

**MEDIATEK**

# MT7986 Build SOP

2022/1/14

# Document Revision History

Revision	Date	Author (Optional)	Description
1.0	2021-7-9	Micheal Su	Official release
1.1	2021-7-19	Micheal Su	Add for build NAND uboot
1.2	2021-8-2	Micheal Su	<ol style="list-style-type: none"> <li>1. Add Panther Bootloader and SDK Image Layout chapter</li> <li>2. Add for upgrade BL2 and FIP in uboot</li> </ol>
1.3	2021-8-6	Micheal Su	Add config for support Secure Boot
1.4	2021-9-17	Micheal Su	Fix uboot image folder name
1.5	2021-9-30	Micheal Su	Change to CONFIDENTIAL C format
1.6	2021-11-30	Micheal Su	Add for build eMMC uboot
1.7	2021-12-30	Micheal Su	Modify for v7.6.2.0 MP release
1.8	2022-1-14	Micheal Su	Modify Appendix B for specific feeds commit ID

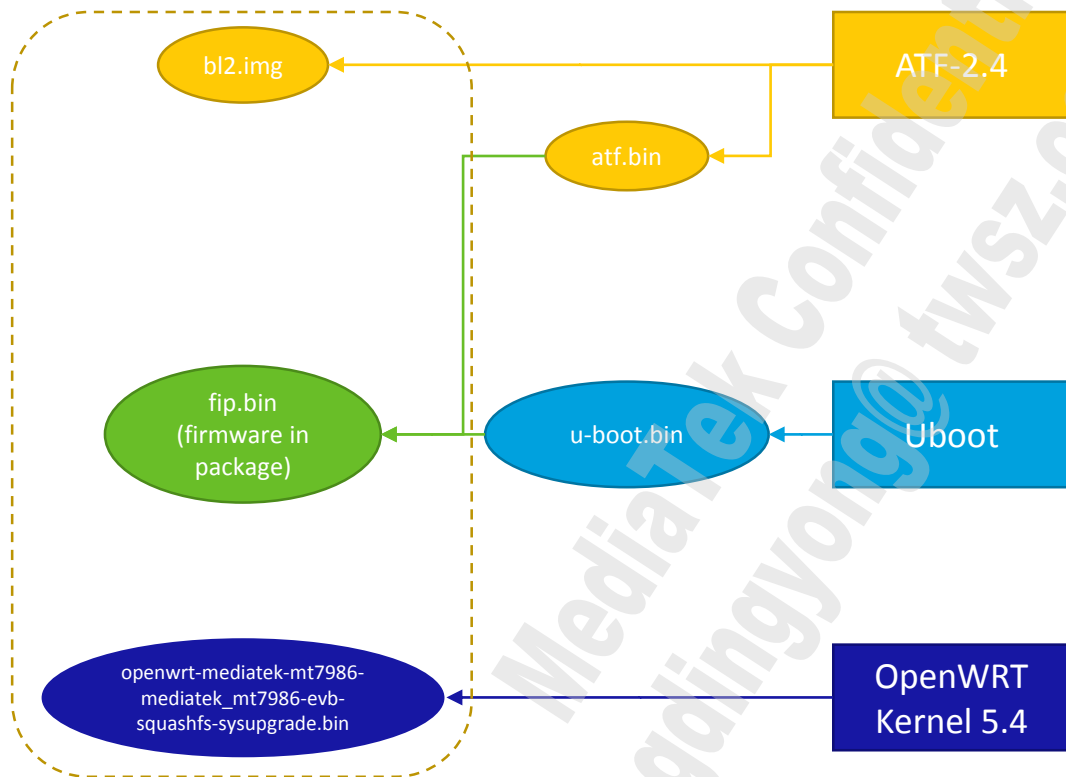
# Outline

- ❑ **Compile Environment Requirement**
- ❑ **Panther Bootloader and SDK Image Layout**
- ❑ **Build BL2/FIP image**
- ❑ **Build SDK and WiFi Package**
- ❑ **Update Image From U-Boot**
- ❑ **Appendix**
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  - **Appendix B : How to sync. to specific commit ID of feeds**

# Compile Environment Requirement

- **Use Ubuntu 18.04**
- **Install below tarball**
  - **#OpenWRT**
    - RUN apt-get install -y uuid-dev
  - **#Toolchain**
    - RUN apt-get install -y gcc-aarch64-linux-gnu
    - RUN apt-get install -y clang-6.0

# Panther Bootloader and SDK Image Layout



## • ATF-2.4

- Panther's preloader is integrated in ATF. ATF will build atf-bl2, which is Panther's preloader.
- ATF also build atf.bin which is ATF-BL31

## • Uboot

- Uboot build u-boot.bin, and atf will combine u-boot image and atf-bl31 together as fip.bin

