



Turning Your Unused STB into a Mini-Server with Ubuntu Server.

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UbuCon Asia 2022

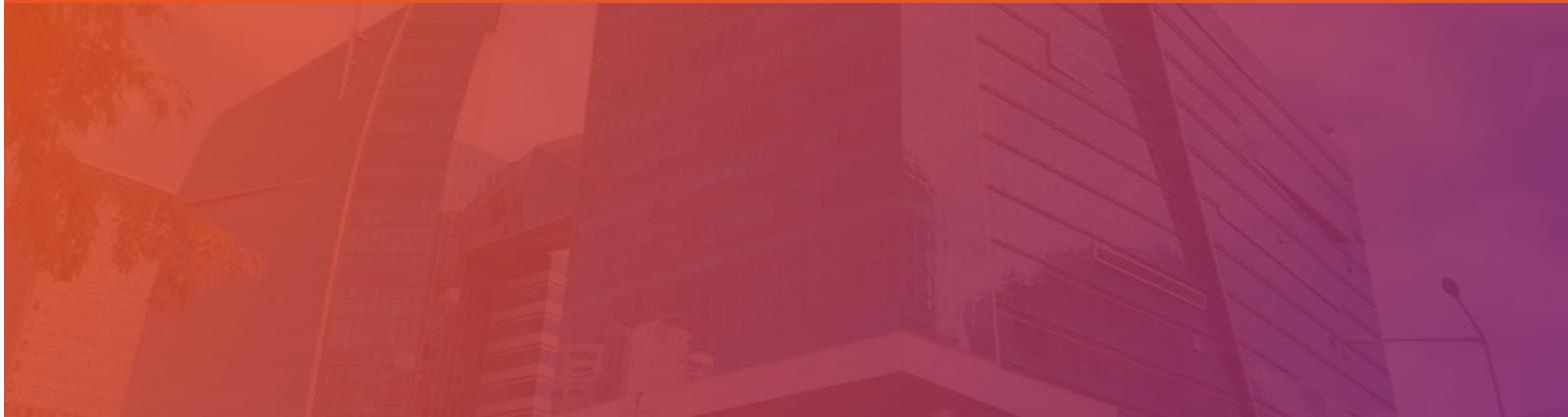
Turning Your Unused TV's Set Top Box Into A Home Server (with Ubuntu Server)

Akmal Pratama





Chapter A: Introduction.





What is STB?

A Set Top Box is a device that allows users to view video content from specific internet video providers via the internet. Also known as a Set Top Unit, these boxes convert a digital television signal to analog to be viewed on a conventional television set, or enable cable or satellite television to be viewed.

(Source: haivision.com)





We're not talking about this ...





But we're talking about this ...





Not too expensive!

Star Bluetooth Smart TV Box Sets 2+16G 4+64G Android TV BOX 10 4K
HDR 2.4G&5.8G Wifi TV Receiver

4.6 ★★★★★ | 1,4RB Ratings | 3RB Sold



Special Price IDR 152,000

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More about IDR/KRW →

Feedback



Pros & Cons by using STB.

Pros

1. Way far better quality streaming compared by Antenna!.
2. More channels and features available and can be watched by the help of STB.
3. Turning your old TV into functioning like a Smart TV running Android OS.

