

 [avafinger](#) / [bananapi-zero-ubuntu-base-minimal](#)

Join GitHub today

Dismiss

GitHub is home to over 40 million developers working together to host and review code, manage projects, and build software together.

Sign up

BananaPi M2 Zero - Ubuntu Xenial Base Minimal Image (Experimental) - U-Boot 2017.09 / Kernel 4.18.y / Kernel 4.19.y / Kernel 4.20.y / Kernel 5.3.y

[#bananapi](#) [#kernel](#) [#firmware](#) [#u-boot](#) [#mainline-kernel](#) [#mainline](#) [#m2z](#) [#banana-pi](#) [#mali](#) [#mailine-kernel](#) [#bluetooth](#) [#ubuntu](#) [#boot](#) [#sd-card](#) [#phone](#)

105 commits

1 branch

0 packages

23 releases


2 contributors

Branch: master


























New pull request

Find file


Clone or download

 **avafinger** Mainline Kernel 5.6.0-rc3

Latest commit f8f34d0 1 hour ago

 img	Update README to Kernel 4.17.4	2 years ago
 README.md	Mainline Kernel 5.6.0-rc3	1 hour ago
 boot_kernel_4.17.y.tar.gz	Fix - boot files for 4.17.4	2 years ago
 boot_m2z.tar.gz	Kernel 4.15.7 + bootloader	2 years ago
 bootloader_m2z.bin	Kernel 4.15.7 + bootloader	2 years ago
 bootloader_m2z_v2.bin	Fix wrong file name	2 years ago
 flash_sdcard_m2z.sh	name fix	2 years ago
 flash_sdcard_m2z_ssh.sh	Image with ssh installer	2 years ago
 flash_sdcard_m2z_v2.sh	Fix wrong file name	2 years ago
 format_sd_mainline.sh	mmc needs p	2 years ago
 linux-image-4.17.10-m2z_1.0-3.deb	linux-image-4.17.10-m2z_1.0-3 deb package	2 years ago
 linux-image-4.17.11-m2z_1.0-4.deb	linux-image-4.17.11-m2z_1.0-4.deb stale release	2 years ago
 linux-image-4.17.12-m2z_1.0-5.deb	linux-image-4.17.12-m2z_1.0-5.deb stable release	2 years ago
 linux-image-4.17.17-m2z_1.0-6.deb	linux-image-4.17.17-m2z_1.0-6.deb stable release (TUN / ZRAM modules ...	2 years ago
 linux-image-4.17.8-m2z_1.0-1.deb	linux-image-4.17.8-m2z deb package	2 years ago
 linux-image-4.17.9-m2z_1.0-2.deb	linux-image-4.17.9-m2z fix - wrong kernel version check prevented upd...	2 years ago
 linux-image-4.18.20-m2z-experim...	linux-image-4.18.20-m2z-experimental_1.0-17.deb add support for overl...	15 months ago
 linux-image-4.18.4-m2z_1.0-7.deb	linux-image-4.18.4-m2z_1.0-7.deb stable	2 years ago
 linux-image-4.18.5-m2z-otg-gadge...	linux-image-4.18.5-m2z-otg-gadget_1.0-10.deb OTG / Gadget / DUAL RULE...	2 years ago
 linux-image-4.18.5-m2z-otg_1.0-9....	add support for OTG (not tested!)	2 years ago
 linux-image-4.18.5-m2z_1.0-8.deb	linux-image-4.18.5-m2z_1.0-8.deb stable	2 years ago
 linux-image-4.18.6-m2z-otg-gadge...	Kernel 4.18.6 - linux-image deb package	2 years ago
 linux-image-4.18.8-m2z-otg-gadge...	linux-image-4.20.0-rc2-m2z-otg-gadget_1.0-15.deb	16 months ago
 linux-image-4.19.0-m2z-otg-gadge...	mailine linux 4.19.0 - linux-image-4.19.0-m2z-otg-gadget_1.0-13.deb (...	16 months ago
 linux-image-4.19.1-m2z-otg-gadge...	linux-image-4.19.1 (stable)	16 months ago

 linux-image-4.19.4-m2z-otg-gadge...	linux-image-4.19.4-m2z-otg-gadget_1.0-18.deb add support for overlayf...	15 months ago
 linux-image-4.19.5-m2z-otg-gadge...	linux-image-4.19.5-m2z-otg-gadget_1.0-19.deb + mali fix	15 months ago
 linux-image-4.20.0-rc2-m2z-otg-ga...	linux-image-4.20.0-rc2-m2z-otg-gadget_1.0-15.deb	16 months ago
 linux-image-4.20.0-rc3-m2z-otg-ga...	linux-image-4.20.0-rc3-m2z-otg-gadget_1.0-16.deb (Bluetooth fix)	16 months ago
 rootfs_kernel_4.17.y.tar.gz.000	Kernel 4.17.4	2 years ago
 rootfs_kernel_4.17.y.tar.gz.001	Kernel 4.17.4	2 years ago
 rootfs_m2z.tar.gz	Kernel 4.15.7 + bootloader	2 years ago
 rootfs_m2z_ssh.tar.gz	rootfs + ssh	2 years ago

 README.md

bananapi-zero-ubuntu-base-minimal

BananaPi M2 Zero - Ubuntu Xenial Base Minimal Image (Experimental) - U-Boot 2017.09 / Kernel 4.19.y (mainline - stable)

This is a **WIP**, a bare minimum firmware image (CLI - command line interface) with basic configurations. Kernel used is Mainline kernel 4.17.y / 4.18.y / 4.20.y with some patches applied. The idea behind this firmware is to have a very basic sd card image and add packages to your need.

The Image comes with the minimum packages but you can install a full Desktop on top of this, see how at the end.

- v1 is Kernel 4.15.y
- v2 is Kernel 4.17.y**

For convenience, an 8GB SD CARD Image is at <https://mega.nz/#!oblAVQiA!GOCCABkLunCcG8hEqMf7NfjTBK1jgMytt2f0VdtOI08>

Use 7zip to unzip it and flash it with **etcher** or win32imagewriter (**Win32DiskImager**)

- v2 stable kernel 4.17.12 update**

```
sudo dpkg -i linux-image-4.17.12-m2z_1.0-5.deb
```

and then:

```
sync && sudo shutdown -h now
```

power cicle the board

- v3 stable kernel 4.18.4 upgrade**

```
sudo dpkg -i linux-image-4.18.4-m2z_1.0-7.deb
```

and then:

```
sync && sudo shutdown -h now
```

power cicle the board

- v4 stable kernel 4.18.8 upgrade**

Before upgrade, get rid of old kernel image not in use and check available space in /boot

```
df -lh
Filesystem      Size  Used Avail Use% Mounted on
/dev/mmcblk0p2  15G  631M   13G   5% /
```

```

devtmpfs      183M    0  183M    0% /dev
tmpfs         248M    0  248M    0% /dev/shm
tmpfs         248M   11M  237M    5% /run
tmpfs         5.0M    0   5.0M    0% /run/lock
tmpfs         248M    0  248M    0% /sys/fs/cgroup
/dev/mmcblk0p1 93M   64M   23M   74% /boot

```

Make sure you have enough free space left, if not, issue in shell:

```

sudo dpkg -l | grep linux-image
ii linux-image-4.17.12-m2z          1.0-5          armhf
Linux kernel 4.17.12-m2z
ii linux-image-4.17.8-m2z         1.0-1          armhf
Linux kernel 4.17.8-m2z
ii linux-image-4.17.9-m2z         1.0-2          armhf
Linux kernel 4.17.9-m2z
ii linux-image-4.18.6-m2z-otg-gadget 1.0-11         armhf
Linux kernel 4.18.6-m2z-otg-gadget

```

and check the current kernel you are running:

```

uname -r
4.18.6-m2z-otg-gadget

```

so it is safe to get rid of unused kernel and free some space for the new one you want to install:

```

sudo dpkg -r linux-image-4.17.12-m2z
(Reading database ... 35990 files and directories currently installed.)
Removing linux-image-4.17.12-m2z (1.0-5) ...

```

and now install the latest kernel:

```

sudo dpkg -i linux-image-4.18.8-m2z-otg-gadget_1.0-12.deb
Selecting previously unselected package linux-image-4.18.8-m2z-otg-gadget.
(Reading database ... 33740 files and directories currently installed.)
Preparing to unpack linux-image-4.18.8-m2z-otg-gadget_1.0-12.deb ...
INFO: Updating Kernel 4.18.6-m2z-otg-gadget to 4.18.8-m2z-otg-gadget
INFO: Updating...
Unpacking linux-image-4.18.8-m2z-otg-gadget (1.0-12) ...
Setting up linux-image-4.18.8-m2z-otg-gadget (1.0-12) ...
OK: Kernel upgrade success! Please reboot with: sync && sudo reboot

```

and then:

```

sync && sudo reboot

```

or better

```

sync && sudo shutdown -h now

```

power cicle the board and check kernel version again:

```

uname -r
4.18.8-m2z-otg-gadget

```

- **v5 mailine kernel 4.19.0 upgrade**

```

sudo dpkg -i linux-image-4.19.0-m2z-otg-gadget_1.0-13.deb
sync && sudo reboot

```

- **v6 mailine kernel 4.19.1 (stable) upgrade**

```
sudo dpkg -i linux-image-4.19.1-m2z-otg-gadget_1.0-14.deb
sync && sudo reboot
```

- **v7 mailine kernel 4.20.0-rc2 (mainline) upgrade**

```
sudo dpkg -i linux-image-4.20.0-rc2-m2z-otg-gadget_1.0-15.deb
sync && sudo reboot
```

rebuild bpi-m2z_boot.scr with:

```
edit bpi-m2-zero_boot.cmd and change:

setenv extra "no_console_suspend consoleblank=0 drm_leak_fbdev_smem=1"
setenv bootargs "console=ttyS0,115200 earlyprintk rootfstype=ext4 root=/dev/mmcblk0p2 rw
rootwait fsck.repair=${fsck.repair} panic=10 ${extra}"
bootz ${kernel_addr} ${ramdisk_addr}:${ramdisk_size} ${dtb_addr}
```

rebuild with:

```
sudo mkimage -C none -A arm -T script -d bpi-m2-zero_boot.cmd bpi-m2-zero_boot.scr
```

- **v8 mailine kernel 4.20.0-rc3 (mainline) upgrade**

```
sudo dpkg -i linux-image-4.20.0-rc3-m2z-otg-gadget_1.0-16.deb
sync && sudo reboot
```

- **v9 mailine kernel 4.19.5 (stable) upgrade**

```
sudo dpkg -i linux-image-4.19.5-m2z-otg-gadget_1.0-19.deb
sync && sudo reboot
```

- **v10 mailine kernel 4.19.6 (stable) upgrade**

deb file in Release v10, grab the file with:

```
wget https://github.com/avafinger/bananapi-zero-ubuntu-base-minimal/releases/download/v10/linux-
image-4.19.6-m2z-otg-gadget_1.0-20.deb
sudo dpkg -i linux-image-4.19.6-m2z-otg-gadget_1.0-20.deb
sync && sudo reboot
```

- **v11 mailine kernel 4.19.12 (stable) upgrade**

deb file in Release v11, grab the file with:

```
wget https://github.com/avafinger/bananapi-zero-ubuntu-base-minimal/releases/download/v11/linux-
image-4.19.12-m2z-otg-gadget_1.0-21.deb
sudo dpkg -i linux-image-4.19.12-m2z-otg-gadget_1.0-21.deb
sync && sudo reboot
```

