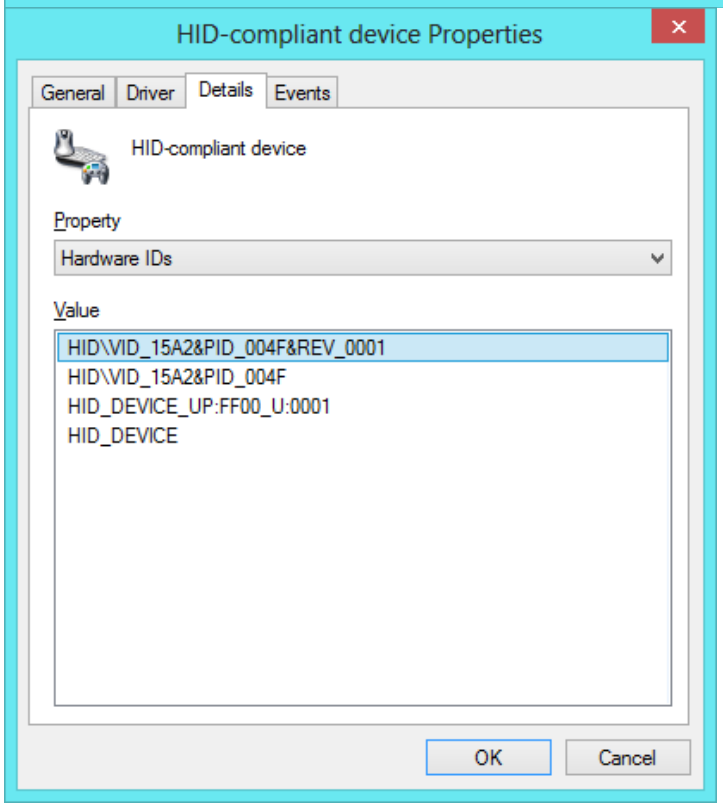
Again the easiest way to force the module into USB/Recovery boot is by holding SW23 (Recovery) button while applying power to the board.

4.4 Install drivers

The first time the module boots into USB mode with the USB cable connected to the PC it should force Windows on the PC to detect a new USB device - you should hear a sound of new device plugged in. It should install a driver on first detection. I did not have to provide a driver for the installation as it is mimicking a standard HID device.

Below are the screenshots taken from the device manager on my machine.


Device Manager
File Action View Help
leonid-xps
Audio inputs and outputs
Computer
Disk drives
Display adapters
Human Interface Devices
HID-compliant device
USB Input Device
USB Input Device
USB Input Device
IDE ATA/ATAPI controllers
Imaging devices
IonMultiPortSerial
Keyboards
Mice and other pointing devices
Monitors
Network adapters
Ports (COM & LPT)
Print queues
Printers
Processors
Software devices


HID-compliant device Properties
General Driver Details Events
HID-compliant device
Property
Hardware IDs
Value
HID\VID_15A2&PID_004F&REV_0001
HID\VID_15A2&PID_004F
HID_DEVICE_UP:FF00_U:0001
HID_DEVICE
OK
Cancel

It will show up as 2 lines on your Human Interface Devices section: “HID compliant device” and “USB input device”.

4.5 Using sb_loader.exe to serve U-boot image

Once the driver is installed, you should be able to boot the module from USB:
Place your normal U-boot file (u-boot-ccardwmx28js-ivt.sb) into the same folder as sb_loader.exe (usually Mfgtools-Rel-1.6.2.032\Utils\sb_loader)
Open a Windows command prompt and navigate to that folder.
Enter the command highlighted below:

```
C:\Mfgtools-Rel-1.6.2.032\Utils\sb_loader>sb_loader.exe /f u-boot-ccardwmx28js-ivt.sb
Downloading u-boot-ccardwmx28js-ivt.sb to device.
  ..... CStHidDevice::Download()  Error(258) during read.
Quitting.
  Error(258) during download.
Quitting.

C:\Mfgtools-Rel-1.6.2.032\Utils\sb_loader>
```

Do not worry about “Error(258) during download. As long as you see “ .....” in front of CStHidDevice, it did complete the programming.

4.6 Updating FLASH on the module

At this point, you should see U-boot coming up on the serial port via the terminal emulation program you configured earlier. This means U-boot has been successfully loaded into SDRAM, and the module was able to build from it.

However, your U-boot partition in FLASH is still blank or corrupted and needs to be updated. This can be done either via TFP (“update uboot tftp” command) or via micro SD card formatted with FAT32 and containing new U-boot image (update uboot mmc 0 fat)

The details of those methods are discussed in the U-Boot Reference Manual that can be found here:

http://ftp1.digi.com/support/documentation/CC_i_MX28_Updates.htm

5 Conclusion

We have just learned how to recover a ConnectCard for i.MX28 module with corrupt U-boot in FLASH.