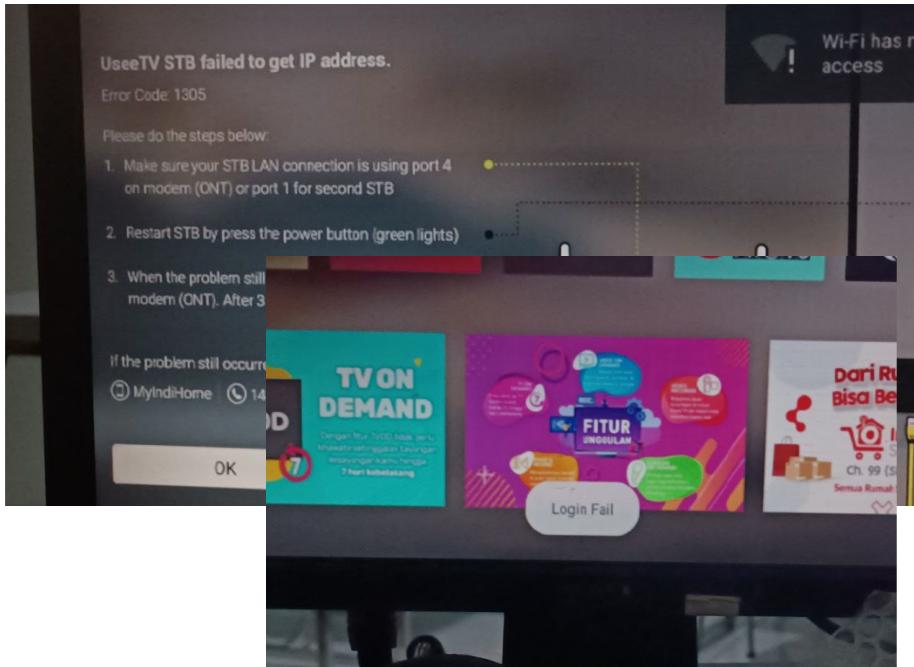
Cons

1. Highly cost monthly fees from the cable provider. 🤑
2. Requires a high-speed internet connection in order to work smoothly.
3. Offline authentication servers making it barely usable.
4. Locked system configurations + Offline servers = Lack of usage.



Why is it rarely used today?

1. Every TV that's made as of right now are all supporting Digital Channels.
 2. Most of old subscription-based STB server are down already. Leaving the item unusable.
 3. Not too customizable, due to lack of features and modifications ability.





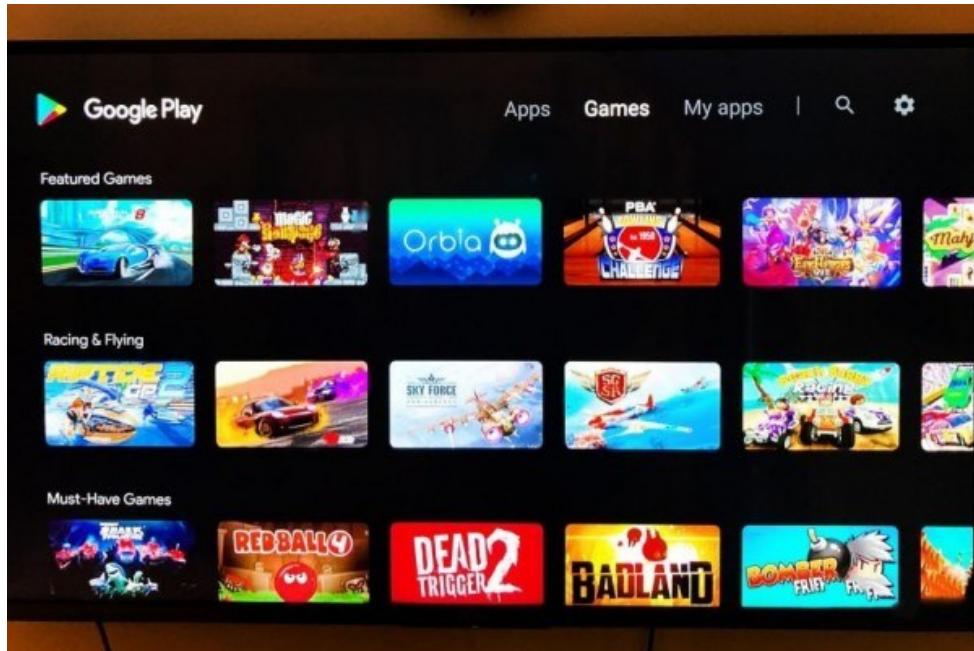
What OS does most STB runs on?

	Android TV	-	Android Open Source Project (...)	Leanback Launcher
	Xbox OS	-	Windows 10	Xbox UI
	Google TV	-	Android Open Source Project (...)	GoogleTV Launcher
	PlayStation OS	-	FreeBSD	PlayStation UI
	Batocera.linux	-	Recalbox	Emulatorstation or Kodi
	SteamOS	-	Debian	Steam Big Picture, Gnome



