# Blackview BV4800 MT6761V

## 2024/02/29

## For Rooting a mediatek device we need some tools

1. MTKclient : MTKclient on GitHub
2. Magisk : Magisk on GitHub

## MTK client Installation

### For ArchLinux

```
(sudo) pacman -S  python python-pip git libusb
```

or

```
yay -S python python-pip git libusb
```

### Grab files and install

```
git clone https://github.com/bkerler/mtkclient
cd mtkclient
```

### Create a python environment and got into it

```
python3.8 -m venv env
source env/bin/activate
```

### Install requirements

```
 pip install -r requirements.txt
```

### Start gui interface

```
python mtk_gui
```

> connect your phone following the steps given in mtk client gui

when device is connected we can't quit and use command line or stay in gui

# Use MTK client with command line to get file boot and vbmeta

download boot.img and vbmeta.img

```
python mtk r boot_a,vbmeta_a boot.img,vbmeta.img
```

> For another device, the file to be patch is "boot", "recovery.img" or "init_boot.img".

# Unlock bootloader

```
python mtk da seccfg unlock
```

# Install Magisk and patch the boot.img

Install **Magisk-v26.1.apk** to the smartphone storage using **adb.** **Github Magisk Release**

```
adb install Magisk-v26.1.apk
```

> Attention only version 26.1 of Magisk works, higher versions are not functional for this phone

Copy the file **boot.img** to the smartphone storage using the **adb push** command.

```
adb push boot.img /sdcard/Download
```

Launch the Magisk app on the phone and select *Magisk* ⇒ *Install* ⇒ **Select and Patch a File**: point the program to the **boot.img** file that you uploaded into the phone storage. After a little of work you should obtain a modified boot image saved into a file like `/sdcard/Download/magisk_patched-26100_xxxxx.img`. The image should contain a modified ramdisk, which will provide the **su** command (superuser) when the Android system is running, but actually without modifying the **system** partition.

Download the patched boot.img to your PC using the **adb pull** command.

```
adb pull /sdcard/Download/magisk_patched-26100_xxxxx.img ./
```

# Sign the patched boot.img and vbmeta.img

Thanks to Niccolo Rigacci

## Sign the patched boot.img

The Blackview BV4800 is based on Android 13 and the Android Verified Boot process cannot be disabled. So the patched **boot.img** must be signed with an **RSA public/private key** and the public part must be included into the **vbmeta.img** partition.

You need the **avbtool.py** tool (it is a Python 3 script, so you must have Python 3 installed); with that script you can get some info from the original boot.img:

```
python avbtool.py info_image --image 'boot.img'
```

```
Footer version:           1.0
Image size:               33554432 bytes
Original image size:      22501376 bytes
VBMeta offset:            22503424
VBMeta size:              1600 bytes
--
Minimum libavb version:   1.0
Header Block:             256 bytes
Authentication Block:     320 bytes
Auxiliary Block:          1024 bytes
Public key (sha1):        9d808b0995768d0677fccb1efcddb7cf9e153d99
Algorithm:                SHA256_RSA2048
Rollback Index:           0
Flags:                    0
Rollback Index Location:  0
Release String:           'avbtool 1.2.0'
Descriptors:
    Hash descriptor:
      Image Size:            22501376 bytes
      Hash Algorithm:        sha256
      Partition Name:        boot
      Salt:                  1ebb2b638d8a865610ed60b1c8f3f9c6bb74a7e917fd12fd99c75345db3a35b9
      Digest:                9868b791c0f58a01b8d0803607dd6aabb7da52751090c97f8dd7d8838ef35fd8
      Flags:                 0
    Prop: com.android.build.boot.fingerprint -> 'Blackview/BV4800_EEA/BV4800:12/SP1A.210812.016/1697881394:user/release-keys
    Prop: com.android.build.boot.os_version -> '12'
    Prop: com.android.build.boot.security_patch -> '2019-06-06'
```

The output will reveal the **partition image size** (33554432 bytes, which is exactly the size of the file) and that the public key **algorithm** is *SHA256_RSA2048*.

Then you need a 2048 bit RSA key; you can create your own, but it is common practice to use the one included into the Android SDK. Download the RSA key named **testkey_rsa2048.pem**.

you can Download it from android.googlesource.com

testkey_rsa2048.pem

With all this information, you can sign the file (actually add an hash footer inside the file). Beware that the file will be patched in-place, so make a backup copy before running the command:

```
cp 'magisk_patched-26100_xxxxx.img' 'magisk_patched-26100_xxxxx-signed.img'


python avbtool.py add_hash_footer \
    --image 'magisk_patched-26100_xxxxx-signed.img' \
    --partition_name 'boot' --partition_size '33554432' \
    --key 'testkey_rsa2048.pem' --algorithm 'SHA256_RSA2048'
```

## Create and sign a custom vbmeta.img

Since Android Verified Boot in this device cannot be disabled, we need a properly crafted and signed **vbmeta.img** partition. Essentially the vbmeta partitions contains:

- An header with the overall **signing hash**.
- A **list of partition names** to be verified by the bootloader. Along with each name there is **the public key** to be used for the verification (where the private part was used for signing that partition).
- The **public key** whose private part was used for signing the whole vbmeta partition.

