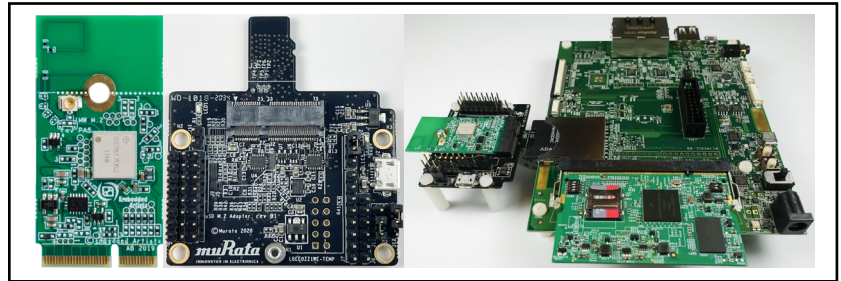


**Murata Wi-Fi/BT (CYW)
Solution for i.MX**

Linux Quick Start Guide



Revision History

Revision	Date	Author	Change Description
1.0	Sept 1, 2015	S Kerr G Mohiuddin	Initial Release
1.1	Sept 6, 2015	S Kerr	Removed software compile/build dependency. User can bring up NXP platform by downloading necessary files before flashing bootable SD card. Refer to Linux User Guide on software build procedures.
2.0	Nov 7, 2015	S Kerr	Modified Murata Wi-Fi/BT EVK definition. This simplifies bring-up on NXP i.MX6 Platforms. Incorporated changes for i.MX6UL 3.14.38 GA BSP Release.
4.0	Feb 14, 2017	S Kerr	Renamed document to “Murata Wi-Fi/BT Solution for i.MX Quick Start Guide (Linux)”. Incorporated changes for NXP Linux 4.1.15_2.0.0 GA BSP release. Modified NXP Linux 3.14.52_1.1.0 GA BSP release to build in bcmhdh WLAN driver, thereby matching 4.1.15_2.0.0 configuration. Added instructions for Murata binary patch release which addresses errata/features on both releases. Provided support for new i.MX 7Dual SDB, i.MX 6ULL EVK, and Murata Type 1CK. Expanded WLAN test verification section.
5.0	Feb 26, 2018	S Kerr J Kareem	Complete revision for integrating new Cypress “fmac” driver release. Added support for SDIO/UART 1.8V VIO signaling on i.MX6UL(L) and i.MX6SX platforms. Rollout of Murata customized Yocto build for i.MX BSP’s. Add support for new i.MX 8MQuad EVK.
6.0	May 29, 2019	S Kerr B Chen P Sah	Added support for Murata's uSD-M.2 Adapter, Embedded Artists' M.2 Wi-Fi/BT modules, and i.MX Linux Kernel versions 4.9.88/4.9.123. Streamlined support for (currently) following Murata modules: 1DX, 1MW, 1LV, and 1CX.
7.0	Nov 17, 2020	TF	Stripped the document to be Quick Start Guide. See <i>Murata Wi-Fi/BT (CYW) Solution for i.MX User Guide (Linux)</i> in References section for previous version.
7.1	Jan 29, 2021	TF	Image update.

Table of Contents

REVISION HISTORY	1
TABLE OF CONTENTS	2
1 INTRODUCTION	3
2 REFERENCES	4
2.1 Murata's uSD-M.2 Adapter Landing Page	4
2.2 Embedded Artists' M.2 Modules Landing Page	4
2.3 Murata's i.MX Wireless Solutions Landing Page	4
2.4 Murata's Community Forum Support	4
2.5 Murata Wi-Fi/BT (CYW) Solution for i.MX Linux User Guide.....	4
2.6 Murata Wi-Fi/BT (CYW) Solution for i.MX Linux User Manual	4
2.7 Murata Wi-Fi/BT Solution for i.MX Hardware User Manual	4
2.8 Murata uSD-M.2 Adapter Datasheet (Rev B1)	4
2.9 Murata uSD-M.2 Adapter Datasheet (legacy Rev A).....	4
3 WI-FI/BT INTERFACING	5
4 BUILD	7
5 DEPLOY	9
6 BOOT THE BOARD	9
7 ENABLE WI-FI	10
8 ENABLE BLUETOOTH	11
9 MURATA COMMUNITY FORUM	11

