

MEDIATEK

MT7981 Build SOP

2022/5/3

Document Revision History

Revision	Date	Author (Optional)	Description
1.0	2022-4-22	Sean Ma	Official release
1.1	2022-4-22	PeiChen Tsai	Review and Correct
1.2	2022-4-26	Ekai Kuo	Correct
1.3	2022-4-29	PeiChen Tsai	Correct naming and final review
1.4	2022-5-03	PeiChen Tsai	Align ATF package with Panther

Outline

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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

Cheetah Bootloader and SDK Image Layout

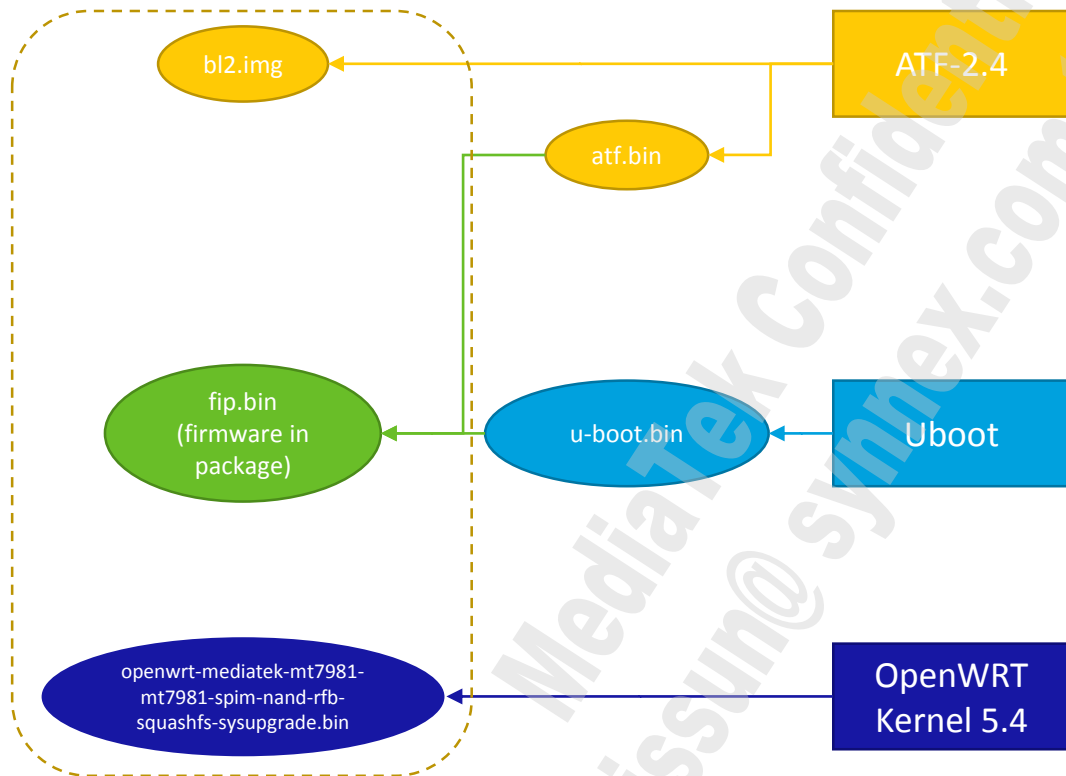


Image used in flash

• ATF-2.4

- Cheetah's preloader is integrated in ATF. ATF will build atf-bl2, which is Cheetah'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

Build BL2/FIP image

- **Build Uboot**

- **Untar Uboot uboot-\${date code}-\${commit ID}.tar.xz and compile it**
- **For example :**
 - CMD:~/ \$> tar -jxvf uboot-2022.04_0421_formal.tar.xz
 - CMD:~/ \$> cd uboot-mtk-20220412-sb/
 - CMD:~/uboot-mtk-20220412-sb\$> make mt7981_spim_nand_rfb_defconfig
Note :
 - if NOR flash, please use mt7981_spim_nor_rfb_defconfig
 - if Secure Boot, please use mt7981_spim_nand_sb_rfb_defconfig
 - if MT7981 eMMC flash, please use mt7981_emmc_rfb_defconfig
 - CMD:~/uboot-mtk-20220412-sb\$> make CROSS_COMPILE=/usr/bin/aarch64-linux-gnu-
- **Uboot's output image, i.e. u-boot.bin location is in uboot-mtk-20220412-sb/**