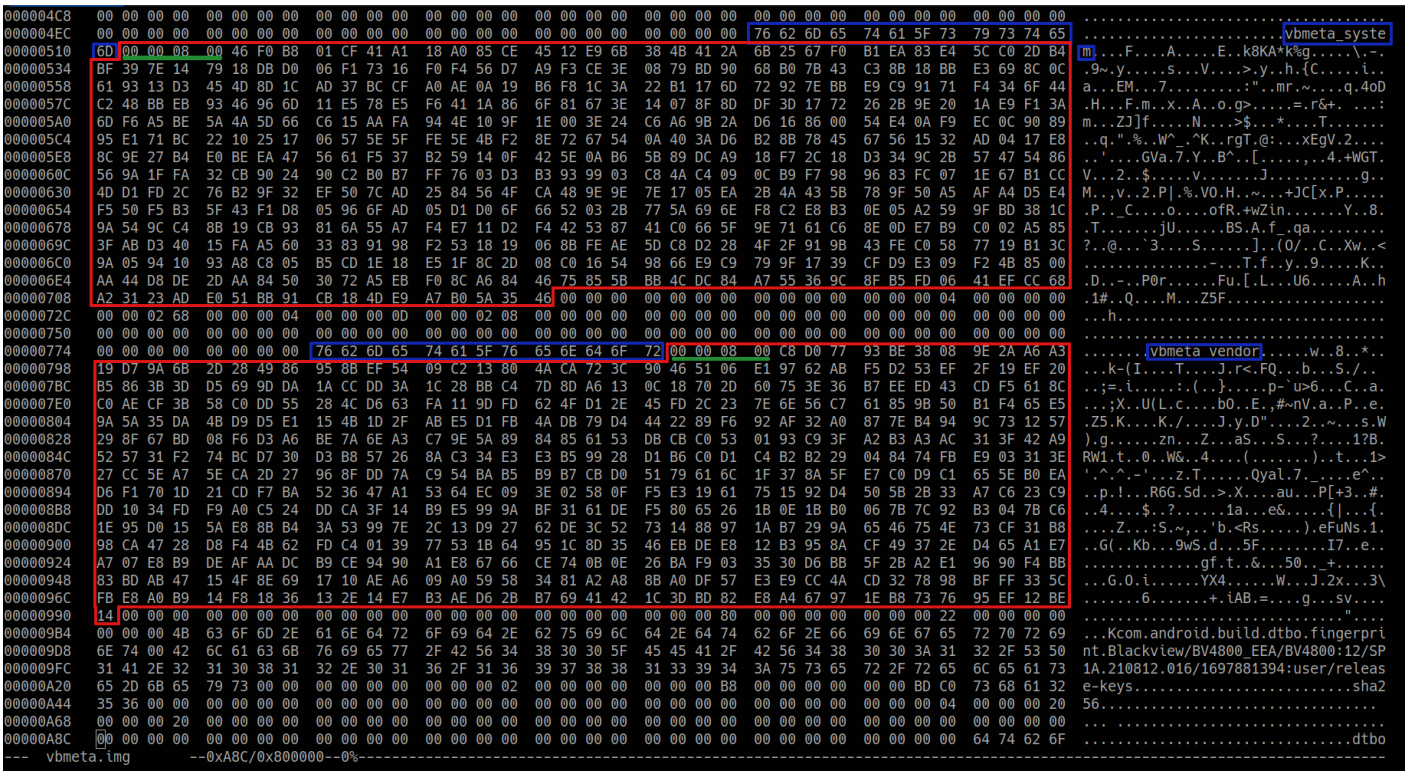
For the overall signing of the vbmeta partition we will use the same **testkey_rsa2048** used to sign the boot partition; we need to extract the public part from it (all the keys to be used will be saved into a `keys` subdirectory):

```
python avbtool.py extract_public_key \
    --key 'testkey_rsa2048.pem' \
    --output 'keys/testkey_rsa2048_pub.bin'
```

**NOTICE**: All the public keys used here are saved into the **AvbRSAPublicKeyHeader** format, not the default PEM or DER formats used by openssl. This is a specific format for the Android Verified Boot process.

From **vbmeta.img** we need to **extract all the public keys of the partitions that were not altered** (i.e. all the partitions listed in it, except the **boot** one). Browsing the *vbmeta.img* file with an **hex editor** it is easy to spot each entry of the list; it is composed as follows:

- An empty space made up of **64 zero bytes**.
- The name of the partition, e.g. **vbmeta_system**.
- A token of four bytes: **0x00 0x00 0x08 0x00** (this should be the default token for a 2048 bit key).
- The actual key in **AvbRSAPublicKeyHeader** format. A 2048 bit keys results into a **516 bytes** chunk.