- **v12 mailine kernel 4.20.0 (experimental) upgrade**

deb file in Release v12, grab the file with:

```
wget https://github.com/avafinger/bananapi-zero-ubuntu-base-minimal/releases/download/v12/linux-
image-4.20.0-m2z-otg-gadget_1.0-22.deb
sudo dpkg -i linux-image-4.20.0-m2z-otg-gadget_1.0-22.deb
sync && sudo reboot
```

- **v13 mailine kernel 4.20.17-m2z (experimental) upgrade**

```
https://github.com/avafinger/bananapi-zero-ubuntu-base-minimal/releases/tag/v13
```

Mainline stable Kernel 4.20.17 (Kodi)

This kernel is provided as a **POC** where you can build **Kodi**

Attention

The mali blobs used for the mali **GBM** are not compatible with the mali **FBDEV** You are required to update the mali with the wayland mali to be able to use GBM

Mainline stable kernel 4.20.17 ready to build **Kodi**:

- Cedrus (VPU)
- Mali (GBM)
- hdmi-sound
- wifi + **eth**
- tools to test cedrus and gbm (pre-built)

To test mali GBM you can run **kmscube** To test cedrus you can run **v4l2-request-test**

VPU test

Testing cedrus on mainline is quite simple, run the tests below:

```
cd v4l2-request-test
sudo ./v4l2-request-test -l -f 25 -P ed-mpeg2
```

or

```
sudo ./v4l2-request-test -l -f 25 -P caminandes-h265
```

Mali GBM test

To test mali GBM you need to setup the mali blobs provided by <https://github.com/bootlin/mali-blobs>

```
sudo ./kmscube
```

When you run the **kmscube** you will see a cube spinning

- Tools:

<https://github.com/avafinger/bananapi-zero-ubuntu-base-minimal/releases/tag/v14>

hdmi-sound

To be able to access and output sound to HDMI you need to update the file **/etc/asound.conf**

```
pcm.!default {
    type plug
    slave {
        pcm "hw:1,0"
    }
}

ctl.!default {
    type hw
    card 1
}
```

Reboot and test the HDMI sound:

```
sudo aplay /usr/share/sounds/alsa/Front_Left.wav
```

Check for the codecs:

cat /proc/asound/cards

```
0 [Codec          ]: H3_Audio_Codec - H3 Audio Codec
                        H3 Audio Codec
1 [allwinnerhdmi  ]: allwinner_hdmi - allwinner,hdm
                        allwinner,hdm
```

- **v30 mailine kernel 5.6.0-rc3 (experimental) Ubuntu 19.10 EOAN**
- Lima support (testing)

Kernel Image: <https://github.com/avafinger/bananapi-zero-ubuntu-base-minimal/releases/tag/v3.0>

- **v29 mailine kernel 5.3.18 (experimental) Ubuntu 19.10 EOAN**

Kernel Image: <https://github.com/avafinger/bananapi-zero-ubuntu-base-minimal/releases/tag/v2.9>

- **v25 mailine kernel 5.3.7 fbdev (experimental) Ubuntu 19.10 EOAN**

Os Image: <https://github.com/avafinger/bananapi-zero-ubuntu-base-minimal/releases/tag/v2.5>

Mainline stable kernel 5.3.7 with:

- Small footprint (hmm, ok, not so small, lots of packages installed)
- HDMI
- sound-hdmi
- Bluetooth (to be tested)
- cedrus
- Wifi
- Ethernet 100 MBits
- mali fbdev
- **v24 mailine kernel 5.3.5 (experimental) Ubuntu 19.10 EOAN**

OS Image: <https://github.com/avafinger/bananapi-zero-ubuntu-base-minimal/releases/tag/v2.4>

Mainline stable kernel 5.3.5 with:

- Small footprint
- HDMI
- sound-hdmi
- Bluetooth (to be tested)
- cedrus
- Wifi
- Ethernet 100 MBits
- **v21 mailine kernel 5.3.4 (experimental) upgrade**

deb package: <https://github.com/avafinger/bananapi-zero-ubuntu-base-minimal/releases/tag/v2.3>

Mainline stable kernel 5.3.4 with:

- HDMI

- sound-hdmi
- Bluetooth (issue with sound)
- cedrus
- **v20 mailine kernel 5.3.1 (experimental) upgrade and fix**

deb package: <https://github.com/avafinger/bananapi-zero-ubuntu-base-minimal/releases/tag/v2.2>

Mainline stable kernel 5.3.1 with:

- HDMI (fix)
- sound-hdmi
- Bluetooth (fix)
- cedrus

Attention

If you already upgraded to the buggy kernel 5.3.1 you need to downgrade or create a clean installation.

- **v19 mailine kernel 5.3.1 (experimental) upgrade**

deb package: <https://github.com/avafinger/bananapi-zero-ubuntu-base-minimal/releases/tag/v2.1>

- **v18 mailine kernel 5.3.0-rc7 (experimental) upgrade**

deb package:

```
https://github.com/avafinger/bananapi-zero-ubuntu-base-minimal/releases/tag/v1.8
```

Mainline Kernel 5.3.0-rc7

This is mainline Kernel 5.3.0-rc7.

Bootlo: <https://gist.github.com/avafinger/9f6bee00e17b1f1d5d120e8b048eb40f> Install the new Kernel (**tested**):
<https://github.com/avafinger/bananapi-zero-ubuntu-base-minimal/releases/tag/v1.8>

Install instructions:

```
sudo dpkg -i linux-image-5.3.0-rc7_1.0-27.deb
```

What's new with this Image v18 (mainline experimental)

- 5.3.0-rc7 (minor update)
- mali gbm (GPU)
- cedrus (VPU hw decoding)
- Wifi + **eth**
- hdmi-sound
- DVFS
- thermal throttling
- Device Tree Overlays support

Mainline Kernel 5.3.0-rc6

This is mainline Kernel 5.3.0-rc6.

v17 mailine kernel 5.3.0-rc6 (experimental) upgrade

deb package (**BROKEN - DON'T USE**):

Install the new Kernel: <https://github.com/avafinger/bananapi-zero-ubuntu-base-minimal/releases/tag/v1.7>

What's new with this Image v17 (mainline experimental)

- 5.3.0-rc6 ()
- mali gbm (GPU)
- cedrus (VPU hw decoding)
- Wifi + **eth**
- hdmi-sound
- DVFS
- thermal throttling
- Device Tree Overlays support
- **v16 mainline kernel 5.3.0-rc3 (experimental) upgrade**

deb package:

```
https://github.com/avafinger/bananapi-zero-ubuntu-base-minimal/releases/tag/v1.7
```

Mainline Kernel 5.3.0-rc3 (Kodi)

This is mainline Kernel 5.3.0-rc3 ready to build and run Kodi.

Bootlog: <https://gist.github.com/avafinger/5a172aaac7a97d6ee186498cd74896cf>

Install the new Kernel: <https://github.com/avafinger/bananapi-zero-ubuntu-base-minimal/releases/tag/v16>

What's new with this Image v16 (mainline experimental)

- 5.3.0-rc3 (for building Kodi)
- mali gbm (GPU)
- cedrus (VPU hw decoding)
- Wifi + **eth**
- hdmi-sound
- DVFS
- thermal throttling

What's new with this Image v14 (mainline experimental)

- 4.20.17 (for building Kodi)
- mali gbm (GPU)
- cedrus (VPU hw decoding)
- Wifi + **eth**
- hdmi-sound

What's new with this Image v13 (mainline experimental)

- 4.20.17-m2z (minimum kernel)

What's new with this Image v12 (mainline experimental)

- 4.20.0 (for testing)
- mali (experimental)

What's new with this Image v11 (LTS experimental)

- 4.19.12 (for testing)
- mali (experimental)

What's new with this Image v10 (LTS experimental)

- 4.19.6 (for testing)
- mali (experimental)

What's new with this Image v9 (LTS experimental)

- mali fix (mali is back and working!)

What's new with this Image v8 (experimental)

Image upgraded to **Kernel 4.20-rc3**

- operating-points-v2 (120 Mhz ~ 1008 MHz) - with sane CPU Temp. (~ 55.0 C)
- attempt to make mali work
- Bluetooth (working) - See Instructions on Bluetooth below

What's new with this Image v7 (experimental)

Image upgraded to **Kernel 4.20-rc2**

- operating-points-v2 (240 Mhz ~ 1008 MHz) - testing only
- attempt to make mali work
- Bluetooth (need to load hci_uart module and install Bluez tools)

What's new with this Image v6 (experimental)

Image upgraded to **Kernel 4.19.1**

- operating-points-v2 (480 Mhz ~ 1008 MHz)
- mali removed

What's new with this Image v5 (experimental)

Image upgraded to **Kernel 4.19.0**

- * operating-points-v2 working as it should (next series will be 4.19.y)
- * new devfreq temp
- * cma memory-reservation for mali (need a revision)

Issue:

- * mali does not work, freezes kernel completely (don't use it)

What's new with this Image v4

Image updated to **Kernel 4.18.8** and has the following working:

- * operating-points-v2 working as it should (next series will be 4.19.y)
- * attempt to get bt working

Configuring ZRAM for the memory hungry stuffs

```
sudo apt-get install zram-config
sync && sudo reboot
```

On next reboot you will see if ZRAM is active:

```
ubuntu@bpi-m2z:~$ ls /dev/zr*
/dev/zram0 /dev/zram1 /dev/zram2 /dev/zram3
```

What's new with this Image v3

Image updated to **Kernel 4.18.4** and has the following working:

- * framebuffer with 1920x1080
- * mali (3D GPU) - fbdev only (Thanks to Maxime Ripard from bootlin)
- * **eth0** up
- * wlan0 up
- * i2c enabled (/dev/i2c-0 and /dev/i2c-1)
- * spi enabled (/dev/spidev0.0)
- * bare minimum image. (**30 Mbytes of RAM used**)
- * new rootfs from scratch
- * ssh enabled
- * new operating-points-v2 instead of old one (experimental)

What's new with this Image v2

Image updated to **Kernel 4.17.17** and has the following working:

- * framebuffer with 1920x1080
- * mali (3D GPU) - fbdev only (Thanks to Maxime Ripard from bootlin)
- * **eth0** up
- * wlan0 up
- * i2c enabled (/dev/i2c-0 and /dev/i2c-1)
- * spi enabled (/dev/spidev0.0)
- * bare minimum image. (**30 Mbytes of RAM used**)
- * new rootfs from scratch
- * ssh enabled
- * ZRAM / TUN modules enabled (but not configured)

Known issues:

- * Hit ENTER twice to see the login prompt if you get a blank screen
- * Boot with your monitor/display turned ON before you power the board
- * HDMI driver is under development, Jernej (the dev. person behind the driver) has given some tips to fix this issue.
- * Debian Bug report logs - #892229
wireless-regdb: Missing support for kernel direct loading
This seems to affect ubuntu 16.04 and 18.04.