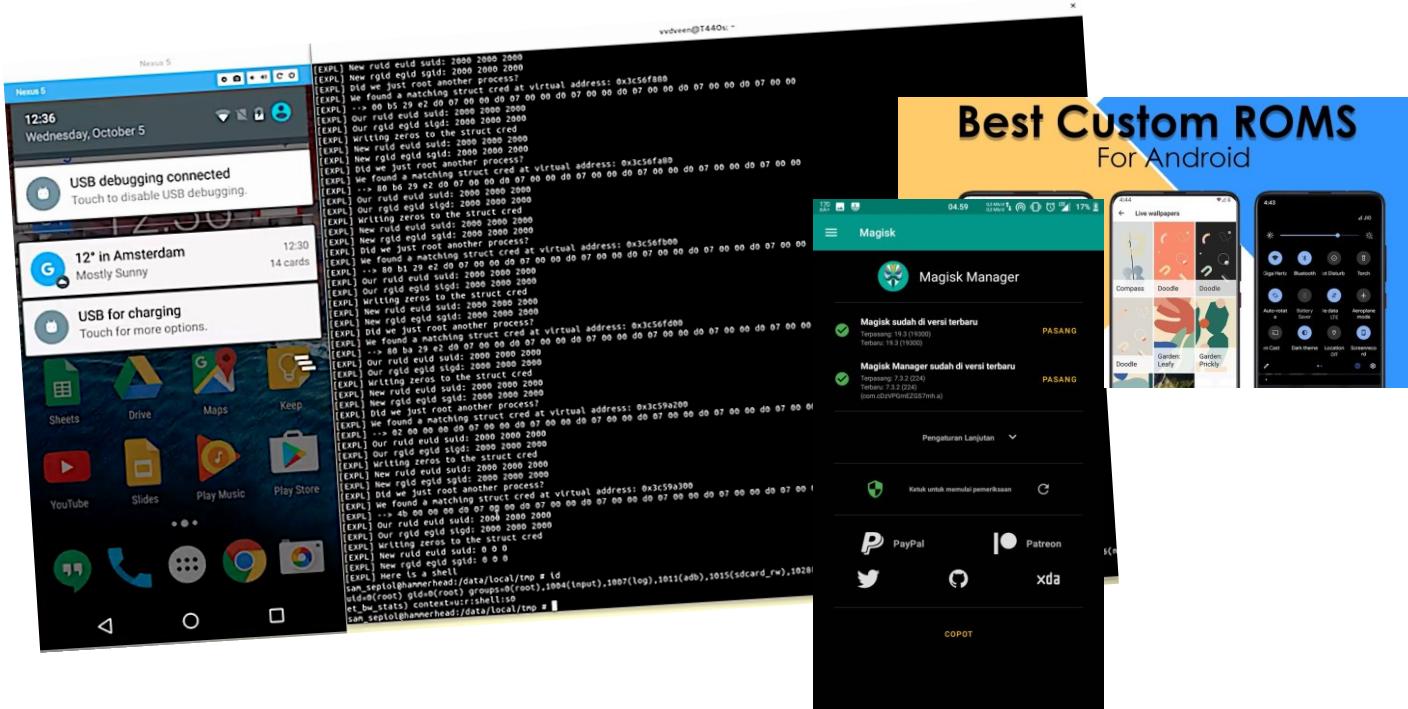


Android? Good news!





So customizable!





One of the requirements to unlock limitations of every Android device, is...

