

# orangepi zero 2w linux、android 开发

改 dts 设备树，进行适配：

正式验证 chsc driver 功能

日期：20240229

查看设备树方式：

1、cd /sys/firmware/devicetree/base/

2、ls /proc/device-tree

```
root@orangepi zero2w:/sys/kernel/debug# cd /sys/firmware/devicetree/base/
root@orangepi zero2w:/sys/firmware/devicetree/base# ls
'address-cells'  cpu-opp-table  firmware        memory          pio-33          _symbols_
aliases          cpus           internal-osc-clk  model          psci            thermal-zones
box_start_os0    dcxo24M-clk    interrupt-controller@0  name          reserved-memory  timer_arch
chosen           dram           interrupt-controller@3021000  osc32k-clk    'size-cells'    uboot_disp@1000000
compatible       dump-reg@20000  interrupt-parent  pio-18        soc@3000000     uboot_hdm@6000000
root@orangepi zero2w:/sys/firmware/devicetree/base# /proc/device-tree
bash: /proc/device-tree: Is a directory
root@orangepi zero2w:/sys/firmware/devicetree/base# ls /proc/device-tree
'address-cells'  cpu-opp-table  firmware        memory          pio-33          _symbols_
aliases          cpus           internal-osc-clk  model          psci            thermal-zones
box_start_os0    dcxo24M-clk    interrupt-controller@0  name          reserved-memory  timer_arch
chosen           dram           interrupt-controller@3021000  osc32k-clk    'size-cells'    uboot_disp@1000000
compatible       dump-reg@20000  interrupt-parent  pio-18        soc@3000000     uboot_hdm@6000000
root@orangepi zero2w:/sys/firmware/devicetree/base#
```

## 设备树另外一个位置和处理方式-》设备树插件：

```

root@orangepi-zero2w:/boot# vim orangePiEnv.txt
root@orangepi-zero2w:/boot# cd /usr/lib
root@orangepi-zero2w:/usr/lib# ls
aarch64-linux-gnu      gnome-session          linux-sound-base       python3.8
accountsservice        gnome-settings-daemon-3.0  linux-u-boot-current-orangepi-zero2w_1.0.0_arm64  python3.9
apg                    gnome-shell            locale                 resolvconf
apt                    gnome-tweak-tool       lsb                    rsyslog
aspell                 gnupg                  man-db                 sas2
bfd-plugins            gnupg2                 mc                     sftp-server
binfmt.d               gold-ld                mime                   software-properties
bluetooth             groff                  modprobe.d            ssl
bridge-utils          gst-install-plugins-helper  modules                sudo
chromium-browser       gvfs                   modules-load.d         sysctl.d
chrony                 hdparm                nand-sata-install     sysstat
compat-ld              ifupdown               netplan                systemd
console-setup          init                   networkd-dispatcher   sysusers.d
cpp                     initramfs-tools        NetworkManager         tc
crda                   ispell                 nocache                tcltk
cups                   kernel                 nvidia                 terminfo
dbus-1.0                klibc                  openssl                thunar-archive-plugin
dpkg                    klibc-lbL2PP0WqEKZBTt1bTcN7It5Usc.so  orangePi               tmpfiles.d
eject                  language-selector      os-release             ubiquity
emacs                  ld-linux-aarch64.so.1  packagekit             u-boot
emacsen-common         libcpufreq.so.0        pkg-config              ubuntu-advantage
environment.d          libcpufreq.so.0.0.0    pm-utils                ubuntu-release-upgrader
evolution-data-server libgcc_s.so.1           policykit-1             udev
file                    libtinyalsa.so         pppd                    udisks2
firmware               libwiringPiDev.so      pulse-13.99.1          unity-settings-daemon-1.0
gcc                     libwiringPiDev.so.2.52  python2.7               update-notifier
ghostscript             libwiringPi.so          python3                  upower
girepository-1.0       lightdm                 xorg
git-core               linux-image-current-sun50iw9
gnome-online-miners    root@orangepi-zero2w:/usr/lib# cd linux-image-current-sun50iw9
root@orangepi-zero2w:/usr/lib/linux-image-current-sun50iw9# ls
sunxi
root@orangepi-zero2w:/usr/lib/linux-image-current-sun50iw9# cd sunxi
root@orangepi-zero2w:/usr/lib/linux-image-current-sun50iw9/sunxi# ls
overlay  sun50i-h616-orangepi-zero3.dtb
root@orangepi-zero2w:/usr/lib/linux-image-current-sun50iw9/sunxi# cd overlay
root@orangepi-zero2w:/usr/lib/linux-image-current-sun50iw9/sunxi/overlay# ls
sun50i-h616-disable-leds.dtb    sun50i-h616-ph-pwm34.dtb    sun50i-h616-pi-pwm2.dtb    sun50i-h616-spi0-spidev.dtb
sun50i-h616-disable-uart0.dtb  sun50i-h616-ph-uart2.dtb   sun50i-h616-pi-pwm3.dtb    sun50i-h616-spi1-cs0-cs1-spidev.dtb
sun50i-h616-ph-i2c1.dtb        sun50i-h616-ph-uart5.dtb   sun50i-h616-pi-pwm4.dtb    sun50i-h616-spi1-cs0-spidev.dtb
sun50i-h616-ph-i2c2.dtb        sun50i-h616-pi-i2c0.dtb    sun50i-h616-pi-uart2.dtb   sun50i-h616-spi1-cs1-spidev.dtb
sun50i-h616-ph-i2c3.dtb        sun50i-h616-pi-i2c1.dtb    sun50i-h616-pi-uart3.dtb   sun50i-h616-usb0-host.dtb
sun50i-h616-ph-i2c4.dtb        sun50i-h616-pi-i2c2.dtb    sun50i-h616-pi-uart4.dtb   sun50i-h616-zero2w-disable-led.dtb
sun50i-h616-ph-pwm12.dtb       sun50i-h616-pi-pwm1.dtb    sun50i-h616-powerkey.dtb
root@orangepi-zero2w:/usr/lib/linux-image-current-sun50iw9/sunxi/overlay#