LIST OF FIGURES

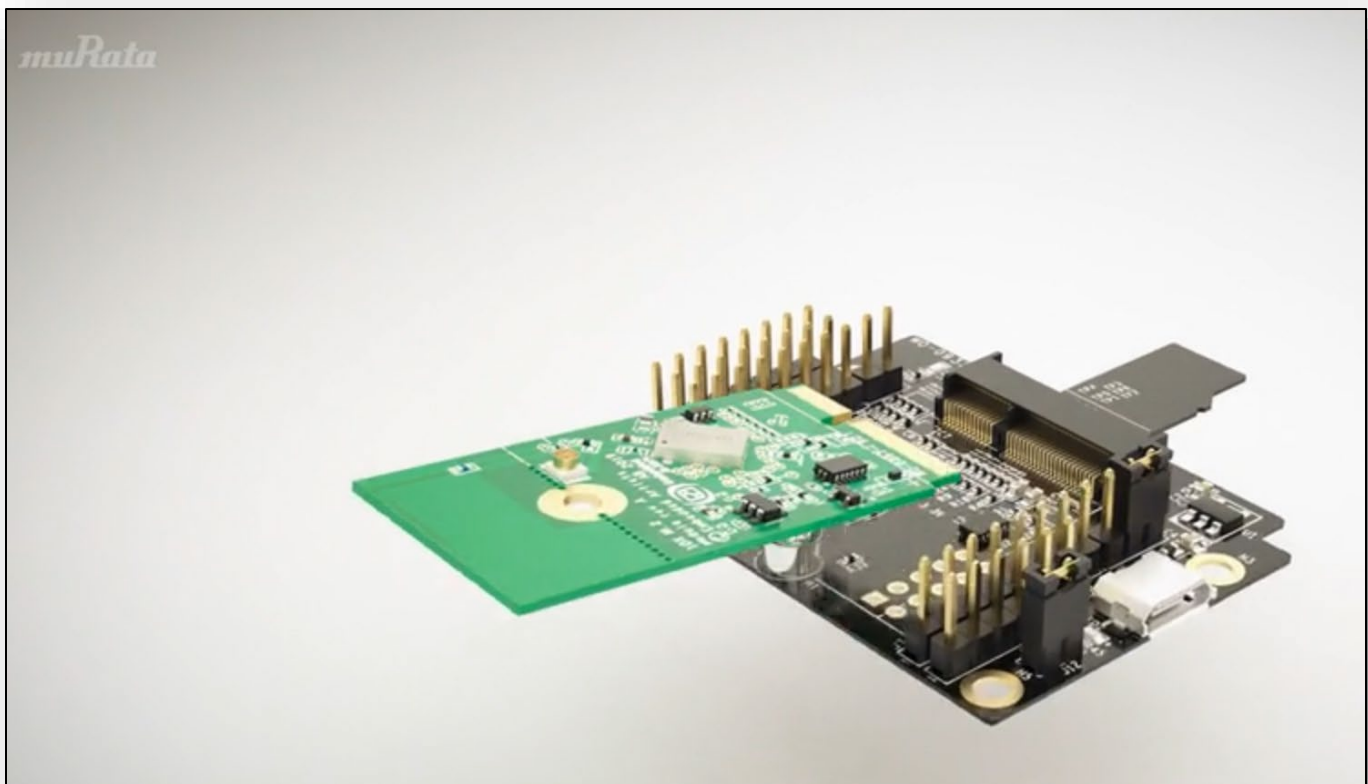
Figure 1: Embedded Artists' M.2 EVB with Murata's uSD-M.2 adapter.....	3
Figure 2: Connecting the Wi-Fi/BT M.2 EVB to uSD-M.2 Adapter	5
Figure 3: Connecting Murata Wireless solution to NXP i.MX 6ULL EVK	5
Figure 4: FFC connection between NXP i.MX 6ULL EVK and uSD-M.2 Adapter	6
Figure 5: Links to Adapter and more Wi-Fi/BT M.2 EVB's.....	11