To do before first boot:

- edit /etc/network/interfaces and add your SSID and password in order to use connect to your Wifi

Generate wpa-psk for Wifi AP, you can use *wpa_passphrase* from your linux box

Generate like so:

```
wpa_passphrase SSID 01234567890
```

where SSID is your Wifi **SSID** and **01234567890** your password

Edit and change accordingly:

```
iface wlan0 inet dhcp
wpa-ssid SSID
#psk="1234567890"
wpa-psk 93c8ff514dc02ae4944f89424d7b0d94f42ab3245cc413755ab655b8e344a2d9
dns-nameservers 8.8.8.8 8.8.4.4
wireless-power off
```

To do after first boot (Advanced users):

```
* build regulatory.db to your country for the wifi to get full power
* re-build wireless-regdb
```

Tips

- Board runs at ~60°C when idle with HDMI, ~40°C without HDMI enabled (*without heatsink*)
- issue in shell on first login: `sudo apt-get update && sudo apt-get upgrade`

It is always a good idea to issue a: **sudo shutdown -h now** (and wait for the Red led Heartbeat to stop and only then unplug power)

- If you have trouble with Wifi, i suggest read **Debian Bug report logs - #892229**

Regulatory.db needs to be generated somehow, until wireless-regdb is updated or rebuild it yourself.

Basic instructions to flash firmware to SD CARD

- You need a *linux box*
- You need a *good* SD CARD reader/writer (External SD CARD Reader are known to not be reliable) Read some heated up discussion on Armbian's forum about how to write to SD CARD
- Get a trusted brand for the SD CARD
- insert your SD CARD into SDHC reader/writer:

check which device is your SD CARD, type in shell:

```
dmesg | tail
```

An output of USB SDHC reader/writer card

```
[47484.133274] sdc: sdc1 sdc2
[47488.681276] EXT4-fs (sdc1): mounted filesystem with ordered data mode. Opts: (null)
[47488.955328] EXT4-fs (sdc2): mounted filesystem without journal. Opts: (null)
```

An output of internal SDHC reader/writer card

```
[ 2024.720656] mmc0: new SDHC card at address 59b4
[ 2024.759743] mmcblk0: mmc0:59b4 SDU1 7.52 GiB
[ 2024.759889] mmcblk0: p1 p2
[ 2025.140282] EXT4-fs (mmcblk0p1): mounted filesystem with ordered data mode
[ 2025.222858] EXT4-fs (mmcblk0p2): mounted filesystem without journal
```

Your device will be in the form of: `/dev/sdX` where *X* is your *sd card letter* (b,c,d...) or `/dev/mmcblkY` where *Y* is your device *number* (0,1,2...)

- format the sd card:

in the example above, our sd card device is *sdC* (could be **sdb**)

```
sudo ./format_sd_mainline.sh /dev/sdC
```

or `/dev/mmcblk0` if you have SDHC reader on your laptop for example

```
sudo ./format_sd_mainline.sh /dev/mmcblk0
```

Image v2 (Kernel 4.17.4)

- flash Image to sd card (**ssh enabled**):

```
cat rootfs_kernel_4.17.y.tar.gz.* > rootfs_kernel_4.17.y.tar.gz  
sudo ./flash_sdcard_m2z_v2.sh /dev/sdC
```

Image v1 (Kernel 4.15.y)

- flash Image to sd card:

```
sudo ./flash_sdcard_m2z.sh /dev/sdC
```

- flash Image with *ssh enabled* to sd card:

```
sudo ./flash_sdcard_m2z_ssh.sh
```

- Booting first time

Before you boot, configure your wifi

Connecting to AP via Wifi

Wifi use `wpa_supplicant` to connect to AP. Before you boot the Image, please edit **`/etc/network/interfaces`**

```
iface wlan0 inet dhcp  
wpa-ssid SSID <== change this  
#psk="1234567890"  
wpa-psk 93c8ff514dc02ae4944f89424d7b0d94f42ab3245cc413755ab655b8e344a2d9 <== change this  
dns-nameservers 8.8.8.8 8.8.4.4  
wireless-power off
```

- Login first time

You can login with

user: ubuntu

pasw: ubuntu

via serial debug or use ssh to connect remotely from your computer.

Conecting via ssh or putty: `ssh ubuntu@IP` where IP is the IP assigned to the board.

First thing you should do on the first login (for v1 only)

- fix mv segment fault

```
sudo apt-get install --reinstall coreutils
```

- fix missing service

```
sudo apt-get install --reinstall systemd
```

- disable power management

```
sudo iwconfig wlan0 power off
```

or in /etc/network/interfaces add this entry:

```
allow-hotplug wlan0
iface wlan0 inet dhcp
wpa-ssid your_ssid
#psk="12345678901234567890"
wpa-psk ababaf514dc02ae4944f89424d7b0d94f42ab3245cc413755ab655b8e344a2d9
dns-nameservers 8.8.8.8 8.8.4.4
wireless-power off <==== add this
```

reboot now:

```
sudo reboot
```

Mali benchmark

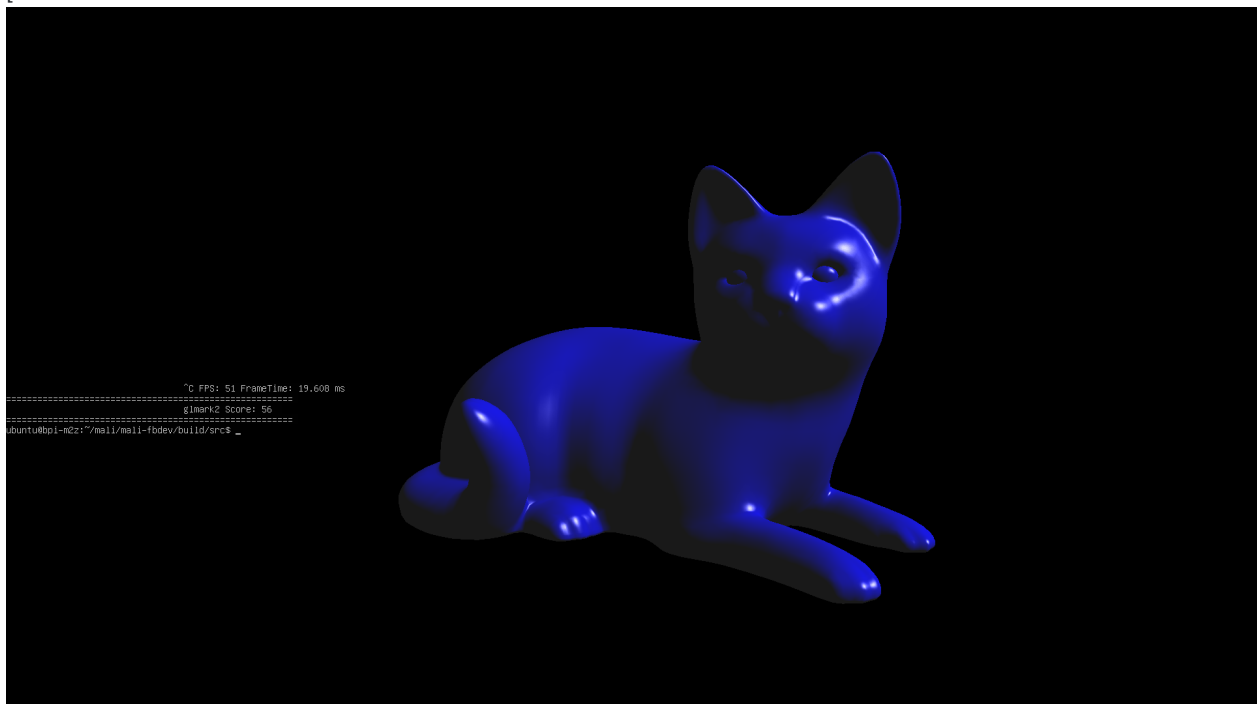
You can benchmark mali for fbdev, type in shell:

```
cd /home/ubuntu/mali/mali-fbdev/build/src
sudo ./glmark2-es2-fbdev
```

You can add FRONTBUFFER_LOCKING=1 to prevent tearing before running benchmark:

```
export FRONTBUFFER_LOCKING=1
```

[



]

Reboot and you have LXDE Desktop

Bluetooth

The latest Kernel 4.20.0-rc3 upgrade has Bluetooth working. To be able to use bluetooth follow this instructions (it should be automated via systemd service but for the sake of documentation we do it manually) :

- Install packages

```
sudo apt-get install rfkill bluez bluetooth-touch
```

- Load hci_uart kernel module

Edit the file /etc/modules and add bluetooth & hci_uart & rfcomm:

```
# /etc/modules: kernel modules to load at boot time.
#
# This file contains the names of kernel modules that should be loaded
# at boot time, one per line. Lines beginning with "#" are ignored.
#xradio_wlan
g_serial
#xradio_wlan
brcmfmac
bluetooth
hci_uart
rfcomm
```

- Boot with the new /etc/modules

- in shell type:

```
sudo su (to become root)
brcm_patchram_plus -d --patchram /lib/firmware/ap6212/bcm43438a1.hcd --enable_hci --bd_addr
11:22:33:44:55:66 --no2bytes --tosleep 5000 /dev/ttyS1
```

wait untill it finish with **"Done setting line discipline"** (CTRL+C to end) and then:

```
hciattach /dev/ttyS1 any
```

We should have now our Bluetooth ready, you can check:

```
hcitool dev
Devices:
    hci0    11:22:33:44:55:66
```

Bluetooth - How to pair a Bluetooth Phone with command line

We are going to test our bluetooth setup connecting our board to a Phone (pair with a Phone). In a Desktop environment we have Blueman which would do it automagically but installing it would require a lot of packages and our goal here is to have the minimum installed otherwise you go with a complete Desktop.

For this, it is necessary to install pulseaudio or you will not be able to connect to a phone. (i think for keyboard or mouse is ok without pulse).

In order to have pulseaudio working we need to install ALSA and make it work.

```
sudo apt-get install alsa-utils alsamixer libasound2 alsa-base
```

Edit (or create) a file /etc/asound.conf with the content:

```
pcm.!default {
    type hw
    card 0
    device 0
}

ctl.!default {
    type hw
    card 0
}
```

sync && reboot.