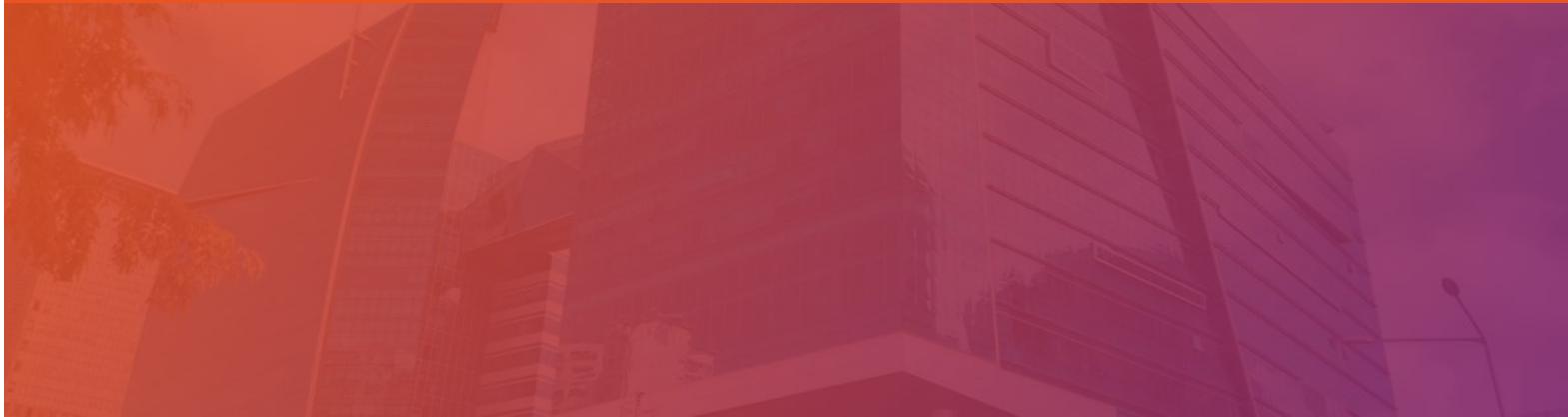


One of the requirements to unlock limitations of every Android device, is...





Chapter B: Problems





The only STB in my organization have is just this Indihome B860H V5 with a new type of board.





Bad news! We can't directly root the device!





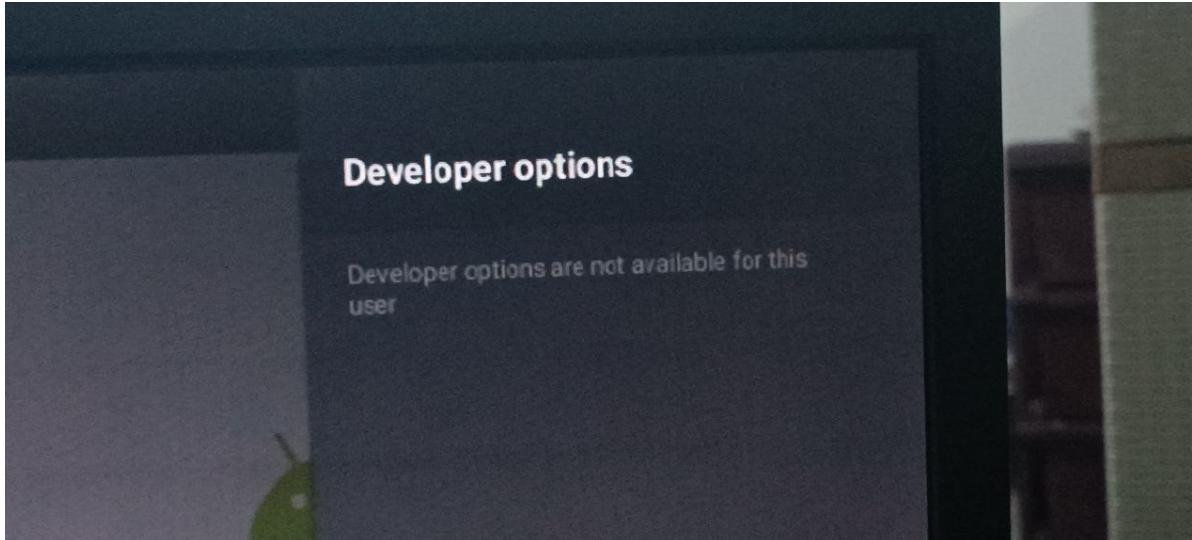
Why though?





Why though?

Blocked Developer Tools





Why though?

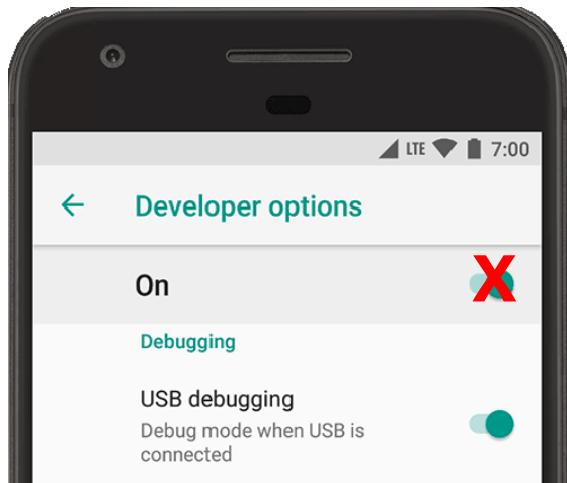
Can't install *.apk files.