1 Introduction

This document details enabling [Murata's Wi-Fi/Bluetooth modules](#) on [NXP i.MX Evaluation Kits](#) (running Linux), using [Embedded Artists' Wi-Fi/BT EVB's](#). Murata supports several combinations of NXP i.MX EVK's and M.2 Wi-Fi/Bluetooth EVB's (running different Linux kernel versions and Cypress "fmac" driver releases). This Quick Start documents only one hardware/software configuration to introduce users to the Murata solution. For more details on different configurations supported, please refer to the [Murata Wi-Fi/BT \(CYW\) Solution for i.MX Linux User Guide](#).

The [NXP](#) platforms currently supported are based on i.MX 8, i.MX 7 and i.MX 6. The wireless solution for these platforms either use the Wi-Fi/BT M.2 EVB's directly, or in combination with [Murata's uSD-M.2 Adapter](#).

Figure 1: Embedded Artists' M.2 EVB with Murata's uSD-M.2 adapter



The following sections describe the process of getting Wi-Fi and Bluetooth up and running on NXP [i.MX 6ULL EVK](#) with Murata [Type 1MW](#) module, running [5.4.47](#) kernel release.

2 References

2.1 Murata's uSD-M.2 Adapter Landing Page

This [website landing page](#) provides latest/comprehensive information on Murata's adapter including links to where it can be purchased.

2.2 Embedded Artists' M.2 Modules Landing Page

This [website landing page](#) provides latest/comprehensive information on Embedded Artists' M.2 Evaluation Boards which enable Murata Wi-Fi/BT modules for easy evaluation.

2.3 Murata's i.MX Wireless Solutions Landing Page

This [website landing page](#) provides latest/comprehensive information on Murata's i.MX Wireless solutions which use the uSD-M.2 Adapter as a key enabler so customers can easily evaluate Murata's modules on i.MX processors.

2.4 Murata's Community Forum Support

Murata's Community provides online support for all of Murata's i.MX Wireless solutions. Refer to [this link](#) for Wi-Fi/Bluetooth main landing page on Forum.

2.5 Murata Wi-Fi/BT (CYW) Solution for i.MX Linux User Guide

This [User Guide](#) details steps to get Murata Wi-Fi/BT (Cypress-based) modules up and running quickly on NXP i.MX 6/7/8 EVK's.

2.6 Murata Wi-Fi/BT (CYW) Solution for i.MX Linux User Manual

This [manual](#) describes all steps necessary to build the file system, kernel, DTB files, and WLAN "*fmac*" driver necessary for supporting NXP i.MX Platforms with Murata module solution.

2.7 Murata Wi-Fi/BT Solution for i.MX Hardware User Manual

This [manual](#) describes the Murata uSD-M.2 Adapter hardware. All interface signals to the NXP i.MX RT, 6, 7, and 8 EVK's are described. Specifics on interfacing each i.MX EVK to Murata uSD-M.2 Adapter are provided.

2.8 Murata uSD-M.2 Adapter Datasheet (Rev B1)

This [datasheet](#) documents the current version of the Murata's uSD-M.2 adapter hardware and its interfacing options.

2.9 Murata uSD-M.2 Adapter Datasheet (legacy Rev A)

This [datasheet](#) documents the first/legacy version of Murata's uSD-M.2 adapter hardware and its interfacing options. This adapter version is no longer manufactured.