The *vbmeta* partition of the Blackview BV4800 contains the signing information about the following partitions:

- boot
- vbmeta_system
- vbmeta_vendor

With an hex editor we need to extrac only the keys for **vbmeta_system** and **vbmeta_vendor** including the initial 4 bytes token, thus creating two files of **520 bytes each**. That key files will be used to create the signed custom vbmeta image, in fact the *vbmeta_system* and *vbmeta_vendor* images are unaltered, so we re-use the same public keys. I used the Linux program **hexedit**: with F9 and the arrows it is possibile to select a bytes region, F7 to copy and Ctrl-Y (or ESC+Y for Linux) to save the copied region into a new file.

result files must be 520 :

-rw-r--r-- 1 user user 520  key_vbmeta_system.bin
-rw-r--r-- 1 user user 520  key_vbmeta_vendor.bin
-rw-r--r-- 1 user user 520 testkey_rsa2048_pub.bin

So we have three key files: **keys/key_vbmeta_system.bin** and **keys/key_vbmeta_vendor.bin** extracted from the original *vbmeta* image and **keys/testkey_rsa2048_pub.bin** that we will use to sign the custom *boot* image.

For the final recipe we need some other piece of information; launch **avbtool.py** to get **info_image** from the original **vbmeta.img**:

```
python avbtool.py info_image --image 'vbmeta.img'
```

```
Minimum libavb version:   1.0
Header Block:             256 bytes
Authentication Block:     320 bytes
Auxiliary Block:          2752 bytes
Public key (sha1):        cdbb77177f731920bbe0a0f94f84d9038ae0617d
Algorithm:                SHA256_RSA2048
Rollback Index:           0
Flags:                    0
Rollback Index Location:  0
Release String:           'avbtool 1.2.0'
Descriptors:
    Chain Partition descriptor:
      Partition Name:          boot
      Rollback Index Location: 3
      Public key (sha1):       9d808b0995768d0677fccb1efcddb7cf9e153d99
    Chain Partition descriptor:
      Partition Name:          vbmeta_system
      Rollback Index Location: 2
      Public key (sha1):       fa41159a5d696abdef93176a07d0b0d001263f01
    Chain Partition descriptor:
      Partition Name:          vbmeta_vendor
      Rollback Index Location: 4
      Public key (sha1):       9577bc6c0772975ecce93c4d8a178662c728dadf
    Prop: com.android.build.dtbo.fingerprint -> 'Blackview/BV4800_EEA/BV4800:12/SP1A.210812.016/1697881394:user/release-keys'
    Hash descriptor:
      Image Size:            48576 bytes
      Hash Algorithm:        sha256
      Partition Name:        dtbo
      Salt:                  3191d5abfd4b659da47ba71f4fe9472e1276d792d92b06660c6a13e437a309c4
      Digest:                e776163e08f6bb5225d4fa17d99adf205bf2c54c299688282fa722c8f8b673fc
      Flags:                 0
```

What we need is the **Flags** value and the **Rollback Index Location** for each of the listed partitions. With that information we can compose the final command to create the custom and signed *vbmeta* partition:

```
python avbtool.py make_vbmeta_image \
    --key 'testkey_rsa2048.pem' --algorithm 'SHA256_RSA2048' --flag 0 \
    --chain_partition 'vbmeta_system:2:keys/key_vbmeta_system.bin' \
    --chain_partition 'vbmeta_vendor:4:keys/key_vbmeta_vendor.bin' \
    --chain_partition 'boot:3:keys/testkey_rsa2048_pub.bin' \
    --padding_size '48576' --output 'vbmeta-custom-sign.img'
```

You should be able to understand each parameter: the *flag* (zero in our case), each partition name is followed by its *Rollback Index Location* and the name of the file containing the public key used to sign it, the padding size is the overall size of the vbmeta.img file.

We used the same *Rollback Index Location* used in the original vbmeta image. In teory an unlocked bootloader should accept any rollback index, while a locked bootloader will refuse to boot from lower indexes to prevent the downgrade of the firmware.

# Use MTK client with command line to push file patched_Signed_boot and signed_vbmeta

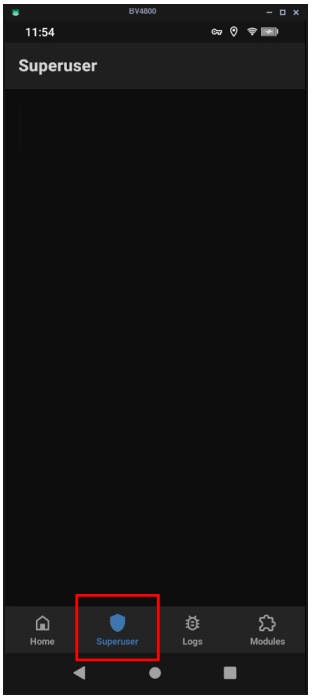
```
python mtk w boot_a,vbmeta_a magisk_patched-26100_biB8t-signed.img,vbmeta-custom-sign.img
```

Once installation is complete, we can restart the device.

```
python mtk reset
```

## Open magisk

> See if you can open superuser,  if so, you're root!




# Web References

MTKclient on GitHub

Magisk on GitHub

avbroot on Github

Rooting blackview bv5300 by Niccolo Rigacci

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