Why though?

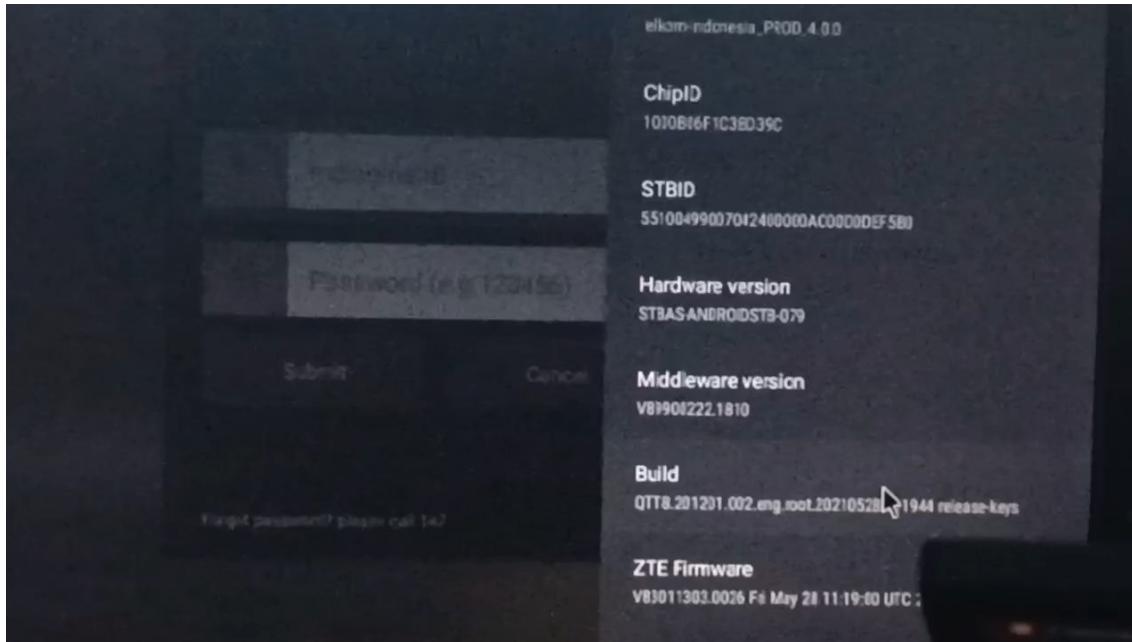
Can't connect to Shell.





Why though?

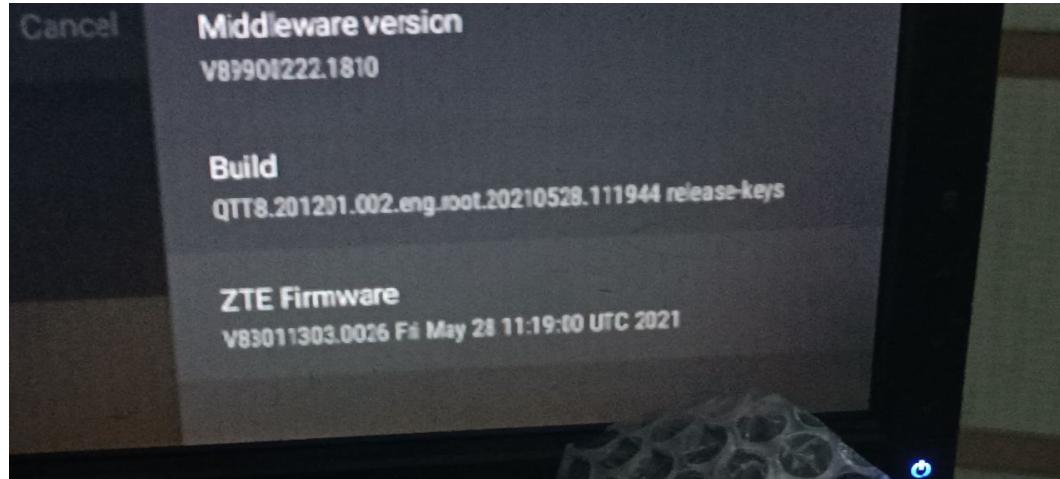
Blocked Developer Tools





Why though?

Built-in firmware is locked totally.





Why though?

Solutions?