## • OpenWRT

- With Linux Kernel-5.4

Image used in flash

# Build BL2/FIP image

- **Build Uboot**

- **Untar Uboot uboot-\${date code}-\${commit ID}.tar.xz and compile it**
- **For example :**
  - CMD:~/ \$> tar -jxvf Uboot-upstream-20211220.tar.bz2
  - CMD:~/ \$> cd Uboot-upstream/
  - CMD:~/Uboot-upstream\$> make mt7986\_spim\_nand\_rfb\_defconfig
  - Note :
    - if NOR flash, please use mt7986\_spim\_nor\_rfb\_defconfig
    - if Secure Boot, please use mt7986\_spim\_nand\_sb\_rfb\_defconfig
    - if MT7986A eMMC flash, please use mt7986a\_emmc\_rfb\_defconfig
    - if MT7986B eMMC flash, please use mt7986b\_emmc\_rfb\_defconfig
  - CMD:~/ Uboot-upstream\$> make CROSS\_COMPILE=/usr/bin/aarch64-linux-gnu-
- **Uboot's output image, i.e. u-boot.bin location is in Uboot-upstream/**

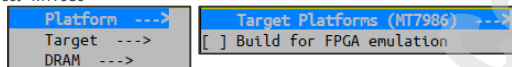
# Build BL2/FIP image

## • Build ATF

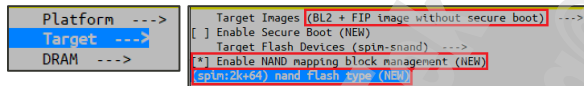
- Untar ATF `atf-$(date code)-$(commit ID).tar.xz` and compile it

### - For example :

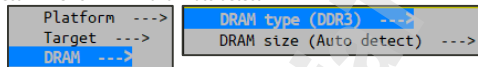
- CMD:~/> tar -Jxvf atf-20211220-3d63d7266.tar.xz
- CMD:~/> cd atf-20211220-3d63d7266/
- CMD:~/atf-20211220-3d63d7266\$> make menuconfig
- Select "MT7986"



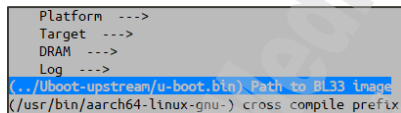
- Select "BL2 + FIP image without secure boot" for Target Image, "spim-snand" and enable NMBM. Also modify nand flash type according to your Flash type.



- Select "DDR3" or "DDR4" and "Auto detect"



- Enter u-boot.bin image path



- CMD:~/atf-20211220-3d63d7266\$> make

- BL2 image is located in `atf-$(date code)-$(commit ID)/build/mt7986/release/bl2.img`

- FIP image is located in `atf-$(date code)-$(commit ID)/build/mt7986/release/fip.bin`

# Build SDK and WiFi Package

## - Step 1.) to Step 5.)

1. Get Openwrt 21.02 source code from Git server
  - CMD:~/> git clone --branch openwrt-21.02 https://git.openwrt.org/openwrt/openwrt.git
2. Untar WiFi package “mtk-wifi-mt7986-`{data code}`\_bin.tar.xz”
  - CMD:~/> tar -Jxvf mtk-wifi-mt7986-20211230\_bin.tar.xz
3. Import WiFi packages into OpenWRT SDK source
  - CMD:~/> cp -rf mtk-wifi-mt7986/\* openwrt/
4. Change to openwrt folder
  - CMD:~/> cd openwrt/
5. Add MTK feed
  - CMD:~/openwrt\$> echo "src-git mtk\_openwrt\_feed  
https://git01.mediatek.com/openwrt/feeds/mtk-openwrt-feeds" >> feeds.conf.default

**NOTE: PLEASE TYPE THOSE COMMANDS MANUALLY, DO NOT USE COPY AND PASTE**



## Build SDK and WiFi Package - Step 6.) to Step 7.)

### 6. Run AX6000 auto build script (including config and make)

- CMD:~/openwrt#> ./autobuild/mt7986-AX6000/lede-branch-build-sanity.sh

### 7. If you only want to config and do not build it, please add config argument.

- CMD:~/openwrt#> ./autobuild/mt7986-AX6000/lede-branch-build-sanity.sh config

### 8. If you want to compile (or re-compile), please use make instead of running the script again.

- CMD:~/openwrt#> make V=s

**Note:** you can only run “lede-branch-build-sanity.sh” once, if you want to re-compile, please use “make” instead of running the script again.