Check device:

```
aplay -l
**** List of PLAYBACK Hardware Devices ****
card 0: Codec [H3 Audio Codec], device 0: CDC PCM Codec-0 []
  Subdevices: 1/1
  Subdevice #0: subdevice #0
```

We can check if ALSA is working, type in shell:

```
alsamixer
and un-mute and turn up the Line up and everything
```

and review:

```
sudo amixer
Simple mixer control 'Line In',0
  Capabilities: pvolume pvolume-joined pswitch cswitch
  Playback channels: Front Left - Front Right
  Capture channels: Front Left - Front Right
  Limits: Playback 0 - 7
  Front Left: Playback 5 [71%] [3.00dB] [off] Capture [off]
  Front Right: Playback 5 [71%] [3.00dB] [off] Capture [off]
Simple mixer control 'Line Out',0
  Capabilities: pvolume pvolume-joined pswitch
  Playback channels: Front Left - Front Right
  Limits: Playback 0 - 31
  Mono:
  Front Left: Playback 25 [81%] [-9.00dB] [on]
  Front Right: Playback 25 [81%] [-9.00dB] [on]
Simple mixer control 'Line Out Source',0
  Capabilities: penum
  Items: 'Stereo' 'Mono Differential'
  Item0: 'Stereo'
  Item1: 'Stereo'
Simple mixer control 'Mic1',0
  Capabilities: pvolume pvolume-joined pswitch cswitch
  Playback channels: Front Left - Front Right
  Capture channels: Front Left - Front Right
  Limits: Playback 0 - 7
  Front Left: Playback 3 [43%] [0.00dB] [off] Capture [off]
  Front Right: Playback 3 [43%] [0.00dB] [off] Capture [off]
Simple mixer control 'Mic1 Boost',0
  Capabilities: volume volume-joined
  Playback channels: Mono
  Capture channels: Mono
  Limits: 0 - 7
  Mono: 4 [57%] [33.00dB]
Simple mixer control 'Mic2',0
  Capabilities: pvolume pvolume-joined pswitch cswitch
  Playback channels: Front Left - Front Right
  Capture channels: Front Left - Front Right
  Limits: Playback 0 - 7
  Front Left: Playback 3 [43%] [0.00dB] [off] Capture [off]
  Front Right: Playback 3 [43%] [0.00dB] [off] Capture [off]
Simple mixer control 'Mic2 Boost',0
```



```

Capabilities: volume volume-joined
Playback channels: Mono
Capture channels: Mono
Limits: 0 - 7
Mono: 4 [57%] [33.00dB]
Simple mixer control 'Mixer',0
Capabilities: cswitch
Capture channels: Front Left - Front Right
Front Left: Capture [off]
Front Right: Capture [off]
Simple mixer control 'Mixer Reversed',0
Capabilities: cswitch
Capture channels: Front Left - Front Right
Front Left: Capture [off]
Front Right: Capture [off]
Simple mixer control 'ADC Gain',0
Capabilities: cvolume cvolume-joined
Capture channels: Mono
Limits: Capture 0 - 7
Mono: Capture 3 [43%] [0.00dB]
Simple mixer control 'DAC',0
Capabilities: pvolume pvolume-joined pswitch
Playback channels: Front Left - Front Right
Limits: Playback 0 - 63
Mono:
Front Left: Playback 45 [71%] [-20.88dB] [on]
Front Right: Playback 45 [71%] [-20.88dB] [on]
Simple mixer control 'DAC Reversed',0
Capabilities: pswitch
Playback channels: Front Left - Front Right
Mono:
Front Left: Playback [off]
Front Right: Playback [off]

```

Testing ALSA:

```

aplay /usr/share/sounds/alsa/Front_Center.wav
Playing WAVE '/usr/share/sounds/alsa/Front_Center.wav' : Signed 16 bit Little Endian, Rate 48000
Hz, Mono

```

Now install pulse:

```
sudo apt-get install pulseaudio pulseaudio-module-bluetooth
```

sync && reboot.

Now check if pulse is running:

```

ps -e|grep pulse
1187 ?          00:00:00 pulseaudio

```

If everything is OK (if not, you should go back and figure out what went wrong) we can now pair with a phone using bluetooth. Type in shell (if you have not done this yet):

```

sudo su (become root)
bcm_patchram_plus -d --patchram /lib/firmware/ap6212/bcm43438a1.hcd --enable_hci --bd_addr
11:22:33:44:55:66 --no2bytes --tosleep 5000 /dev/ttyS1
Done setting line discipline (^C)
hciattach /dev/ttyS1 any
hciconfig list
hci0: Type: BR/EDR Bus: UART
      BD Address: 11:22:33:44:55:66 ACL MTU: 1021:8 SCO MTU: 64:1
      UP RUNNING
      RX bytes:1214 acl:0 sco:0 events:42 errors:0
      TX bytes:756 acl:0 sco:0 commands:42 errors:0
hciconfig -a
hci0: Type: BR/EDR Bus: UART
      BD Address: 11:22:33:44:55:66 ACL MTU: 1021:8 SCO MTU: 64:1
      UP RUNNING
      RX bytes:934 acl:0 sco:0 events:39 errors:0

```

```
TX bytes:744 acl:0 sco:0 commands:39 errors:0
Features: 0xbf 0xfe 0xcf 0xfe 0xdb 0xff 0x7b 0x87
Packet type: DM1 DM3 DM5 DH1 DH3 DH5 HV1 HV2 HV3
Link policy: RSWITCH SNIFF
Link mode: SLAVE ACCEPT
Name: 'bpi-m2z'
Class: 0x000000
Service Classes: Unspecified
Device Class: Miscellaneous,
HCI Version: 4.0 (0x6) Revision: 0x6a
LMP Version: 4.0 (0x6) Subversion: 0x2209
Manufacturer: Broadcom Corporation (15)
```

We are ready to pair. Type in shell (with your phone with bluetooth on):

```
bluetoothctl -a
[NEW] Controller 22:22:33:44:55:66 bpi-m2z [default]
Agent registered
[bluetooth]# devices
[bluetooth]# list
Controller 22:22:33:44:55:66 bpi-m2z [default]
[bluetooth]# power on
Changing power on succeeded
[bluetooth]# agent on
Agent is already registered
[bluetooth]# default-agent
Default agent request successful
[bluetooth]# scan on
Discovery started
[CHG] Controller 22:22:33:44:55:66 Discovering: yes
[NEW] Device 00:17:CA:F7:38:18 Haier HW-W910
[bluetooth]# pair 00:17:CA:F7:38:18
Attempting to pair with 00:17:CA:F7:38:18
[CHG] Device 00:17:CA:F7:38:18 Connected: yes
Request confirmation
[agent] Confirm passkey 736813 (yes/no): yes
[CHG] Device 00:17:CA:F7:38:18 Modalias: usb:v0000Ap0000d0000
[CHG] Device 00:17:CA:F7:38:18 UUIDs: 00001105-0000-1000-8000-00805f9b34fb
[CHG] Device 00:17:CA:F7:38:18 UUIDs: 0000110a-0000-1000-8000-00805f9b34fb
[CHG] Device 00:17:CA:F7:38:18 UUIDs: 0000110c-0000-1000-8000-00805f9b34fb
[CHG] Device 00:17:CA:F7:38:18 UUIDs: 00001112-0000-1000-8000-00805f9b34fb
[CHG] Device 00:17:CA:F7:38:18 UUIDs: 00001116-0000-1000-8000-00805f9b34fb
[CHG] Device 00:17:CA:F7:38:18 UUIDs: 0000111f-0000-1000-8000-00805f9b34fb
[CHG] Device 00:17:CA:F7:38:18 UUIDs: 0000112f-0000-1000-8000-00805f9b34fb
[CHG] Device 00:17:CA:F7:38:18 UUIDs: 00001132-0000-1000-8000-00805f9b34fb
[CHG] Device 00:17:CA:F7:38:18 UUIDs: 00001200-0000-1000-8000-00805f9b34fb
[CHG] Device 00:17:CA:F7:38:18 UUIDs: 00001800-0000-1000-8000-00805f9b34fb
[CHG] Device 00:17:CA:F7:38:18 UUIDs: 00001801-0000-1000-8000-00805f9b34fb
[CHG] Device 00:17:CA:F7:38:18 Paired: yes
Pairing successful
[CHG] Device 00:17:CA:F7:38:18 Connected: no
[bluetooth]# devices
Device 00:17:CA:F7:38:18 Haier HW-W910
[bluetooth]# list
Controller 22:22:33:44:55:66 bpi-m2z [default]
[bluetooth]# info 00:17:CA:F7:38:18
Device 00:17:CA:F7:38:18
    Name: Haier HW-W910
    Alias: Haier HW-W910
    Class: 0x5a020c
    Icon: phone
    Paired: yes
    Trusted: no
    Blocked: no
    Connected: no
    LegacyPairing: no
    UUID: OBEX Object Push (00001105-0000-1000-8000-00805f9b34fb)
    UUID: Audio Source (0000110a-0000-1000-8000-00805f9b34fb)
    UUID: A/V Remote Control Target (0000110c-0000-1000-8000-00805f9b34fb)
    UUID: Headset AG (00001112-0000-1000-8000-00805f9b34fb)
    UUID: NAP (00001116-0000-1000-8000-00805f9b34fb)
    UUID: Handsfree Audio Gateway (0000111f-0000-1000-8000-00805f9b34fb)
    UUID: Phonebook Access Server (0000112f-0000-1000-8000-00805f9b34fb)
    UUID: Message Access Server (00001132-0000-1000-8000-00805f9b34fb)
    UUID: PnP Information (00001200-0000-1000-8000-00805f9b34fb)
    UUID: Generic Access Profile (00001800-0000-1000-8000-00805f9b34fb)
```

```
        UUID: Generic Attribute Profile (00001801-0000-1000-8000-00805f9b34fb)
        Modalias: usb:v000Ap0000d0000
        RSSI: -42
[bluetooth]# list-attributes 00:17:CA:F7:38:18
[bluetooth]# connect 00:17:CA:F7:38:18
Attempting to connect to 00:17:CA:F7:38:18
[CHG] Device 00:17:CA:F7:38:18 Connected: yes
Connection successful
[Haier HW-W910]# list-attributes 00:17:CA:F7:38:18
[Haier HW-W910]# disconnect 00:17:CA:F7:38:18
Attempting to disconnect from 00:17:CA:F7:38:18
Successful disconnected
[CHG] Device 00:17:CA:F7:38:18 Connected: no
[bluetooth]# list-attributes 00:17:CA:F7:38:18
[bluetooth]# info 00:17:CA:F7:38:18
Device 00:17:CA:F7:38:18
    Name: Haier HW-W910
    Alias: Haier HW-W910
    Class: 0x5a020c
    Icon: phone
    Paired: yes
    Trusted: no
    Blocked: no
    Connected: no
    LegacyPairing: no
    UUID: OBEX Object Push (00001105-0000-1000-8000-00805f9b34fb)
    UUID: Audio Source (0000110a-0000-1000-8000-00805f9b34fb)
    UUID: A/V Remote Control Target (0000110c-0000-1000-8000-00805f9b34fb)
    UUID: Headset AG (00001112-0000-1000-8000-00805f9b34fb)
    UUID: NAP (00001116-0000-1000-8000-00805f9b34fb)
    UUID: Handsfree Audio Gateway (0000111f-0000-1000-8000-00805f9b34fb)
    UUID: Phonebook Access Server (0000112f-0000-1000-8000-00805f9b34fb)
    UUID: Message Access Server (00001132-0000-1000-8000-00805f9b34fb)
    UUID: PnP Information (00001200-0000-1000-8000-00805f9b34fb)
    UUID: Generic Access Profile (00001800-0000-1000-8000-00805f9b34fb)
    UUID: Generic Attribute Profile (00001801-0000-1000-8000-00805f9b34fb)
    Modalias: usb:v000Ap0000d0000
    RSSI: -42
[bluetooth]# connect 00:17:CA:F7:38:18
Attempting to connect to 00:17:CA:F7:38:18
[CHG] Device 00:17:CA:F7:38:18 Connected: yes
Connection successful
[Haier HW-W910]# trust 00:17:CA:F7:38:18
[CHG] Device 00:17:CA:F7:38:18 Trusted: yes
Changing 00:17:CA:F7:38:18 trust succeeded
[Haier HW-W910]# info 00:17:CA:F7:38:18
Device 00:17:CA:F7:38:18
    Name: Haier HW-W910
    Alias: Haier HW-W910
    Class: 0x5a020c
    Icon: phone
    Paired: yes
    Trusted: yes
    Blocked: no
    Connected: yes
    LegacyPairing: no
    UUID: OBEX Object Push (00001105-0000-1000-8000-00805f9b34fb)
    UUID: Audio Source (0000110a-0000-1000-8000-00805f9b34fb)
    UUID: A/V Remote Control Target (0000110c-0000-1000-8000-00805f9b34fb)
    UUID: Headset AG (00001112-0000-1000-8000-00805f9b34fb)
    UUID: NAP (00001116-0000-1000-8000-00805f9b34fb)
    UUID: Handsfree Audio Gateway (0000111f-0000-1000-8000-00805f9b34fb)
    UUID: Phonebook Access Server (0000112f-0000-1000-8000-00805f9b34fb)
    UUID: Message Access Server (00001132-0000-1000-8000-00805f9b34fb)
    UUID: PnP Information (00001200-0000-1000-8000-00805f9b34fb)
    UUID: Generic Access Profile (00001800-0000-1000-8000-00805f9b34fb)
    UUID: Generic Attribute Profile (00001801-0000-1000-8000-00805f9b34fb)
    Modalias: usb:v000Ap0000d0000
    RSSI: -42
[Haier HW-W910]# list-attributes 00:17:CA:F7:38:18
[Haier HW-W910]# untrust 00:17:CA:F7:38:18
[CHG] Device 00:17:CA:F7:38:18 Trusted: no
Changing 00:17:CA:F7:38:18 untrust succeeded
[Haier HW-W910]# disconnect 00:17:CA:F7:38:18
Attempting to disconnect from 00:17:CA:F7:38:18
Successful disconnected
[CHG] Device 00:17:CA:F7:38:18 Connected: no
```

```
[bluetooth]# remove 00:17:CA:F7:38:18
[DEL] Device 00:17:CA:F7:38:18 Haier HW-W910
Device has been removed
[bluetooth]# list
Controller 22:22:33:44:55:66 bpi-m2z [default]
[NEW] Device 00:17:CA:F7:38:18 Haier HW-W910
[bluetooth]# scan off
[CHG] Device 00:17:CA:F7:38:18 RSSI is nil
Discovery stopped
[CHG] Controller 22:22:33:44:55:66 Discovering: no
[bluetooth]#
[bluetooth]# quit
Agent unregistered
[DEL] Controller 22:22:33:44:55:66 bpi-m2z [default]
```