We're going to replace the entire firmware of the STB.

So, everything is possible!.





Chapter C: Preparation.



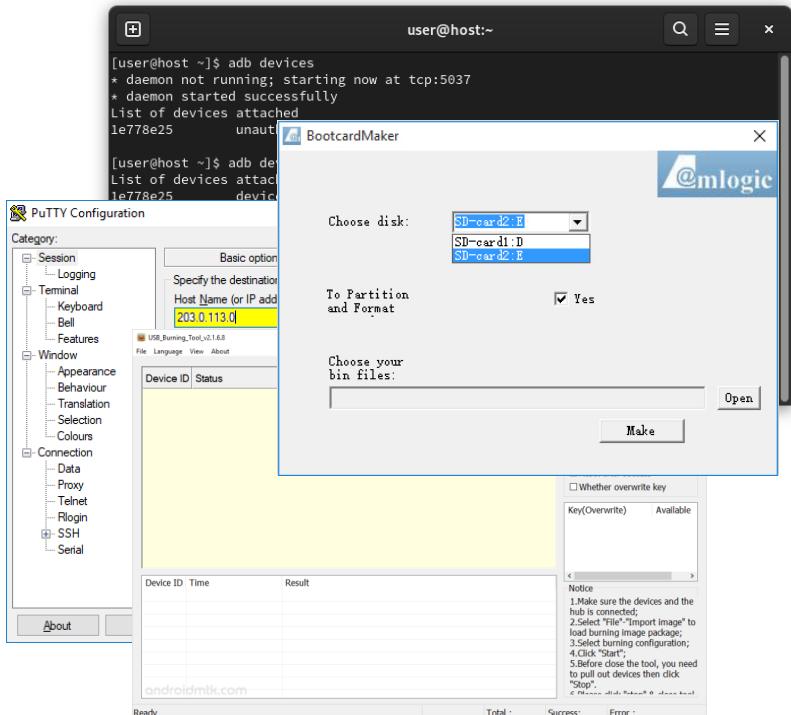


Software used to flash custom firmwares?



Software used to flash custom firmwares?

- ADB Utilities / Terminal.
- PUTTY
- USB Burning Tool.
- Amlogic Bootcard Maker.





Prepare the following tools:

1. The STB (of course)
2. Female-to-Female jumper wires
3. USB-to-TTL
4. USB-to-USB
5. SD Card





Searching for Pre-Rooted Firmwares...

The image displays two side-by-side screenshots of Telegram group chats. Both groups have a dark theme.

Left Group: Realunix

- Pinned message: "Just Reminder: Demi Kepentingan bersama mohon untuk..."
- Message from Realunix Assisten: "Halo om Didit
Berikut link download yang tersedia untuk Realunix 😊"
- Message from Akari ax512: "=> Realunix Pro ax-512"
- Message from Akari ax512 (update): "=> Realunix Pro ax-512"
- Message from B860h v5 Android 10: "=> RealUNIX B860H os10"
- Message from AeroRealunix Android 10 | Powered by Aero (Abu Aulian): "=> AeroRealunix
Pass : aerosupersu"
- Message from HG680-FJ: "=> Realunix HG680-FJ"
- Message from Realunix Assisten: "+ File Tambahan +
=> FW ORI B860H v5 OS10
=> Fw Upgrade OS9 to OS10

Right Group: ANDROID FLASHER

- Message from maz hadi: "diki flasher
mantap
izin sher apk bermanfaat bang 16:23"
- Message from diki flasher: "owner
maz hadi
izin sher apk bermanf...
monggo bang 16:24"
- Message from maz hadi: "AlfinetTV Pro (SFILE.MOBI)(1).apk
16.5 MB
- Message from maz hadi: "SBOTVMAX NEW VERSION (SFILE.MOBI).apk
16.4 MB
- Message from maz hadi: "SBOTV Terbaru(Danangiskadar).apk
17.3 MB
- Message from maz hadi: "AirMax TV (SFILE.MOBI).apk
9.8 MB
Password nya= 8401078695 16:26



Searching for Pre-Rooted Firmwares...

Realunix: <https://t.me/realunix1212>

Android Flasher: <https://t.me/+szzBKdQK-PI2NDE1>
(INDONESIAN-SPEAKING GROUP CHAT)



Searching for Pre-Rooted Firmwares...