3 Wi-Fi/BT Interfacing

When connecting the Wi-Fi/BT M.2 EVB to uSD-M.2 Adapter **Rev B1** (Figure 2), make sure to (#1) firmly insert it before using M.2 screw to (#2) secure it in place. Ensure that J12/J13 jumpers are set to 1-2 position, and J1 is set to 2-3 position (see [Adapter datasheet](#) for specifics on jumper settings).

Figure 2: Connecting the Wi-Fi/BT M.2 EVB to uSD-M.2 Adapter

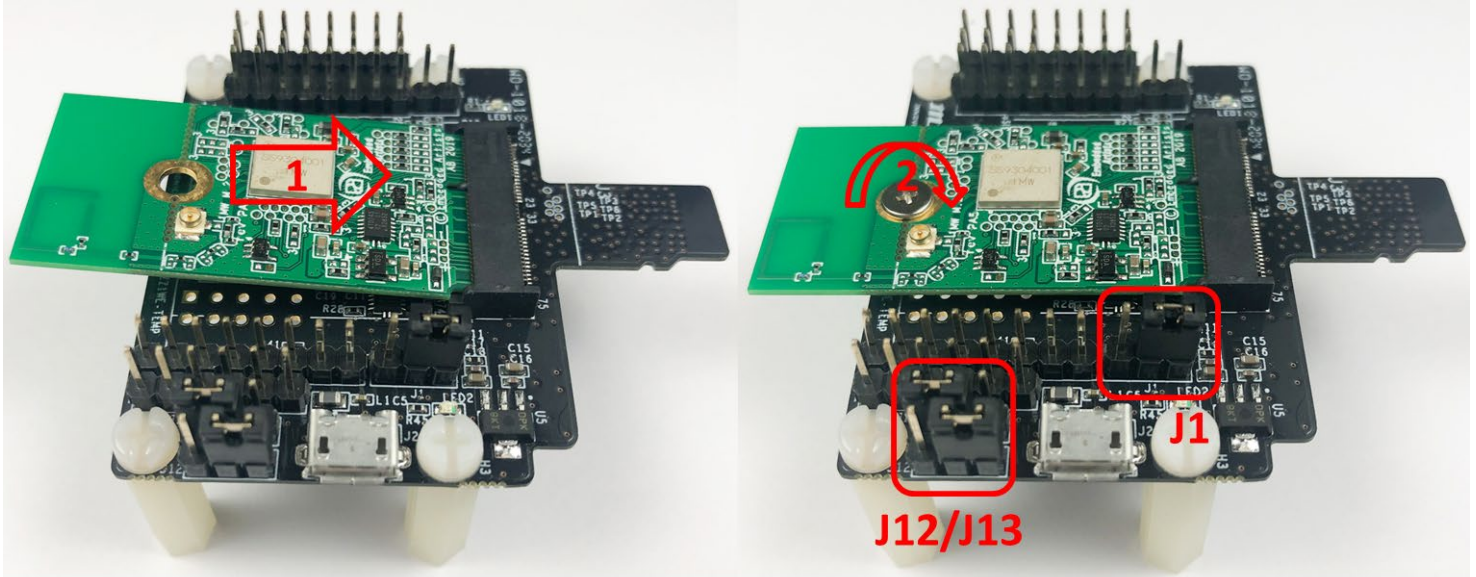


Figure 3: Connecting Murata Wireless solution to NXP i.MX 6ULL EVK

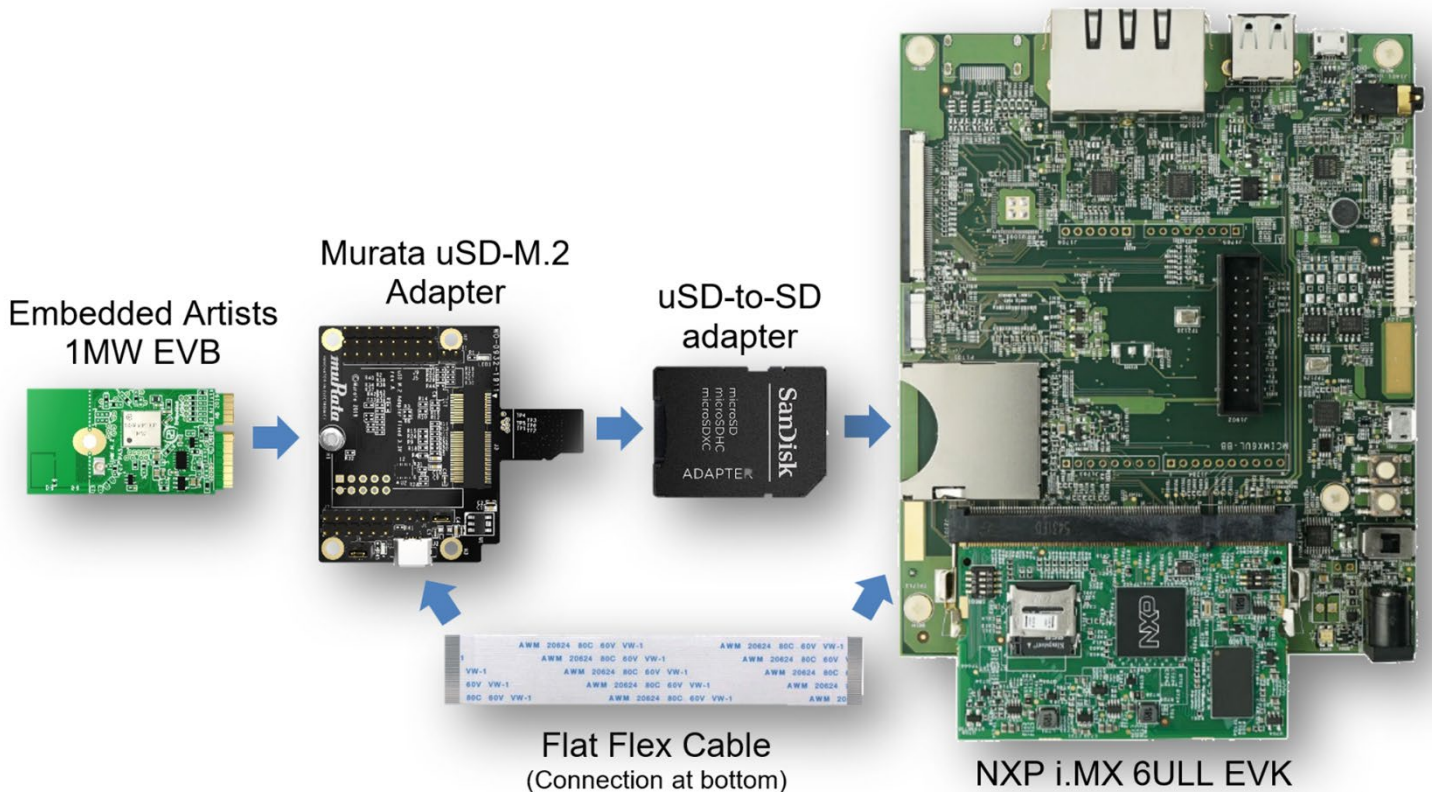
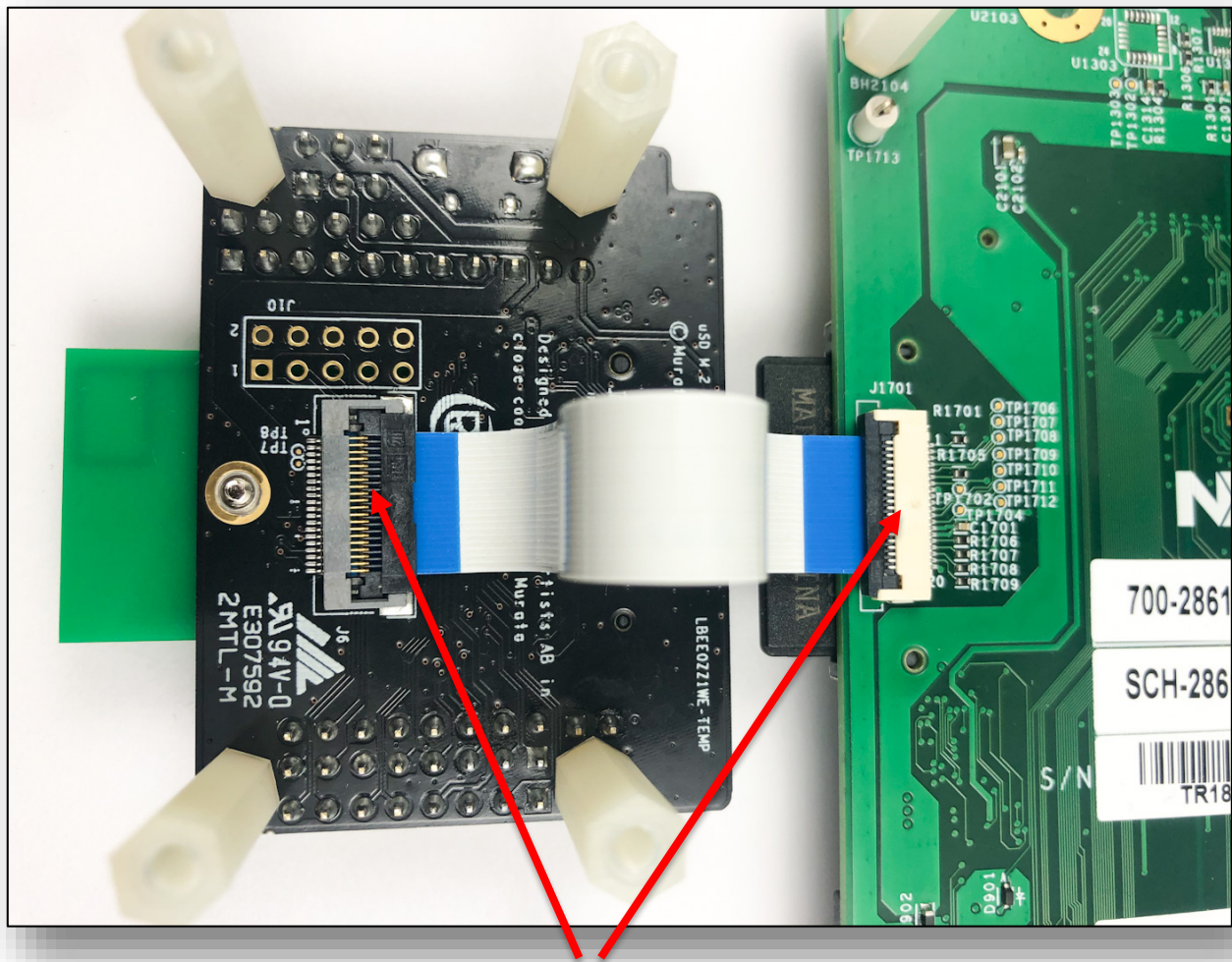