And finally you can check the Services of your Bluetooth Phone:

```
dptool browse 00:17:CA:F7:38:18|grep "Service Name"
Service Name: Generic Access Profile
Service Name: Generic Attribute Profile
Service Name: Audio Source
Service Name: AVRCP TG
Service Name: Voice Gateway
Service Name: OBEX Object Push
Service Name: Voice Gateway
Service Name: OBEX Phonebook Access Server
Service Name: Network service
Service Name: SMS/MMS Message Access
Service Name: Email Message Access
```

Enbale Bluetooth on next boot (permanently)

To enable Bluetooth (BT) for every new boot, edit `/etc/rc.local` and add the command:

```
#!/bin/sh -e
#
# rc.local
#
# This script is executed at the end of each multiuser runlevel.
# Make sure that the script will "exit 0" on success or any other
# value on error.
#
# In order to enable or disable this script just change the execution
# bits.
#
# By default this script does nothing.

# -----
# ----- enable BT -----
# -----
# borrowed from madscientist42
# Compute a BD_ADDR. We're going to use pieces of the device serial number for the LAP part.
SERIAL=`cat /proc/device-tree/serial-number | cut -c9-`
B1=`echo $SERIAL | cut -c3-4`
B2=`echo $SERIAL | cut -c5-6`
B3=`echo $SERIAL | cut -c7-8`
BDADDR=`printf b8:27:eb:%02x:%02x:%02x $((0x$B1 ^ 0xaa)) $((0x$B2 ^ 0xaa)) $((0x$B3 ^ 0xaa))`
brcm_patchram_plus -d --patchram /lib/firmware/ap6212/bcm43438a1.hcd --enable_hci --bd_addr $BDADDR
$BDADDR --no2bytes --tosleep 5000 /dev/ttyS1 > /tmp/bt.log 2>&1 &
# -- BT end -----

exit 0
#!/bin/bash
```

Make sure `/etc/rc.local` has run permissions:

```
sudo chmod +x /etc/rc.local
```

Build your own Kernel

Here are the instructions for building your own kernel on board.

- Install tools

```
sudo apt-get install git bison flex bc device-tree-compiler
```

- Get a Kernel with support for this board, for example mainline kernel 5.2.0 or your own
- Get the patch or patch set and apply to your kernel if your kernel is not complete
- Get mali support from Bootlin
- Watch linux-sunxi for the latest changes and fixes

Create directory:

```
mkdir -p linux  
cd linux  
export KVD=$PWD
```

Grab your kernel (here we get linux torvalds kernel 5.2 as an example):

<https://git.kernel.org/pub/scm/linux/kernel/git/torvalds/linux.git/refs/tags>

```
wget https://git.kernel.org/pub/scm/linux/kernel/git/torvalds/linux.git/snapshot/linux-5.2.tar.gz  
tar -xvpzf linux-5.2.tar.gz  
cd linux-5.2
```

Build:

```
make sunxi_defconfig  
#make menuconfig (if you want to add or change kernel modules)  
make oldconfig  
make INSTALL_MOD_PATH=output zImage  
make INSTALL_MOD_PATH=output dtbs  
make INSTALL_MOD_PATH=output modules  
make INSTALL_MOD_PATH=output modules_install  
export KV=$(strings ./arch/arm/boot/Image |grep "Linux version"|awk '{print $3}')make INSTALL_HDR_PATH=output/usr/src/linux-headers-${KV} headers_install
```

Install:

```
sudo cp -vfr ./output/* /  
sync  
sudo cp -fv ./arch/arm/boot/zImage /boot/zImage_${KV}  
sync  
sudo cp -fv ./arch/arm/boot/dts/sun8i-h2-plus-bananapi-m2-zero.dtb /boot/bpi-m2-zero.dtb_${KV}  
sync
```

Make it current kernel

```
cd /boot  
sudo ln -sf zImage_${KV} zImage  
sudo ln -sf bpi-m2-zero.dtb_${KV} bpi-m2-zero.dtb  
cd ${KVD}  
sync
```

Reboot

```
sudo reboot
```

You can add or change kernel modules at any time and modify your **dts** to get the hw peripherals to work properly. **From now on you are at your own.**

Credits

Kernel 4.20.0-rc3 is based on mainline kernel (<https://www.kernel.org/>) (linux-sunxi effort).

Mali based on MRipard (Bootlin)

Thanks to Nora Lee (FOXCONN) for the sample.