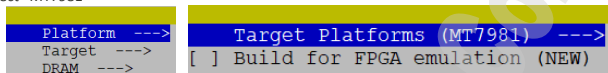
Build BL2/FIP image

• Build ATF

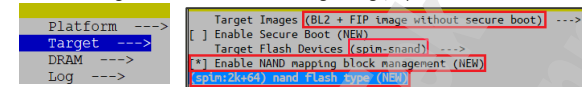
- Untar ATF `atf-$(date code)-$(commit ID).tar.xz` and compile it

- For example :

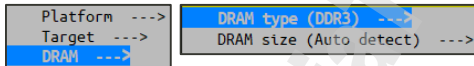
- CMD:~/> tar -Jxvf atf-2.6-20220421-be1606233.tar.xz
- CMD:~/> cd atf-2.6-20220421-be1606233/
- CMD:~/> atf-2.6-20220421-be1606233> make menuconfig
 - Select "MT7981"



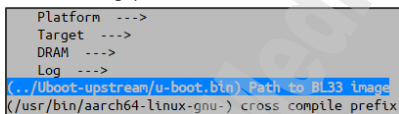
- Select "BL2 + FIP image without secure boot" for Target Image, "spim-snand" and enable NMBM. Also modify nand flash type according to your Flash type.



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



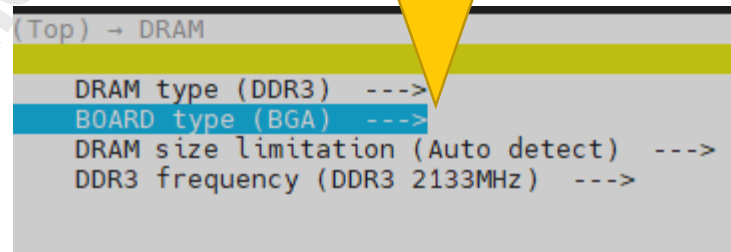
- Enter u-boot.bin image path



- CMD:~/> atf-2.6-20220421-d0152f6db> make

- BL2 image is located in `atf-$(date code)-$(commit ID)/build/mt7981/release/bl2.img`
- FIP image is located in `atf-$(date code)-$(commit ID)/build/mt7981/release/fip.bin`

If it's 7981a or 7981b > BGA
If it's 7981c > FCN



Note: It's bl2.img

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-mt7981-`{data code}`.tar.xz”

- CMD:~/> tar -Jxvf mtk-wifi-mt7981-20220426.tar.xz

3. Import WiFi packages into OpenWRT SDK source

- CMD:~/> cp -rf mtk-wifi-mt7981/* 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 AX3000 auto build script (including config and make)

- CMD:~/openwrt#> ./autobuild/mt7981-AX3000/lede-branch-build-sanity.sh

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

- CMD:~/openwrt#> ./autobuild/mt7981-AX3000/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/mt7981/ folder

- CMD:~/openwrt/bin/targets/mediatek/mt7981#> tree -L 1

```
@compiler:~/openwrt/bin/targets/mediatek/mt7981$ tree -L 1
.
├── config.buildinfo
├── feeds.buildinfo
├── openwrt-mediatek-mt7981.manifest
├── openwrt-mediatek-mt7981-mt7981-snfi-nand-2500wan-gmac2-initramfs-kernel.bin
├── openwrt-mediatek-mt7981-mt7981-snfi-nand-2500wan-gmac2-squashfs-factory.bin
├── openwrt-mediatek-mt7981-mt7981-snfi-nand-2500wan-gmac2-squashfs-sysupgrade.bin
├── openwrt-mediatek-mt7981-mt7981-spim-nand-rfb-initramfs-kernel.bin
├── openwrt-mediatek-mt7981-mt7981-spim-nand-rfb-squashfs-factory.bin
├── openwrt-mediatek-mt7981-mt7981-spim-nand-rfb-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 menu, shows as below
2. Press 2 for upgrade kernel firmware while boot menu 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):
```

- [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 MT7981 release note.**
 3. **In the MT7981 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_AX4200/openwrt/autobuild$ cat feeds.conf.default-21.02
src-git mtk_openwrt_feed https://git01.mediatek.com/openwrt/feeds/mtk-openwrt-feeds^b629793
src-git packages https://git.openwrt.org/feed/packages.git^ee69afe
src-git luci https://git.openwrt.org/project/luci.git^0a0ce2a
src-git routing https://git.openwrt.org/feed/routing.git^fc0b140
```

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

3. You can find the feeds commit ID in MT7981 release note.
4. In the MT7981 release note, it includes the commit ID with different release version.

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