```

## 加载方式，适用于 目前开发：

我们可以使用 uboot 加载编写好的设备树插件，只需完成简单的两个步骤：

- 1、将需要加载的.dtb 文件放入 “/usr/lib/linux-image-4.19.35-imx6/overlays/” 目录下。

```

root@npi:/home/debian/nfs_share#
root@npi:/home/debian/nfs_share# ls
imx-fire-rgb-led.dtb
root@npi:/home/debian/nfs_share# cp imx-fire-rgb-led.dtb /usr/lib/linux-image-4.19.35-imx6/overlays/
root@npi:/home/debian/nfs_share# ls /usr/lib/linux-image-4.19.35-imx6/overlays/
imx-fire-485r1.dtb    imx-fire-i2c3.dtb    imx-fire-mpu6050.dtb
imx-fire-485r2.dtb    imx-fire-i2c4.dtb    imx-fire-otg1.dtb
imx-fire-74hc595.dtb  imx-fire-key.dtb     imx-fire-pwm-led.dtb
imx-fire-adc1.dtb     imx-fire-lcd.dtb     imx-fire-pwm.dtb
imx-fire-bluetooth.dtb  imx-fire-led.dtb     imx-fire-resistive-screen.dtb
imx-fire-btwifi.dtb    imx-fire-mpu6050.dtb  imx-fire-rgb-led.dtb
imx-fire-cam.dtb       imx-fire-otg1.dtb    imx-fire-sound.dtb
imx-fire-can1.dtb      imx-fire-pwm-led.dtb  imx-fire-touch-capacitive-goodix.dtb
imx-fire-can2.dtb      imx-fire-pwm.dtb     imx-fire-touch-resistive-4wires.dtb
imx-fire-dht11.dtb     imx-fire-resistive-screen.dtb  imx-fire-uart2.dtb
imx-fire-ds18b20.dtb   imx-fire-rgb-led.dtb  imx-fire-uart3.dtb
imx-fire-ecspi1.dtb    imx-fire-sound.dtb    imx-fire-uart4.dtb
imx-fire-ecspi2.dtb    imx-fire-touch-capacitive-goodix.dtb  imx-fire-uart5.dtb
imx-fire-ecspi3-slave.dtb  imx-fire-touch-resistive-4wires.dtb  imx-fire-uart6.dtb
imx-fire-ecspi3.dtb    imx-fire-uart2.dtb    imx-fire-uart7.dtb
imx-fire-ecspi4.dtb    imx-fire-uart3.dtb    imx-fire-uart8.dtb
imx-fire-emmc.dtb      imx-fire-uart4.dtb
imx-fire-gpmi.dtb      imx-fire-uart5.dtb
imx-fire-hdmi.dtb      imx-fire-uart6.dtb
imx-fire-i2c-gpio.dtb   imx-fire-uart7.dtb
imx-fire-i2c1.dtb      imx-fire-uart8.dtb
imx-fire-i2c2.dtb
root@npi:/home/debian/nfs_share#