bootlog of bpi-m2z with Kernel 4.20.0-rc3

```
[ 0.000000] Booting Linux on physical CPU 0x0
[ 0.000000] Linux version 4.20.0-rc3-m2z-otg-gadget (alex@svn) (gcc version 7.3.1 20180425 [linaro-7.3-2018.05 revision d29120a424ecfbc167ef90065c0eeb7f91977701] (Linaro GCC 7.3-2018.05)) #1 SMP Mon Nov 19 19:37:43 -02 2018
[ 0.000000] CPU: ARMv7 Processor [410fc075] revision 5 (ARMv7), cr=10c5387d
[ 0.000000] CPU: div instructions available: patching division code
[ 0.000000] CPU: PIPT / VIPT nonaliasing data cache, VIPT aliasing instruction cache
[ 0.000000] OF: fdt: Machine model: Banana Pi M2 Zero
[ 0.000000] Memory policy: Data cache writealloc
[ 0.000000] Reserved memory: created CMA memory pool at 0x4a000000, size 96 MiB
[ 0.000000] OF: reserved mem: initialized node cma@4a000000, compatible id shared-dma-pool
[ 0.000000] On node 0 totalpages: 131072
[ 0.000000]   Normal zone: 1024 pages used for memmap
[ 0.000000]   Normal zone: 0 pages reserved
[ 0.000000]   Normal zone: 131072 pages, LIFO batch:31
[ 0.000000] psci: probing for conduit method from DT.
[ 0.000000] psci: Using PSCI v0.1 Function IDs from DT
[ 0.000000] random: get_random_bytes called from start_kernel+0xa0/0x3f4 with crng_init=0
[ 0.000000] percpu: Embedded 16 pages/cpu @(ptrval) s35020 r8192 d22324 u65536
[ 0.000000] pcpu-alloc: s35020 r8192 d22324 u65536 alloc=16*4096
[ 0.000000] pcpu-alloc: [0] 0 [0] 1 [0] 2 [0] 3
[ 0.000000] Built 1 zonelists, mobility grouping on. Total pages: 130048
[ 0.000000] Kernel command line: console=ttyS0,115200 earlyprintk rootfstype=ext4 root=/dev/mmcblk0p2 rw rootwait fsck.repair=yes panic=10 no_console_suspend consoleblank=0 drm_leak_fbdev_smem=1
[ 0.000000] Dentry cache hash table entries: 65536 (order: 6, 262144 bytes)
[ 0.000000] Inode-cache hash table entries: 32768 (order: 5, 131072 bytes)
[ 0.000000] Memory: 407036K/524288K available (8192K kernel code, 341K rwdata, 1960K rodata, 1024K init, 268K bss, 18948K reserved, 98304K cma-reserved, 0K highmem)
[ 0.000000] Virtual kernel memory layout:
       vector : 0xffff0000 - 0xffff1000   ( 4 kB)
       fixmap : 0xffc00000 - 0xffff0000   (3072 kB)
       vmalloc : 0xe0800000 - 0xff800000   ( 496 MB)
       lowmem  : 0xc0000000 - 0xe0000000   ( 512 MB)
       pkmap   : 0xbfe00000 - 0xc0000000   ( 2 MB)
       modules : 0xbf000000 - 0xbfe00000   ( 14 MB)
       .text   : 0x(ptrval) - 0x(ptrval)   (9184 kB)
       .init   : 0x(ptrval) - 0x(ptrval)   (1024 kB)
       .data   : 0x(ptrval) - 0x(ptrval)   ( 342 kB)
       .bss    : 0x(ptrval) - 0x(ptrval)   ( 269 kB)
[ 0.000000] SLUB: Hwalign=64, Order=0-3, MinObjects=0, CPUs=4, Nodes=1
[ 0.000000] rcu: Hierarchical RCU implementation.
[ 0.000000] rcu: RCU calculated value of scheduler-enlistment delay is 10 jiffies.
[ 0.000000] NR_IRQS: 16, nr_irqs: 16, preallocated irq: 16
[ 0.000000] GIC: Using split EOI/Deactivate mode
[ 0.000000] clocksource: timer: mask: 0xffffffff max_cycles: 0xffffffff, max_idle_ns: 79635851949 ns
[ 0.000000] arch_timer: cp15 timer(s) running at 24.00MHz (phys).
[ 0.000000] clocksource: arch_sys_counter: mask: 0xffffffffffffff max_cycles: 0x588fe9dc0, max_idle_ns: 440795202592 ns
[ 0.000006] sched_clock: 56 bits at 24MHz, resolution 41ns, wraps every 4398046511097ns
[ 0.000018] Switching to timer-based delay loop, resolution 41ns
[ 0.000214] Console: colour dummy device 80x30
[ 0.000267] Calibrating delay loop (skipped), value calculated using timer frequency.. 48.00 BogoMIPS (lpj=240000)
[ 0.000282] pid_max: default: 32768 minimum: 301
[ 0.000433] Mount-cache hash table entries: 1024 (order: 0, 4096 bytes)
[ 0.000448] Mountpoint-cache hash table entries: 1024 (order: 0, 4096 bytes)
[ 0.001143] CPU: Testing write buffer coherency: ok
[ 0.001605] CPU0: update cpu_capacity 1024
[ 0.001617] CPU0: thread -1, cpu 0, socket 0, mpidr 80000000
```

```
[ 0.002178] Setting up static identity map for 0x40100000 - 0x40100060
[ 0.002331] rcu: Hierarchical SRCU implementation.
[ 0.003088] smp: Bringing up secondary CPUs ...
[ 0.013872] CPU1: update cpu_capacity 1024
[ 0.013878] CPU1: thread -1, cpu 1, socket 0, mpidr 80000001
[ 0.024754] CPU2: update cpu_capacity 1024
[ 0.024760] CPU2: thread -1, cpu 2, socket 0, mpidr 80000002
[ 0.035538] CPU3: update cpu_capacity 1024
[ 0.035543] CPU3: thread -1, cpu 3, socket 0, mpidr 80000003
[ 0.035629] smp: Brought up 1 node, 4 CPUs
[ 0.035658] SMP: Total of 4 processors activated (192.00 BogoMIPS).
[ 0.035665] CPU: All CPU(s) started in HYP mode.
[ 0.035671] CPU: Virtualization extensions available.
[ 0.036727] devtmpfs: initialized
[ 0.043445] VFP support v0.3: implementor 41 architecture 2 part 30 variant 7 rev 5
[ 0.043696] clocksource: jiffies: mask: 0xffffffff max_cycles: 0xffffffff, max_idle_ns:
19112604462750000 ns
[ 0.043722] futex hash table entries: 1024 (order: 4, 65536 bytes)
[ 0.047452] pinctrl core: initialized pinctrl subsystem
[ 0.048536] NET: Registered protocol family 16
[ 0.050400] DMA: preallocated 256 KiB pool for atomic coherent allocations
[ 0.051329] cpuidle: using governor menu
[ 0.051686] hw-breakpoint: found 5 (+1 reserved) breakpoint and 4 watchpoint registers.
[ 0.051696] hw-breakpoint: maximum watchpoint size is 8 bytes.
[ 0.069898] SCSI subsystem initialized
[ 0.070151] libata version 3.00 loaded.
[ 0.070373] usbcore: registered new interface driver usbfs
[ 0.070421] usbcore: registered new interface driver hub
[ 0.070503] usbcore: registered new device driver usb
[ 0.070816] pps_core: LinuxPPS API ver. 1 registered
[ 0.070824] pps_core: Software ver. 5.3.6 - Copyright 2005-2007 Rodolfo Giometti <giometti@linux.it>
[ 0.070850] PTP clock support registered
[ 0.071236] Advanced Linux Sound Architecture Driver Initialized.
[ 0.072602] clocksource: Switched to clocksource arch_sys_counter
[ 0.072746] VFS: Disk quotas dquot_6.6.0
[ 0.072813] VFS: Dquot-cache hash table entries: 1024 (order 0, 4096 bytes)
[ 0.080888] NET: Registered protocol family 2
[ 0.081871] tcp_listen_portaddr_hash hash table entries: 512 (order: 0, 6144 bytes)
[ 0.081901] TCP established hash table entries: 4096 (order: 2, 16384 bytes)
[ 0.081953] TCP bind hash table entries: 4096 (order: 3, 32768 bytes)
[ 0.082017] TCP: Hash tables configured (established 4096 bind 4096)
[ 0.082147] UDP hash table entries: 256 (order: 1, 8192 bytes)
[ 0.082194] UDP-Lite hash table entries: 256 (order: 1, 8192 bytes)
[ 0.082449] NET: Registered protocol family 1
[ 0.083046] RPC: Registered named UNIX socket transport module.
[ 0.083059] RPC: Registered udp transport module.
[ 0.083065] RPC: Registered tcp transport module.
[ 0.083071] RPC: Registered tcp NFSv4.1 backchannel transport module.
[ 0.083755] Unpacking initramfs...
[ 0.127611] Freeing initrd memory: 960K
[ 0.129426] Initialise system trusted keyrings
[ 0.129818] workingset: timestamp_bits=30 max_order=17 bucket_order=0
[ 0.137120] squashfs: version 4.0 (2009/01/31) Phillip Lougher
[ 0.138629] NFS: Registering the id_resolver key type
[ 0.138670] Key type id_resolver registered
[ 0.138676] Key type id_legacy registered
[ 0.138693] nfs4filelayout_init: NFSv4 File Layout Driver Registering...
[ 0.138702] Installing knfsd (copyright (C) 1996 okir@monad.swb.de).
[ 0.139599] fuse init (API version 7.28)
[ 0.140049] SGI XFS with ACLs, security attributes, realtime, no debug enabled
[ 0.148962] Key type asymmetric registered
[ 0.148986] Asymmetric key parser 'x509' registered
[ 0.149085] Block layer SCSI generic (bsg) driver version 0.4 loaded (major 247)
[ 0.149098] io scheduler noop registered
[ 0.149104] io scheduler deadline registered
[ 0.149331] io scheduler cfq registered (default)
[ 0.149342] io scheduler mq-deadline registered
[ 0.149350] io scheduler kyber registered
[ 0.150418] sun4i-usb-phy 1c19400.phy: Couldn't request ID GPIO
[ 0.154712] sun8i-h3-pinctrl 1c20800.pinctrl: initialized sunXi PIO driver
[ 0.156494] sun8i-h3-r-pinctrl 1f02c00.pinctrl: initialized sunXi PIO driver
[ 0.205952] Serial: 8250/16550 driver, 8 ports, IRQ sharing disabled
[ 0.208391] printk: console [ttyS0] disabled
[ 0.228619] 1c28000.serial: ttyS0 at MMIO 0x1c28000 (irq = 44, base_baud = 1500000) is a U6_16550A
[ 0.950227] printk: console [ttyS0] enabled
[ 0.975650] 1c28400.serial: ttyS1 at MMIO 0x1c28400 (irq = 45, base_baud = 1500000) is a U6_16550A
[ 0.997540] sun4i-drm display-engine: bound 1100000.mixer (ops 0xc095568c)
```



```
[ 1.004716] sun4i-drm display-engine: bound 1c0c000.lcd-controller (ops 0xc095275c)
[ 1.012419] sun8i-dw-hdmi 1ee0000.hdmi: 1ee0000.hdmi supply hvcc not found, using dummy regulator
[ 1.021366] sun8i-dw-hdmi 1ee0000.hdmi: Linked as a consumer to regulator.0
[ 1.029143] sun8i-dw-hdmi 1ee0000.hdmi: Detected HDMI TX controller v1.32a with HDCP
(sun8i_dw_hdmi_phy)
[ 1.039027] sun8i-dw-hdmi 1ee0000.hdmi: registered DesignWare HDMI I2C bus driver
[ 1.046829] sun4i-drm display-engine: bound 1ee0000.hdmi (ops 0xc0955034)
[ 1.053635] [drm] Supports vblank timestamp caching Rev 2 (21.10.2013).
[ 1.060240] [drm] No driver support for vblank timestamp query.
[ 1.268718] random: fast init done
[ 1.599232] Console: switching to colour frame buffer device 240x67
[ 1.638833] sun4i-drm display-engine: fb0: DRM emulated frame buffer device
[ 1.646284] [drm] Initialized sun4i-drm 1.0.0 20150629 for display-engine on minor 0
[ 1.657027] libphy: Fixed MDIO Bus: probed
[ 1.661316] CAN device driver interface
[ 1.665835] dwmac-sun8i 1c30000.ethernet: PTP uses main clock
[ 1.671616] dwmac-sun8i 1c30000.ethernet: No regulator found
[ 1.677662] dwmac-sun8i 1c30000.ethernet: No HW DMA feature register supported
[ 1.684900] dwmac-sun8i 1c30000.ethernet: RX Checksum Offload Engine supported
[ 1.692124] dwmac-sun8i 1c30000.ethernet: COE Type 2
[ 1.697094] dwmac-sun8i 1c30000.ethernet: TX Checksum insertion supported
[ 1.703897] dwmac-sun8i 1c30000.ethernet: Normal descriptors
[ 1.709557] dwmac-sun8i 1c30000.ethernet: Chain mode enabled
[ 1.715365] libphy: stmmac: probed
[ 1.719299] dwmac-sun8i 1c30000.ethernet: Found internal PHY node
[ 1.725528] libphy: mdio_mux: probed
[ 1.729119] dwmac-sun8i 1c30000.ethernet: Switch mux to internal PHY
[ 1.735484] dwmac-sun8i 1c30000.ethernet: Powering internal PHY
[ 1.742359] libphy: mdio_mux: probed
[ 1.746460] ehci_hcd: USB 2.0 'Enhanced' Host Controller (EHCI) Driver
[ 1.752997] ehci-platform: EHCI generic platform driver
[ 1.758425] ehci-platform 1c1a000.usb: EHCI Host Controller
[ 1.764033] ehci-platform 1c1a000.usb: new USB bus registered, assigned bus number 1
[ 1.772190] ehci-platform 1c1a000.usb: irq 27, io mem 0x01c1a000
[ 1.802613] ehci-platform 1c1a000.usb: USB 2.0 started, EHCI 1.00
[ 1.808902] usb usb1: New USB device found, idVendor=1d6b, idProduct=0002, bcdDevice= 4.20
[ 1.817177] usb usb1: New USB device strings: Mfr=3, Product=2, SerialNumber=1
[ 1.824409] usb usb1: Product: EHCI Host Controller
[ 1.829281] usb usb1: Manufacturer: Linux 4.20.0-rc3-m2z-otg-gadget ehci_hcd
[ 1.836330] usb usb1: SerialNumber: 1c1a000.usb
[ 1.841429] hub 1-0:1.0: USB hub found
[ 1.845232] hub 1-0:1.0: 1 port detected
[ 1.850060] ohci_hcd: USB 1.1 'Open' Host Controller (OHCI) Driver
[ 1.856279] ohci-platform: OHCI generic platform driver
[ 1.861687] ohci-platform 1c1a400.usb: Generic Platform OHCI controller
[ 1.868330] ohci-platform 1c1a400.usb: new USB bus registered, assigned bus number 2
[ 1.876364] ohci-platform 1c1a400.usb: irq 28, io mem 0x01c1a400