Once you found the perfect one, download the modified firmware. We're going to use this in the USB Burning Tool.



Let's start flashing!





Chapter D: Flashing Process.





Steps to Flash:

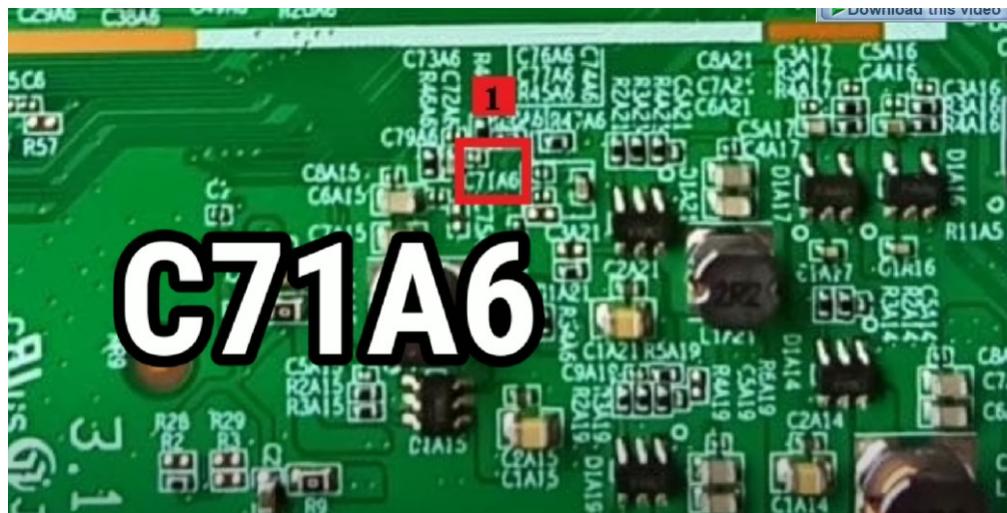
1. Unbox the Body of the STB so we can access the pins in the Internal board.





Steps to Flash:

2. Search for the test-point. For my model, the short-pin point is at the C71A6. You can use a screw driver or a needle to short-pin.





Steps to Flash:

3. Prepare your USB-to-TTL and Hook Clip. And search for the Hook Clip point. And check which one is the point GND, TX and RX. (i get help from community for this)





Steps to Flash:

4. Connect the USB-to-USB from the STB to the computer.





Steps to Flash:

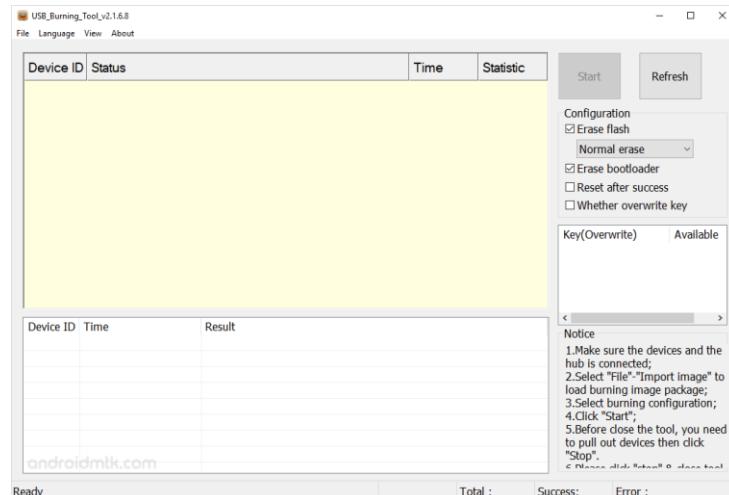
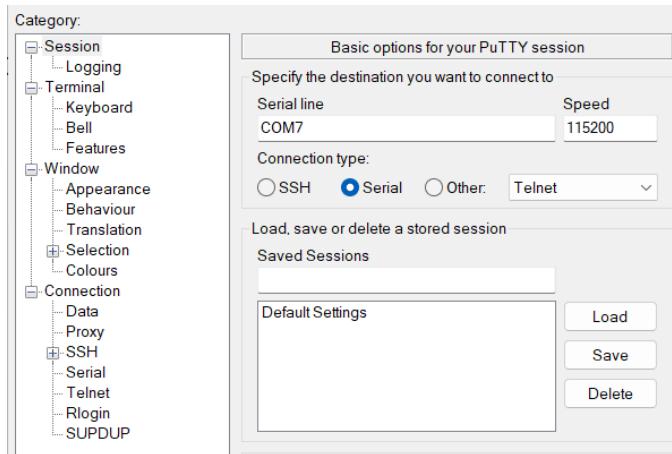
5. Connect all the Hook Clip to the desired points, and match the female cable in the USB-to-TTL as the points detail. (RX to RX, GND to GND, TX to TX)