```

- 2、将对应的设备树插件加载配置，写入 uEnv.txt 配置文件，系统启动过程中会自动从 uEnv.txt 读取要加载的设备树插件。

## 对应 orange pi 修改方法：

## 源码目录:

|        |                               |                                                                                         |  |
|--------|-------------------------------|-----------------------------------------------------------------------------------------|--|
|        |                               | 201401 17:00                                                                            |  |
|        |                               | Home / oran...v1d / kernel / oran...0hw / arch / arm64 / boot / dts / sunxi / overlay 1 |  |
| nts    | Makefile                      | 510B                                                                                    |  |
|        | sun50i-h616-disable-leds.dtb  | 1.0 k                                                                                   |  |
|        | sun50i-h616-disable-leds.dts  | 321 B                                                                                   |  |
|        | sun50i-h616-disable-uart0.dtb | 222 B                                                                                   |  |
|        | sun50i-h616-disable-uart0.dts | 220 B                                                                                   |  |
| ds     | sun50i-h616-ph-i2c1.dtb       | 113 B                                                                                   |  |
|        | sun50i-h616-ph-i2c1.dts       | 443 B                                                                                   |  |
|        | sun50i-h616-ph-i2c2.dtb       | 214 B                                                                                   |  |
|        | sun50i-h616-ph-i2c2.dts       | 443 B                                                                                   |  |
|        | sun50i-h616-ph-i2c3.dts       | 214 B                                                                                   |  |
| ations | sun50i-h616-ph-i2c4.dtb       | 443 B                                                                                   |  |
|        | sun50i-h616-ph-i2c4.dts       | 214 B                                                                                   |  |
|        | sun50i-h616-ph-pwm12.dtb      | 450 B                                                                                   |  |
|        | sun50i-h616-ph-pwm12.dts      | 260 B                                                                                   |  |
|        | sun50i-h616-ph-pwm34.dtb      | 570 B                                                                                   |  |
|        | sun50i-h616-ph-pwm34.dts      | 352 B                                                                                   |  |
|        | sun50i-h616-ph-uart2.dtb      | 389 B                                                                                   |  |
|        | sun50i-h616-ph-uart2.dts      | 237 B                                                                                   |  |
|        | sun50i-h616-ph-uart5.dtb      | 224 B                                                                                   |  |
|        | sun50i-h616-ph-uart5.dts      | 100 B                                                                                   |  |
|        | sun50i-h616-pi-i2c0.dtb       | 443 B                                                                                   |  |
|        | sun50i-h616-pi-i2c0.dts       | 214 B                                                                                   |  |
|        | sun50i-h616-pi-i2c1.dtb       | 443 B                                                                                   |  |
|        | sun50i-h616-pi-i2c2.dts       | 443 B                                                                                   |  |
|        | sun50i-h616-pi-i2c3.dts       | 214 B                                                                                   |  |

## 官方说明:

40pin接口GPIO、I2C、UART、SPI和PWM测试

注意, 如果需要设置overlays同时打开多个配置, 请像下面这样使用空格隔开写在一行即可。

```
orange@orange:~$ sudo vim /boot/orangepiEnv.txt
```

```
overlays=spi3-m0-cs0-spidev i2c2-m1 i2c3-m0 uart7-m2 uart9-m2 pwm11-m1
```