[ 1.946763] usb usb2: New USB device found, idVendor=1d6b, idProduct=0001, bcdDevice= 4.20
[ 1.955045] usb usb2: New USB device strings: Mfr=3, Product=2, SerialNumber=1
[ 1.962268] usb usb2: Product: Generic Platform OHCI controller
[ 1.968196] usb usb2: Manufacturer: Linux 4.20.0-rc3-m2z-otg-gadget ohci_hcd
[ 1.975254] usb usb2: SerialNumber: 1c1a400.usb
[ 1.980284] hub 2-0:1.0: USB hub found
[ 1.984076] hub 2-0:1.0: 1 port detected
[ 1.988900] usbcore: registered new interface driver cdc_acm
[ 1.994590] cdc_acm: USB Abstract Control Model driver for USB modems and ISDN adapters
[ 2.002648] usbcore: registered new interface driver usbblp
[ 2.008177] usbcore: registered new interface driver cdc_wdm
[ 2.013919] usbcore: registered new interface driver usb-storage
[ 2.020023] usbcore: registered new interface driver ch341
[ 2.025556] usbserial: USB Serial support registered for ch341-uart
[ 2.031847] usbcore: registered new interface driver cp210x
[ 2.037452] usbserial: USB Serial support registered for cp210x
[ 2.043433] usbcore: registered new interface driver ftdi_sio
[ 2.049204] usbserial: USB Serial support registered for FTDI USB Serial Device
[ 2.056626] usbcore: registered new interface driver pl2303
[ 2.062215] usbserial: USB Serial support registered for pl2303
[ 2.068917] mousedev: PS/2 mouse device common for all mice
[ 2.075219] sun6i-rtc 1f00000.rtc: rtc core: registered rtc-sun6i as rtc0
[ 2.082002] sun6i-rtc 1f00000.rtc: RTC enabled
[ 2.086731] i2c /dev entries driver
[ 2.092535] thermal thermal_zone0: failed to read out thermal zone (-16)
[ 2.099901] sunxi-wdt 1c20ca0.watchdog: Watchdog enabled (timeout=16 sec, nowayout=0)
[ 2.109005] sunxi-mmc 1c0f000.mmc: Linked as a consumer to regulator.2
[ 2.141438] sunxi-mmc 1c0f000.mmc: initialized, max. request size: 16384 KB
[ 2.148808] sunxi-mmc 1c10000.mmc: Linked as a consumer to regulator.2
[ 2.156082] sunxi-mmc 1c10000.mmc: allocated mmc-pwrseq
```



```
[ 2.185330] sunxi-mmc 1c10000.mmc: initialized, max. request size: 16384 KB
[ 2.193708] ledtrig-cpu: registered to indicate activity on CPUs
[ 2.199989] hidraw: raw HID events driver (C) Jiri Kosina
[ 2.205826] usbcore: registered new interface driver usbhid
[ 2.211424] usbhid: USB HID core driver
[ 2.218165] sun4i-codec 1c22c00.codec: ASoC: codec-analog@1f015c0 not registered
[ 2.219174] mmc0: host does not support reading read-only switch, assuming write-enable
[ 2.225590] sun4i-codec 1c22c00.codec: Failed to register our card
[ 2.227243] Initializing XFRM netlink socket
[ 2.235622] mmc0: new high speed SDHC card at address 59b4
[ 2.239822] NET: Registered protocol family 17
[ 2.245682] mmcblk0: mmc0:59b4 SDU1 7.52 GiB
[ 2.249611] can: controller area network core (rev 20170425 abi 9)
[ 2.256018] mmcblk0: p1 p2
[ 2.258645] NET: Registered protocol family 29
[ 2.266951] mmc1: queuing unknown CIS tuple 0x80 (2 bytes)
[ 2.267550] can: raw protocol (rev 20170425)
[ 2.273511] mmc1: queuing unknown CIS tuple 0x80 (3 bytes)
[ 2.277463] can: broadcast manager protocol (rev 20170425 t)
[ 2.283214] mmc1: queuing unknown CIS tuple 0x80 (3 bytes)
[ 2.287203] can: netlink gateway (rev 20170425) max_hops=1
[ 2.295540] mmc1: queuing unknown CIS tuple 0x80 (7 bytes)
[ 2.299215] rfkill_gpio rfkill_bt: sunxi-bt device registered.
[ 2.307111] mmc1: queuing unknown CIS tuple 0x81 (9 bytes)
[ 2.309579] 9pnet: Installing 9P2000 support
[ 2.324938] Key type dns_resolver registered
[ 2.329439] Registering SWP/SWPB emulation handler
[ 2.334843] Loading compiled-in X.509 certificates
[ 2.347548] cam: supplied by vcc5v0
[ 2.351808] cam-avdd: supplied by cam
[ 2.355557] cam-dovdd: supplied by cam
[ 2.359343] cam-dvdd: supplied by cam
[ 2.364536] ehci-platform 1c1b000.usb: EHCI Host Controller
[ 2.370140] ehci-platform 1c1b000.usb: new USB bus registered, assigned bus number 3
[ 2.378396] ehci-platform 1c1b000.usb: irq 29, io mem 0x01c1b000
[ 2.398114] mmc1: new high speed SDIO card at address 0001
[ 2.412620] ehci-platform 1c1b000.usb: USB 2.0 started, EHCI 1.00
[ 2.418918] usb usb3: New USB device found, idVendor=1d6b, idProduct=0002, bcdDevice= 4.20
[ 2.427193] usb usb3: New USB device strings: Mfr=3, Product=2, SerialNumber=1
[ 2.434419] usb usb3: Product: EHCI Host Controller
[ 2.439292] usb usb3: Manufacturer: Linux 4.20.0-rc3-m2z-otg-gadget ehci_hcd
[ 2.446342] usb usb3: SerialNumber: 1c1b000.usb
[ 2.451420] hub 3-0:1.0: USB hub found
[ 2.455216] hub 3-0:1.0: 1 port detected
[ 2.459940] ehci-platform 1c1c000.usb: EHCI Host Controller
[ 2.465553] ehci-platform 1c1c000.usb: new USB bus registered, assigned bus number 4
[ 2.473608] ehci-platform 1c1c000.usb: irq 31, io mem 0x01c1c000
[ 2.502616] ehci-platform 1c1c000.usb: USB 2.0 started, EHCI 1.00
[ 2.508856] usb usb4: New USB device found, idVendor=1d6b, idProduct=0002, bcdDevice= 4.20
[ 2.517130] usb usb4: New USB device strings: Mfr=3, Product=2, SerialNumber=1
[ 2.524354] usb usb4: Product: EHCI Host Controller
[ 2.529227] usb usb4: Manufacturer: Linux 4.20.0-rc3-m2z-otg-gadget ehci_hcd
[ 2.536276] usb usb4: SerialNumber: 1c1c000.usb
[ 2.541290] hub 4-0:1.0: USB hub found
[ 2.545081] hub 4-0:1.0: 1 port detected
[ 2.549700] ehci-platform 1c1d000.usb: EHCI Host Controller
[ 2.555308] ehci-platform 1c1d000.usb: new USB bus registered, assigned bus number 5
[ 2.563406] ehci-platform 1c1d000.usb: irq 33, io mem 0x01c1d000
[ 2.592613] ehci-platform 1c1d000.usb: USB 2.0 started, EHCI 1.00
[ 2.598845] usb usb5: New USB device found, idVendor=1d6b, idProduct=0002, bcdDevice= 4.20
[ 2.607115] usb usb5: New USB device strings: Mfr=3, Product=2, SerialNumber=1
[ 2.614342] usb usb5: Product: EHCI Host Controller
[ 2.619214] usb usb5: Manufacturer: Linux 4.20.0-rc3-m2z-otg-gadget ehci_hcd
[ 2.626262] usb usb5: SerialNumber: 1c1d000.usb
[ 2.631285] hub 5-0:1.0: USB hub found
[ 2.635076] hub 5-0:1.0: 1 port detected
[ 2.639693] ohci-platform 1c1b400.usb: Generic Platform OHCI controller
[ 2.646349] ohci-platform 1c1b400.usb: new USB bus registered, assigned bus number 6
[ 2.654358] ohci-platform 1c1b400.usb: irq 30, io mem 0x01c1b400
[ 2.726765] usb usb6: New USB device found, idVendor=1d6b, idProduct=0001, bcdDevice= 4.20
[ 2.735041] usb usb6: New USB device strings: Mfr=3, Product=2, SerialNumber=1
[ 2.742254] usb usb6: Product: Generic Platform OHCI controller
[ 2.748181] usb usb6: Manufacturer: Linux 4.20.0-rc3-m2z-otg-gadget ohci_hcd
[ 2.755232] usb usb6: SerialNumber: 1c1b400.usb
[ 2.760259] hub 6-0:1.0: USB hub found
[ 2.764054] hub 6-0:1.0: 1 port detected
[ 2.768682] ohci-platform 1c1c400.usb: Generic Platform OHCI controller
```

```

[ 2.775333] ohci-platform 1c1c400.usb: new USB bus registered, assigned bus number 7
[ 2.783334] ohci-platform 1c1c400.usb: irq 32, io mem 0x01c1c400
[ 2.856757] usb usb7: New USB device found, idVendor=1d6b, idProduct=0001, bcdDevice= 4.20
[ 2.865026] usb usb7: New USB device strings: Mfr=3, Product=2, SerialNumber=1
[ 2.872238] usb usb7: Product: Generic Platform OHCI controller
[ 2.878163] usb usb7: Manufacturer: Linux 4.20.0-rc3-m2z-otg-gadget ohci_hcd
[ 2.885211] usb usb7: SerialNumber: 1c1c400.usb
[ 2.890204] hub 7-0:1.0: USB hub found
[ 2.893994] hub 7-0:1.0: 1 port detected
[ 2.898656] ohci-platform 1c1d400.usb: Generic Platform OHCI controller
[ 2.905304] ohci-platform 1c1d400.usb: new USB bus registered, assigned bus number 8
[ 2.913297] ohci-platform 1c1d400.usb: irq 34, io mem 0x01c1d400
[ 2.986793] usb usb8: New USB device found, idVendor=1d6b, idProduct=0001, bcdDevice= 4.20
[ 2.995076] usb usb8: New USB device strings: Mfr=3, Product=2, SerialNumber=1
[ 3.002289] usb usb8: Product: Generic Platform OHCI controller
[ 3.008216] usb usb8: Manufacturer: Linux 4.20.0-rc3-m2z-otg-gadget ohci_hcd
[ 3.015272] usb usb8: SerialNumber: 1c1d400.usb
[ 3.020347] hub 8-0:1.0: USB hub found
[ 3.024139] hub 8-0:1.0: 1 port detected
[ 3.028883] usb_phy_generic usb_phy_generic.3.auto: usb_phy_generic.3.auto supply vcc not found,
using dummy regulator
[ 3.039657] usb_phy_generic usb_phy_generic.3.auto: Linked as a consumer to regulator.0
[ 3.048029] musb-hdrc musb-hdrc.4.auto: MUSB HDRC host driver
[ 3.053798] musb-hdrc musb-hdrc.4.auto: new USB bus registered, assigned bus number 9
[ 3.061779] usb usb9: New USB device found, idVendor=1d6b, idProduct=0002, bcdDevice= 4.20
[ 3.070056] usb usb9: New USB device strings: Mfr=3, Product=2, SerialNumber=1
[ 3.077278] usb usb9: Product: MUSB HDRC host driver
[ 3.082238] usb usb9: Manufacturer: Linux 4.20.0-rc3-m2z-otg-gadget musb-hcd
[ 3.089285] usb usb9: SerialNumber: musb-hdrc.4.auto
[ 3.094716] hub 9-0:1.0: USB hub found
[ 3.098495] hub 9-0:1.0: 1 port detected
[ 3.103139] cpu cpu0: Linked as a consumer to regulator.8
[ 3.108593] cpu cpu0: Dropping the link to regulator.8
[ 3.113933] cpu cpu0: Linked as a consumer to regulator.8
[ 3.121144] sun4i-codec 1c22c00.codec: ASoC: Failed to create component debugfs directory
[ 3.131748] sun4i-codec 1c22c00.codec: Codec <-> 1c22c00.codec mapping ok
[ 3.140681] sun6i-rtc 1f00000.rtc: setting system clock to 1970-01-01 00:00:09 UTC (9)
[ 3.155809] cfg80211: Loading compiled-in X.509 certificates for regulatory database
[ 3.168145] cfg80211: Loaded X.509 cert 'sforshee: 00b28ddf47aef9cea7'
[ 3.178491] platform regulatory.0: Direct firmware load for regulatory.db failed with error -2
[ 3.180801] vcc3v0: disabling
[ 3.187360] platform regulatory.0: Falling back to syfs fallback for: regulatory.db
[ 3.190307] vcc5v0: disabling
[ 3.200934] cam-avdd: disabling
[ 3.204604] cam-dovdd: disabling
[ 3.208160] cam-dvdd: disabling
[ 3.211459] ALSA device list:
[ 3.214431]   #0: H3 Audio Codec
[ 3.219984] Freeing unused kernel memory: 1024K
[ 3.253946] Run /init as init process
[ 3.594710] usb 1-1: new high-speed USB device number 2 using ehci-platform
[ 3.597365] EXT4-fs (mmcblk0p2): mounted filesystem without journal. Opts: (null)
[ 3.794928] usb 1-1: New USB device found, idVendor=05e3, idProduct=0608, bcdDevice=85.36
[ 3.803205] usb 1-1: New USB device strings: Mfr=0, Product=1, SerialNumber=0
[ 3.810388] usb 1-1: Product: USB2.0 Hub
[ 3.815584] hub 1-1:1.0: USB hub found
[ 3.821038] hub 1-1:1.0: 4 ports detected
[ 4.152684] usb 1-1.2: new high-speed USB device number 3 using ehci-platform
[ 4.279191] systemd[1]: System time before build time, advancing clock.
[ 4.328486] usb 1-1.2: New USB device found, idVendor=05e3, idProduct=0608, bcdDevice= 9.01
[ 4.336887] usb 1-1.2: New USB device strings: Mfr=0, Product=1, SerialNumber=0
[ 4.344218] usb 1-1.2: Product: USB2.0 Hub
[ 4.349604] hub 1-1.2:1.0: USB hub found
[ 4.354342] hub 1-1.2:1.0: 4 ports detected
[ 4.653016] NET: Registered protocol family 10
[ 4.722232] Segment Routing with IPv6
[ 4.722718] usb 1-1.2.3: new low-speed USB device number 4 using ehci-platform
[ 4.761011] random: systemd: uninitialized urandom read (16 bytes read)
[ 4.776589] systemd[1]: systemd 229 running in system mode. (+PAM +AUDIT +SELINUX +IMA +APPARMOR
+SMACK +SYSVINIT +UTMP +LIBCRYPTSETUP +GCRYPT +GNUTLS +ACL +XZ -LZ4 +SECCOMP +BLKID +ELFUTILS +KMOD -
IDN)
[ 4.795876] systemd[1]: Detected architecture arm.
[ 4.853992] systemd[1]: Set hostname to <nanopi-duo>.
[ 4.901619] usb 1-1.2.3: New USB device found, idVendor=1c4f, idProduct=0002, bcdDevice= 1.10
[ 4.910179] usb 1-1.2.3: New USB device strings: Mfr=1, Product=2, SerialNumber=0
[ 4.917682] usb 1-1.2.3: Product: USB Keyboard
[ 4.922128] usb 1-1.2.3: Manufacturer: SIGMACHIP