Figure 3 shows how Embedded Artists' 1MW M.2 EVB is connected to the i.MX 6ULL EVK in the SD card slot via Murata's uSD-M.2 Adapter and microSD-to-SD Adapter. A FFC cable is used to connect BT-UART and WLAN/BT control signals.

The Bluetooth UART signals and WLAN/Bluetooth control signals are connected to the NXP i.MX 6ULL EVK using a Flat Flex Cable (FFC), provided with Murata's uSD-M.2 Adapter kit - see **Figure 4** below on how to connect (note orientation of blue tabs to ensure proper connection).

Figure 4: FFC connection between NXP i.MX 6ULL EVK and uSD-M.2 Adapter



NOTE: First pry open FFC connectors before inserting cable at either end; then push down to close connectors. Attach flex cable **before** fully inserting uSD-M.2 Adapter.

4 Build

Murata has greatly simplified the build requirement by providing scripts for Ubuntu host setup and customized Yocto build, downloadable from [Murata's GitHub](#). The recommended development Operating System is Ubuntu 16.04.

1. Download Murata's setup and build script files from Murata's Github.

```
mkdir ~/linux-imx/  
cd ~/linux-imx/  
  
wget --no-check-certificate --content-disposition https://github.com/murata-wireless/meta-murata-wireless/raw/master/script-  
utils/latest/Host_Setup_for_Yocto.sh  
  
wget --no-check-certificate --content-disposition https://github.com/murata-wireless/meta-murata-wireless/raw/master/script-  
utils/latest/Murata_Wireless_Yocto_Build.sh  
  
chmod a+x *.sh
```

2. Set up development environment by running Murata's setup script.

```
./Host_Setup_for_Yocto.sh
```

This will install the necessary packages (please provide root password if asked), optionally prompting the user to configure their git setup.

3. Start the build by running Murata's build script.

```
./Murata_Wireless_Yocto_Build.sh
```

4. Select Stable build (this is Murata's tested release).

```
Select Stable ( 'n'=Developer )? Y/n: Y  
Stable release selected
```

5. Select Zeus Yocto release running Linux 5.4.47.

```
Select which entry? 0  
Selected : 5.4.47
```

6. Select "CYW" for wireless solution (this configures image for 1MW).

```
Select which entry? 1  
Selected : CYW
```

7. Select Zigra "fmac" version.

```
Select which entry? 0  
Selected : zigra
```

8. Select i.MX 6ULL EVK as target platform.

```
Select your entry: 2
Selected target: imx6ull14x14evk
```

9. Proceed with the default distro and image selections.

```
Murata default DISTRO & Image pre-selected are:
DISTRO: fsl-imx-fb
Image: core-image-base
```

```
Proceed with this configuration? Y/n: Y
Proceeding with Murata defaults.
```

10. Enter build-imx6ullevk as build directory name.

```
Enter build directory name: build-imx6ullevk
```

11. Verify selection and start the build.

```
i.MX Yocto Release      : 5.4.47_2.2.0 GA
Yocto branch           : zeus
Wireless               : CYW
fmac version           : zigra
Target                 : imx6ull14x14evk
NXP i.MX EVK Part Number : MCIMX6ULL-EVK
meta-murata-wireless Release Tag: imx-zeus-zigra_r1.0
DISTRO                 : fsl-imx-fb
Image                  : core-image-base
Build Directory        : build-imx6ullevk
```

```
Please verify your selection
Do you accept selected configurations ? Y/n: Y
```

12. Accept the End User License Agreement (EULA).

```
Do you want to continue? Y/n: Y
```

13. Accept the third-party EULA (press 'space' to read next page, 'q' to quit reading).

```
Do you accept the EULA you just read? (y/n) y
EULA has been accepted.
```

14. Start the build. Typically this takes 2~4 hours to complete. Ensure that there is a minimum of 50 GB free disk space.

```
Do you want to start the build ? Y/n: Y
```

15. Once the build is complete, the image will be available in **~/linux-imx/build-imx6ullevk/tmp/deploy/images/imx6ullevk/** folder. Look for the file with ".wic.bz2" extension.

5 Deploy

The built image must be flashed onto a microSD card to use on the NXP i.MX 6ULL EVK. Follow the procedure mentioned below.