## 开发板目录:

```
orange@orange:~/boot/dtb-5.4.125$ ls
sunxi
orange@orange:~/boot/dtb-5.4.125$ cd sunxi
orange@orange:~/boot/dtb-5.4.125/sunxi$ ls
overlay sun50i-h616-orangepi-zero3.dtb
orange@orange:~/boot/dtb-5.4.125/sunxi$ cd overlay
orange@orange:~/boot/dtb-5.4.125/sunxi/overlay$ ls
sun50i-h616-disable-leds.dtb    sun50i-h616-ph-pwm34.dtb    sun50i-h616-pi-pwm2.dtb    sun50i-h616-spi0-spidev.dtb
sun50i-h616-disable-uart0.dtb  sun50i-h616-ph-uart2.dtb   sun50i-h616-pi-pwm3.dtb    sun50i-h616-spi1-cs0-cs1-spidev.dtb
sun50i-h616-ph-i2c1.dtb        sun50i-h616-ph-uart5.dtb   sun50i-h616-pi-pwm4.dtb    sun50i-h616-spi1-cs0-spidev.dtb
sun50i-h616-ph-i2c2.dtb        sun50i-h616-pi-i2c0.dtb    sun50i-h616-pi-uart2.dtb   sun50i-h616-spi1-cs1-spidev.dtb
sun50i-h616-ph-i2c3.dtb        sun50i-h616-pi-i2c1.dtb    sun50i-h616-pi-uart3.dtb   sun50i-h616-usb0-host.dtb
sun50i-h616-ph-i2c4.dtb        sun50i-h616-pi-i2c2.dtb    sun50i-h616-pi-uart4.dtb   sun50i-h616-zero2w-disable-led.dtb
sun50i-h616-ph-pwm12.dtb       sun50i-h616-pi-pwm1.dtb    sun50i-h616-powerkey.dtb
orange@orange:~/boot/dtb-5.4.125/sunxi/overlay$
```

```
7. COM3 (USB-SERIAL CH340 (COM...)) 11. 192.168.3.65 (orangeipi)
verbosity=1
bootlogo=true
console=both
disp_mode=1080p60
fb0_width=1920
fb0_height=1080
debug_uart=ttyAS0
overlay_prefix=sun50i-h616
rootdev=UUID=c5dda5ca-717c-404f-b168-8c2a272c70c8
rootfstype=ext4
overlays=ph-i2c1 ph-i2c2
usbstoragequirks=0x2537:0x1066:u,0x2537:0x1068:u
~
~
~
~
~
~
~
~
~
~
~
~
~
~
~
```

```
# Executing script at 43100000
Boot script loaded from mmc
273 bytes read in 15 ms (17.6 KiB/s)
443 bytes read in 25 ms (16.6 KiB/s)
Applying kernel provided DT overlay sun50i-h616-ph-12c1.dtb
443 bytes read in 26 ms (16.6 KiB/s)
Applying kernel provided DT overlay sun50i-h616-ph-12c2.dtb
1420564 bytes read in 1179 ms (11.3 MiB/s)
27899976 bytes read in 2323 ms (11.5 MiB/s)
## Booting kernel from Legacy Image at 41000000 ...
Image Name:
Image Type: ARM Linux Kernel Image (uncompressed)
Data Size: 27899912 Bytes = 26.6 MiB
Load Address: 41000000
Entry Point: 41000000
Verifying Checksum ... OK
## Loading init Ramdisk from Legacy Image at 43300000 ...
```

```

orange1@orange1zero2w:/dev/$ ls
ashmem      full      loop1    net       ram5      stdout    tty15     tty3      tty44     tty59     tty53     vcsa2     vhost-net
autofs      fuse      loop2    null      ram6      sunxi_drm_heap  tty16     tty30     tty45     tty6      ubi_ctrl  vcsa3     vhost-vsock
block       g2d       loop3    ppp       ram7      sunxi_reg   tty17     tty31     tty46     tty66     urandom  vcsa4     watchdog
btrfs-control  gpitchip0 loop4    ptxmx    ram8      sunxi_soc_info  tty18     tty32     tty47     tty61     input    vcsa5     watchdog0
bus         gpitchip1 loop5    pts       ram9      synx-wlan   tty19     tty33     tty48     tty62     urandom  vcsa6     wcn_op
cec        hdmi      loop6    random    ram0      syncence    tty2       tty34     tty49     tty63     vcs7     zero
cedar_dev   hugepages loop7    ram1      random    tee0        tty20     tty35     tty5     tty7     vcs1     zram0
char        hvnc      loop-control ram10     rtc        teeprv0     tty21     tty36     tty50    tty8     vcs2     zram1
console     i2c-2     mapper   ram11     rtc        tty         tty22     tty37     tty51    tty9     vcs3     vcsu1
core        i2c-5     mel      ram12     shm        tty0        tty23     tty38     tty52    ttyA0    vcs4     vcsu2
cpu_dma_latency  initctl  mmcblk0  ram13     sio_efuse  tty1        tty24     tty39     tty53     ttyA1    vcs5     vcsu3
daiinterface  input    mmcblk0p1 ram14     slog_wcn0  tty10       tty25     tty4     tty54     ttyB70   vcs6     vcsu4
disk        kmsg     mqueue   ram15     slog_wcn1  tty11       tty26     tty40     tty55     ttyB71   vcs7     vcsu5
disp        l1rc0    mt00     ram2      snd        tty12       tty27     tty41     tty56     tty50    vcs8     vcsu6
fb0         log       mtd0ero ram3      stderr     tty13       tty28     tty42     tty57     tty51    vcs9     vcsu7
fd          loop0    mtdblock0 ram4      stdin      tty14       tty29     tty43     tty58     tty52    vcsa1    vcsu8