**NOTE: PLEASE TYPE THOSE COMMANDS MANUALLY, DO NOT USE COPY AND PASTE**

# Build SDK and WiFi Package

## - Step 8.)

8. After compile PASS, you can get image at openwrt/bin/targets/mediatek/mt7986/ folder

- CMD:~/openwrt/bin/targets/mediatek/mt7986#> tree -L 1

```
@compiler:~/openwrt/bin/targets/mediatek/mt7986$ tree -L 1
.
├── config.buildinfo
├── feeds.buildinfo
├── openwrt-mediatek-mt7986.manifest
├── openwrt-mediatek-mt7986-mt7986a-mt7975-ax6000-rfb1-initramfs-kernel.bin
├── openwrt-mediatek-mt7986-mt7986a-mt7975-ax6000-rfb1-snand-initramfs-kernel.bin
├── openwrt-mediatek-mt7986-mt7986a-mt7975-ax6000-rfb1-snand-squashfs-factory.bin
├── openwrt-mediatek-mt7986-mt7986a-mt7975-ax6000-rfb1-snand-squashfs-sysupgrade.bin
├── openwrt-mediatek-mt7986-mt7986a-mt7975-ax6000-rfb1-squashfs-sysupgrade.bin
├── openwrt-mediatek-mt7986-mt7986a-mt7976-ax6000-rfb2-initramfs-kernel.bin
├── openwrt-mediatek-mt7986-mt7986a-mt7976-ax6000-rfb2-snand-initramfs-kernel.bin
├── openwrt-mediatek-mt7986-mt7986a-mt7976-ax6000-rfb2-snand-squashfs-factory.bin
├── openwrt-mediatek-mt7986-mt7986a-mt7976-ax6000-rfb2-snand-squashfs-sysupgrade.bin
├── openwrt-mediatek-mt7986-mt7986a-mt7976-ax6000-rfb2-squashfs-sysupgrade.bin
├── openwrt-mediatek-mt7986-mt7986b-mt7975-ax6000-rfb1-initramfs-kernel.bin
├── openwrt-mediatek-mt7986-mt7986b-mt7975-ax6000-rfb1-snand-initramfs-kernel.bin
├── openwrt-mediatek-mt7986-mt7986b-mt7975-ax6000-rfb1-snand-squashfs-factory.bin
├── openwrt-mediatek-mt7986-mt7986b-mt7975-ax6000-rfb1-snand-squashfs-sysupgrade.bin
├── openwrt-mediatek-mt7986-mt7986b-mt7975-ax6000-rfb1-squashfs-sysupgrade.bin
├── packages
├── sha256sums
└── version.buildinfo
```

# Update Image From U-Boot

## - Step 1.) to Step 2.)

1. Power on device and wait for U-Boot boot manu, shows as below
2. Press 2 for upgrade kernel firmware while boot manu count down  
Press 3 for upgrade BL2 image  
Press 4 for upgrade FIP image

```
*** U-Boot Boot Menu ***  
1. Startup system (Default)  
2. Upgrade firmware  
3. Upgrade ATF BL2  
4. Upgrade ATF FIP  
5. Upgrade single image  
6. Load image  
0. U-Boot console  
  
Hit any key to stop autoboot: 4  
Press UP/DOWN to move, ENTER to select, ESC/CTRL+C to quit
```

```
*** Upgrading Firmware ***  
Run image after upgrading? (Y/n):
```

## Update Image From U-Boot - Step 3.) to Step 9.)

3. Press Y for start upgrade
4. Press 0 for upgrade from TFTP
5. Input device IP
6. Input TFTP server IP
7. Input netmask
8. Input image file name
  - ATF BL2 : bl2.img
  - ATF FIP : fip.bin
  - Kernel : openwrt-mediatek-mt7986b-ax6000-<flash type>-rfb-squashfs-sysupgrade.bin
9. Press Enter, then start upgrade

[illegible]

# Appendix - A

- **How to sync. to specific commit ID of openwrt**
  1. **If you want to revert to specific openwrt commit ID. You can use git checkout with commit ID under openwrt/ folder.**
    - CMD:~/openwrt#> git checkout <commit ID>
  2. **You can find the openwrt commit ID in MT7986 release note.**
  3. **In the MT7986 release note, it includes the commit ID with different release version.**

## Appendix - B

- **How to sync. to specific commit ID of feeds**
  1. **If you want to revert to specific feeds commit ID. You can add commit ID to openwrt/autobuild/feeds.conf.default-21.02 file**
  2. **For example:**

```
@compiler:~/openwrt_AX6000/openwrt/autobuild$ cat feeds.conf.default-21.02
src-git packages https://git.openwrt.org/feed/packages.git^d3e6dc5
src-git luci https://git.openwrt.org/project/luci.git^dd9390c
src-git routing https://git.openwrt.org/feed/routing.git^61cd00c
src-git telephony https://git.openwrt.org/feed/telephony.git^ec88aa7
src-git mtk_openwrt_feed https://git01.mediatek.com/openwrt/feeds/mtk-openwrt-feeds^94da18a
```

**Note: If there is no feeds.conf.default-21.02, create it.**

3. **You can find the feeds commit ID in MT7986 release note.**
4. **In the MT7986 release note, it includes the commit ID with different release version.**

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