1. Plug in the microSD card to the Ubuntu host PC. If the host PC does not contain a microSD slot, you will need either a uSD-SD adapter or uSD-USB adapter.
2. Check dmesg to identify the connected microSD card device name.
3. Flash the microSD card with the built image. **Ensure you select the correct device** (“/dev/sdc” in this example) to flash, otherwise you may unintentionally wipe/erase your hard drive.

```
sudo dd if=~/.linux-imx/build-imx6ull-evk/tmp/deploy/images/imx6ullevk/core-image-base-imx6ullevk.wic of=/dev/sdc bs=1M && sync
```

4. The microSD card is now ready to be used to boot the NXP i.MX 6ULL EVK.

6 Boot the board

1. Plug in the flashed microSD card on the NXP i.MX 6ULL EVK. Refer to The [NXP i.MX 6ULL Quick Start Guide](#) for instructions.
2. Connect J1101 micro-USB port to PC and start terminal emulator (e.g. minicom). Set port to 115200-N-8-1.
3. Set up the uSD-M.2 adapter jumpers:
 - a. Jumper J1 to position 2-3 (VBAT from microSD connector).
 - b. For **new** Rev B1 adapter:
 - i. Jumper J12 to position 1-2 (M.2 VIO set to 1.8V – default configuration).
 - ii. Jumper J13 to position 1-2 (HOST VIO set to 3.3V – default configuration).
 - c. For **legacy** Rev A adapter:
 - i. Remove jumper from J12 (M.2 VIO set to 1.8 V – default configuration).
4. Power on the EVK and configure the EVK to detect Type 1MW.

```
switch_module.sh CYW-SDIO
```

5. Reboot the i.MX 6ULL EVK and interrupt the boot sequence by pressing any key.
6. Set the correct DTB file (Device Tree Blob). The one corresponding to SDIO in-band interrupt in this case. Save bootloader setup and boot the kernel. **NOTE:** It is preferable to run SDIO Out-of-Band interrupt configuration, but that requires a hardware rework.

```
setenv fdt_file imx6ull-14x14-evk-btwifi-m2.dtb
saveenv
boot
```

7. The EVK should boot with the “fmac” driver loaded automatically. To verify, you can issue “dmesg” command and search on “brcm” string.

```
$ dmesg | grep brcm
```

7 Enable Wi-Fi

1. Enable Wi-Fi interface

```
$ ifconfig wlan0 up
```

2. Ensure the interface is up

```
$ ifconfig wlan0
wlan0      Link encap:Ethernet  HWaddr 00:9D:6B:A6:EE:76      ← WLAN MAC Address
           UP BROADCAST MULTICAST  MTU:1500  Metric:1      ← “wlan0” interface is UP
           RX packets:0 errors:0 dropped:0 overruns:0 frame:0
           TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
           collisions:0 txqueuelen:1000
           RX bytes:0 (0.0 B)  TX bytes:0 (0.0 B)
```

3. Scan for available Wi-Fi networks

```
$ iw dev wlan0 scan
```

4. Connect to an unsecured Access Point (AP) “Murata_5G”.

```
$ iw dev wlan0 connect Murata_5G
$ iw dev wlan0 link
Connected to 84:1b:5e:f6:a7:60 (on wlan0)
  SSID: Murata_5G
  freq: 5180
  RX: 1944 bytes (8 packets)
  TX: 0 bytes (0 packets)
  signal: -44 dBm
  tx bitrate: 24.0 MBit/s

  bss flags:
  dtim period: 1
  beacon int: 100
```

5. Run DHCP client to get IP address.

```
$ udhcpc -i wlan0
```

6. Ping AP (IP address 192.168.10.1) to check connectivity.

```
$ ping 192.168.10.1
```

8 Enable Bluetooth

1. Load the Bluetooth driver. The Linux BlueZ stack is used for Bluetooth operations.

```
$ hciattach /dev/ttymxcl bcm43xx 3000000 flow -t 20
```

2. Enable Bluetooth interface.

```
$ hciconfig hci0 up
```

3. Scan for nearby Bluetooth devices

```
$ hcitool scan
```

9 Murata Community Forum

For more support, please go to Murata's Wireless Community Forum at <https://community.murata.com/>.

Figure 5: Links to Adapter and more Wi-Fi/BT M.2 EVB's