```

直接修改设备树，编译不成功：

另外一个教程:

### 22.4.5 程序结果

#### 22.4.5.1 下载设备树

通过 SCP 或 NFS 将编译的设备树拷贝到开发板上。替换 `/usr/lib/linux-image-4.19.35-imx6/imx6ull-mmc-npi.dtb`。

uboot 在启动的时候负责该目录的设备文件加载到内存，供内核解析使用。

输入 `sudo reboot` 命令重启开发板。

源码路径直接 `make dtbs` 也不成功:

```
[ o.k. ] Extension manager [ processed 3 Extension Methods calls and 3 Extension Method Implementations ]
[ o.k. ] Preparing [ host ]
[ o.k. ] Build host OS release [ jammy ]
[ .... ] Installing build dependencies
[ o.k. ] Syncing clock [ cn.pool.ntp.org ]
[ o.k. ] Checking for external GCC compilers
[ o.k. ] Cleaning /home/goku/orangepi-build/output/debs for [ orangepi-zero2w current ]
/home/goku/orangepi-build/scripts/compilation.sh: line 135: cd: /home/goku/orangepi-build/u-boot/v2018.05-h618: No such file or directory
goku@goku-virtual-machine:~/orangepi-build$ make dtbs
make: *** No rule to make target 'dtbs'. Stop.
goku@goku-virtual-machine:~/orangepi-build$ make dtb
make: *** No rule to make target 'dtb'. Stop.
goku@goku-virtual-machine:~/orangepi-build$ make dtbs
make: *** No rule to make target 'dtbs'. Stop.
goku@goku-virtual-machine:~/orangepi-build$
```

第三种思路，解包 deb 后替换 dtb，重新打包 deb，更新：

## 设备树调试最佳方式-》修改设备树，使用 orangepi 自带内核编译脚本进行编译测试

### 发现内核编译时设备树 编译相关信息:

[illegible]

目前遇到问题设备树替换不生效，各种方式都试了：

1、/boot/dtb 下的

```
sunxi
orangeipi@orangeipizero2w:/boot/dtb$ cd sunxi
orangeipi@orangeipizero2w:/boot/dtb/sunxi$ ls
overlay  sun50i-h616-orangepi-zero3.dtb
orangeipi@orangeipizero2w:/boot/dtb/sunxi$
```

2、/usr/lib/linux-image-current-sun50iw9 下的

```
orangeipi@orangeipizero2w:/usr/lib$ cd linux-image-current-sun50iw9
orangeipi@orangeipizero2w:/usr/lib/linux-image-current-sun50iw9$ ls
sunxi
orangeipi@orangeipizero2w:/usr/lib/linux-image-current-sun50iw9$ cd sunxi
orangeipi@orangeipizero2w:/usr/lib/linux-image-current-sun50iw9/sunxi$ ls
overlay  sun50i-h616-orangepi-zero3.dtb
orangeipi@orangeipizero2w:/usr/lib/linux-image-current-sun50iw9/sunxi$
```