```

```
[ 4.971346] input: SIGMACHIP USB Keyboard as /devices/platform/soc/1c1a000.usb/usb1/1-1/1-1.2/1-1.2.3/1-1.2.3:1.0/0003:1C4F:0002.0001/input/input0
[ 4.974065] random: systemd: uninitialized urandom read (16 bytes read)
[ 5.055034] hid-generic 0003:1C4F:0002.0001: input,hidraw0: USB HID v1.10 Keyboard [SIGMACHIP USB Keyboard] on usb-1c1a000.usb-1.2.3/input0
[ 5.062380] random: systemd-gpt-aut: uninitialized urandom read (16 bytes read)
[ 5.079213] input: SIGMACHIP USB Keyboard Consumer Control as /devices/platform/soc/1c1a000.usb/usb1/1-1/1-1.2/1-1.2.3/1-1.2.3:1.1/0003:1C4F:0002.0002/input/input1
[ 5.163697] input: SIGMACHIP USB Keyboard System Control as /devices/platform/soc/1c1a000.usb/usb1/1-1/1-1.2/1-1.2.3/1-1.2.3:1.1/0003:1C4F:0002.0002/input/input2
[ 5.180901] hid-generic 0003:1C4F:0002.0002: input,hidraw1: USB HID v1.10 Device [SIGMACHIP USB Keyboard] on usb-1c1a000.usb-1.2.3/input1
[ 5.304755] usb 1-1.2.4: new low-speed USB device number 5 using ehci-platform
[ 5.451765] usb 1-1.2.4: New USB device found, idVendor=1bcf, idProduct=0007, bcdDevice= 0.10
[ 5.460466] usb 1-1.2.4: New USB device strings: Mfr=0, Product=2, SerialNumber=0
[ 5.468421] usb 1-1.2.4: Product: USB Optical Mouse
[ 5.482692] input: USB Optical Mouse as /devices/platform/soc/1c1a000.usb/usb1/1-1/1-1.2/1-1.2.4/1-1.2.4:1.0/0003:1BCF:0007.0003/input/input3
[ 5.496087] input: USB Optical Mouse as /devices/platform/soc/1c1a000.usb/usb1/1-1/1-1.2/1-1.2.4/1-1.2.4:1.0/0003:1BCF:0007.0003/input/input4
[ 5.520418] hid-generic 0003:1BCF:0007.0003: input,hiddev96,hidraw2: USB HID v1.10 Mouse [USB Optical Mouse] on usb-1c1a000.usb-1.2.4/input0
[ 5.837758] systemd[1]: Listening on Journal Socket.
[ 5.914407] systemd[1]: Reached target Remote File Systems (Pre).
[ 5.937931] systemd[1]: Listening on udev Control Socket.
[ 5.983265] systemd[1]: Started Trigger resolvconf update for networkd DNS.
[ 6.013319] systemd[1]: Started Dispatch Password Requests to Console Directory Watch.
[ 6.054594] systemd[1]: Listening on /dev/initctl Compatibility Named Pipe.
[ 6.104286] systemd[1]: Started Forward Password Requests to Wall Directory Watch.
[ 6.706757] EXT4-fs (mmcblk0p2): re-mounted. Opts: (null)
[ 6.835752] g_serial gadget: Gadget Serial v2.4
[ 6.840303] g_serial gadget: g_serial ready
[ 6.902950] brcmfmac: brcmf_fw_alloc_request: using brcm/brcmfmac43430-sdio for chip BCM43430/1
[ 6.985436] Bluetooth: Core ver 2.22
[ 6.989175] NET: Registered protocol family 31
[ 6.993826] Bluetooth: HCI device and connection manager initialized
[ 7.000509] Bluetooth: HCI socket layer initialized
[ 7.005468] Bluetooth: L2CAP socket layer initialized
[ 7.010572] Bluetooth: SCO socket layer initialized
[ 7.023201] Bluetooth: HCI UART driver ver 2.3
[ 7.028050] Bluetooth: HCI UART protocol H4 registered
[ 7.033226] Bluetooth: HCI UART protocol BCSP registered
[ 7.038535] Bluetooth: HCI UART protocol ATH3K registered
[ 7.044231] Bluetooth: HCI UART protocol Intel registered
[ 7.049630] Bluetooth: HCI UART protocol AG6XX registered
[ 7.055066] Bluetooth: HCI UART protocol Marvell registered
[ 7.087649] brcmfmac: brcmf_fw_alloc_request: using brcm/brcmfmac43430-sdio for chip BCM43430/1
[ 7.098671] brcmfmac mmc1:0001:1: Direct firmware load for brcm/brcmfmac43430-sdio.clm_blob failed with error -2
[ 7.112736] brcmfmac mmc1:0001:1: Falling back to syfs fallback for: brcm/brcmfmac43430-sdio.clm_blob
[ 8.034398] systemd-journal[192]: Received request to flush runtime journal from PID 1
[ 8.307647] brcmfmac: brcmf_c_process_clm_blob: no clm_blob available (err=-11), device may have limited channels available
[ 8.311894] brcmfmac: brcmf_c_preinit_dcmts: Firmware: BCM43430/1 wl0: Mar 30 2016 11:30:56 version 7.45.77.h8.4 FWID 01-ee8a6268
[ 8.468024] cfg80211: failed to load regulatory.db
[ 8.777141] media: Linux media interface: v0.10
[ 8.791229] mali: loading out-of-tree module taints kernel.
[ 8.802801] Allwinner sunxi mali glue initialized
[ 8.804860] Registered IR keymap rc-empty
[ 8.805108] rc rc0: sunxi-ir as /devices/platform/soc/1f02000.ir/rc/rc0
[ 8.805556] input: sunxi-ir as /devices/platform/soc/1f02000.ir/rc/rc0/input5
[ 8.806450] rc rc0: lirc_dev: driver sunxi-ir registered at minor = 0, raw IR receiver, no transmitter
[ 8.811998] Mali:
[ 8.812008] Found Mali GPU Mali-400 MP r1p1
[ 8.812725] sunxi-ir 1f02000.ir: initialized sunXi IR driver
[ 8.816537] videodev: Linux video capture interface: v2.00
[ 8.847290] ov5640 2-003c: Linked as a consumer to regulator.5
[ 8.847385] ov5640 2-003c: Linked as a consumer to regulator.6
[ 8.847472] ov5640 2-003c: Linked as a consumer to regulator.4
[ 8.850168] Mali:
[ 8.850180] 2+0 PP cores initialized
[ 8.851383] Mali:
[ 8.851390] Mali device driver loaded
[ 8.880132] ov5640 2-003c: ov5640_read_reg: error: reg=300a
[ 8.885969] ov5640 2-003c: ov5640_check_chip_id: failed to read chip identifier
```

```
[ 8.893761] ov5640 2-003c: Dropping the link to regulator.5
[ 8.893853] ov5640 2-003c: Dropping the link to regulator.6
[ 8.893914] ov5640 2-003c: Dropping the link to regulator.4
[ 9.941571] EXT4-fs (mmcblk0p1): mounted filesystem with ordered data mode. Opts: (null)
[ 10.912016] Generic PHY 0.1:01: attached PHY driver [Generic PHY] (mii_bus:phy_addr=0.1:01, irq=POLL)
[ 10.925866] dwmac-sun8i 1c30000.ethernet eth0: No Safety Features support found
[ 10.925896] dwmac-sun8i 1c30000.ethernet eth0: No MAC Management Counters available
[ 10.925918] dwmac-sun8i 1c30000.ethernet eth0: PTP not supported by HW
[ 10.927314] IPv6: ADDRCONF(NETDEV_UP): eth0: link is not ready
[ 11.141416] IPv6: ADDRCONF(NETDEV_UP): wlan0: link is not ready
[ 12.003556] dwmac-sun8i 1c30000.ethernet eth0: Link is Up - 100Mbps/Full - flow control rx/tx
[ 12.003643] IPv6: ADDRCONF(NETDEV_CHANGE): eth0: link becomes ready
[ 12.798637] IPv6: ADDRCONF(NETDEV_CHANGE): wlan0: link becomes ready
[ 56.711762] random: crng init done
[ 56.711814] random: 7 urandom warning(s) missed due to ratelimiting
[ 521.245276] Bluetooth: BNEP (Ethernet Emulation) ver 1.3
[ 521.245291] Bluetooth: BNEP filters: protocol multicast
[ 521.245324] Bluetooth: BNEP socket layer initialized
[ 525.482009] Bluetooth: hci0: sending frame failed (-49)
[ 668.728660] Bluetooth: hci0: last event is not cmd complete (0x0f)
```