野火描述：

## 22.4.5 程序结果

### 22.4.5.1 下载设备树

通过 SCP 或 NFS 将编译的设备树拷贝到开发板上。替换 /usr/lib/linux-image-4.19.35-imx6/imx6ull-mmc-npi.dtb。

uboot 在启动的时候负责该目录的设备文件加载到内存，供内核解析使用。

输入 `sudo reboot` 命令重启开发板。

3、源码 arch/arm64/boot/dts/sunxi/ 修改 dts，重新编译 deb，替换

修改：



10. 如果对内核做了修改，可以使用下面的方法来更新开发板linux系统的内核和内核模块

a. 将编译好的linux内核的deb包上传到开发板的linux系统中

```
test@test:~/orange-pi-build$ cd output/debs
test@test:~/orange-pi-build/output/debs$ scp \
linux-image-next-sun50iw9_x.x.x_arm64.deb root@192.168.1.xxx:/root
```

b. 再安装刚才上传的新的linux内核的deb包

```
orange-pi@orange-pi:~$ sudo dpkg -i linux-image-next-sun50iw9_x.x.x_arm64.deb
```

c. 然后重启开发板，再查看内核相关的修改是否已生效

```
orange-pi@orange-pi:~$ sudo reboot
```

最后效果：

```
orange-pi@orange-pi-zero2w:/proc/device-tree$ ls
'#address-cells'  firmware          pio-33
aliases           internal-osc-clk   psci
box_start_os0     interrupt-controller@0 reserved-memory
chosen            interrupt-controller@3021000 '#size-cells'
compatible        interrupt-parent    soc@3000000
cpu-opp-table     memory            symbols_
cpus              model             thermal-zones
dcxo24M-clk       name              timer_arch
dram              osc32k-clk         uboot_disp@1000000
dump-reg@20000    pio-18            uboot_hdmi@6000000
orange-pi@orange-pi-zero2w:/proc/device-tree$ cd firmware
orange-pi@orange-pi-zero2w:/proc/device-tree/firmware$ ls
android  name  optee
orange-pi@orange-pi-zero2w:/proc/device-tree/firmware$ cd android
-bash: cd: android: No such file or directory
orange-pi@orange-pi-zero2w:/proc/device-tree/firmware$ ls
android  name  optee
orange-pi@orange-pi-zero2w:/proc/device-tree/firmware$ cd /usr/lib
orange-pi@orange-pi-zero2w:/usr/lib$ ls
aarch64-linux-gnu
accountsservice
apg
apt
--..
```

分析过程：

直接对/boot/dtb 下的 dtb 反编译：

```
FATAL ERROR: Couldn't open output file output.dts: Permission denied
orange-pi@orange-pi-zero2w:/boot/dtb/sunxi$ sudo dtc -I dtb -O dts -o output.dts sun50i-h616-orange-pi-zero3.dtb
[sudo] password for orange-pi:
output.dts: Warning (unit_address_vs_reg): /reserved-memory/bl31: node has a reg or ranges property, but no unit name
output.dts: Warning (unit_address_vs_reg): /cpu-opp-table/opp@480000000: node has a unit name, but no reg property
output.dts: Warning (unit_address_vs_reg): /cpu-opp-table/opp@600000000: node has a unit name, but no reg property
output.dts: Warning (unit_address_vs_reg): /cpu-opp-table/opp@720000000: node has a unit name, but no reg property
output.dts: Warning (unit_address_vs_reg): /cpu-opp-table/opp@792000000: node has a unit name, but no reg property
output.dts: Warning (unit_address_vs_reg): /cpu-opp-table/opp@936000000: node has a unit name, but no reg property
output.dts: Warning (unit_address_vs_reg): /cpu-opp-table/opp@1008000000: node has a unit name, but no reg property
output.dts: Warning (unit_address_vs_reg): /cpu-opp-table/opp@1040000000: node has a unit name, but no reg property
output.dts: Warning (unit_address_vs_reg): /cpu-opp-table/opp@1200000000: node has a unit name, but no reg property
output.dts: Warning (unit_address_vs_reg): /cpu-opp-table/opp@1320000000: node has a unit name, but no reg property
output.dts: Warning (unit_address_vs_reg): /cpu-opp-table/opp@1416000000: node has a unit name, but no reg property
output.dts: Warning (unit_address_vs_reg): /cpu-opp-table/opp@1512000000: node has a unit name, but no reg property
output.dts: Warning (unit_address_vs_reg): /interrupt-controller@0: node has a unit name, but no reg property
output.dts: Warning (unit_address_vs_reg): /soc@3000000: node has a unit name, but no reg property
output.dts: Warning (unit_address_vs_reg): /soc@3000000/ve1@1c0e900: node has a unit name, but no reg property
output.dts: Warning (unit_address_vs_reg): /soc@3000000/sid@3006000/secure_status: node has a reg or ranges property, but no unit name
output.dts: Warning (unit_address_vs_reg): /soc@3000000/sid@3006000/secure_status: node has a reg or ranges property, but no unit name
```

```
orange-pi@orange-pi-zero2w:/boot/dtb/sunxi$ cd /usr/lib
output.dts overlay sun50i-h616-orange-pi-zero3.dtb
orange-pi@orange-pi-zero2w:/boot/dtb/sunxi$ vim output.dts
```

```

        ranges;

        bl31 {
            reg = <0x00 0x48000000 0x00 0x1000000>;
        };
    };

    firmware {
        android {
            compatible = "android1,firmware";
            boot_devices = "soc@3000000/4020000.sdmmc,soc@3000000/4022000.sdmmc,soc@3000000";

            vbmeta {
                compatible = "android1,vbmeta";
                parts = "vbmeta,vbmeta_system,vbmeta_vendor,boot";
            };
        };

        optee {
            compatible = "linaro1,optee-tz";
            method = "smc";
        };
    };

    cpus {
        ...
    };

```

直接对/usr/lib 下的 dtb 反编译：

在次之前进行了 deb 的卸载和重新加载

```

FATAL ERROR: Couldn't open output file output.dts: Permission denied
orange1@orangeipizero2w:/usr/lib/linux-image-current-sun50iw9/sunxi$ sudo dtc -I dtb -O dts -o output.dts sun50i-h616-orangepi-zero3.dtb
output.dts: Warning (unit_address_vs_reg): /reserved-memory/bl31: node has a reg or ranges property, but no unit name
output.dts: Warning (unit_address_vs_reg): /cpu-opp-table/opp@4800000000: node has a unit name, but no reg property
output.dts: Warning (unit_address_vs_reg): /cpu-opp-table/opp@6000000000: node has a unit name, but no reg property
output.dts: Warning (unit_address_vs_reg): /cpu-opp-table/opp@7200000000: node has a unit name, but no reg property
output.dts: Warning (unit_address_vs_reg): /cpu-opp-table/opp@7920000000: node has a unit name, but no reg property
output.dts: Warning (unit_address_vs_reg): /cpu-opp-table/opp@9360000000: node has a unit name, but no reg property
output.dts: Warning (unit_address_vs_reg): /cpu-opp-table/opp@10880000000: node has a unit name, but no reg property
output.dts: Warning (unit_address_vs_reg): /cpu-opp-table/opp@11040000000: node has a unit name, but no reg property
output.dts: Warning (unit_address_vs_reg): /cpu-opp-table/opp@12000000000: node has a unit name, but no reg property
output.dts: Warning (unit_address_vs_reg): /cpu-opp-table/opp@13200000000: node has a unit name, but no reg property
output.dts: Warning (unit_address_vs_reg): /cpu-opp-table/opp@14160000000: node has a unit name, but no reg property
output.dts: Warning (unit_address_vs_reg): /cpu-opp-table/opp@15120000000: node has a unit name, but no reg property
output.dts: Warning (unit_address_vs_reg): /interrupt-controller@0: node has a unit name, but no reg property

```



虚拟机编译 kernel deb 加载后的系统信息：

```

root@orangeipizero2w:/home/orangepi# cat /proc/version
Linux version 5.4.125 (root@goku-virtual-machine) (aarch64-none-linux-gnu-gcc (GNU Toolchain for the Arm Architecture 11.2-2022.02 (arm-11.14)) 11.2.1 20220111, GNU ld (GNU Toolchain for the Arm Architecture 11.2-2022.02 (arm-11.14)) 2.37.20220122) #1.0.0 SMP Thu Feb 29 11:13:01 CST 2024
root@orangeipizero2w:/home/orangepi#
root@orangeipizero2w:/home/orangepi#
root@orangeipizero2w:/home/orangepi#
root@orangeipizero2w:/home/orangepi#

```