Steps to Flash:

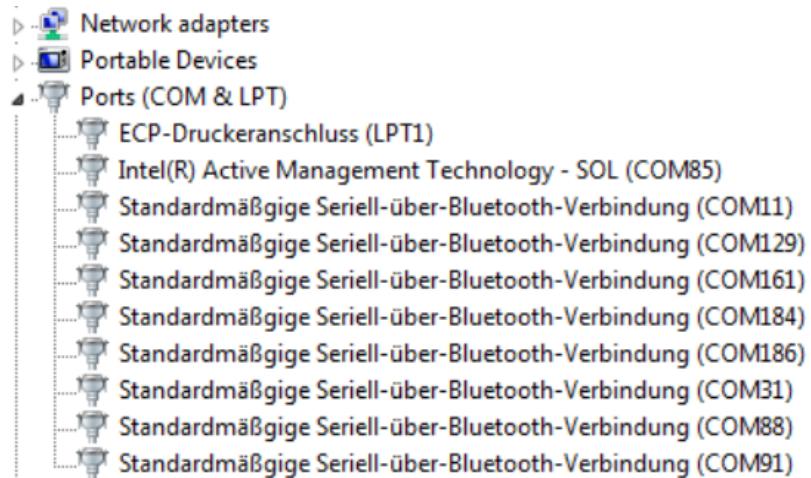
6. Once you're done, open up both PUTTY and USB Burning Tool. On PUTTY, connect to the serial line and set the speed to 115200.





Steps to Flash:

7. If you don't know what the COM port is, go to Device Manager and check for "Ports (COM & LPT)" dropdown. You'll see all available ports like below.





Steps to Flash:

8. Now, once you connect both. Power on the STB and directly short-pin the points (C71A6). If the PUTTY outputs a shell prompt (g12a_u212_v1#) Means that it's successful.

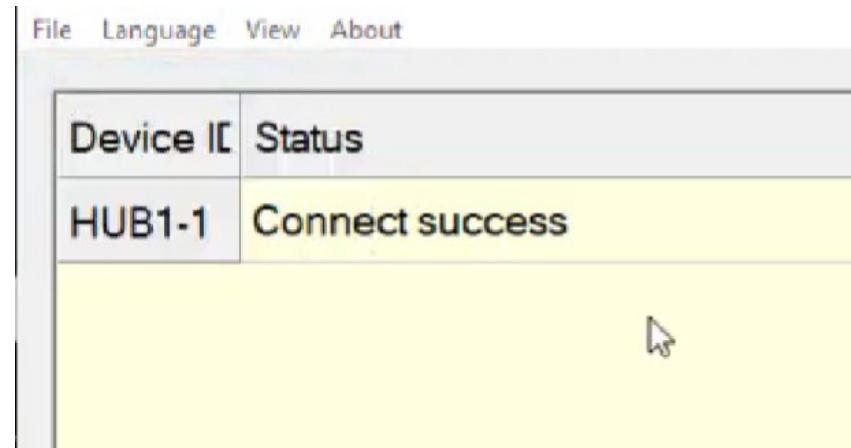
```
chipid: 1000B07707363A17, ret=8
Saving Environment to aml-storage...
_find_partition_by_name()-198: do not find match in table env
get partition info failed !!
bootmode:NORM
_find_partition_by_name()-198: do not find match in table boot
Cannot find dev.
## defenv_reserve
Saving Environment to aml-storage...
_find_partition_by_name()-198: do not find match in table env
get partition info failed !!
boot system norm failed, try boot safe!
_find_partition_by_name()-198: do not find match in table recovery
Cannot find dev.
g12a_u212_v1#
```



Steps to Flash:

9. Now go into the Update Mode, by typing “update” in the shell prompt. The USB Burning Tool will shows a device saying “Connect success”.

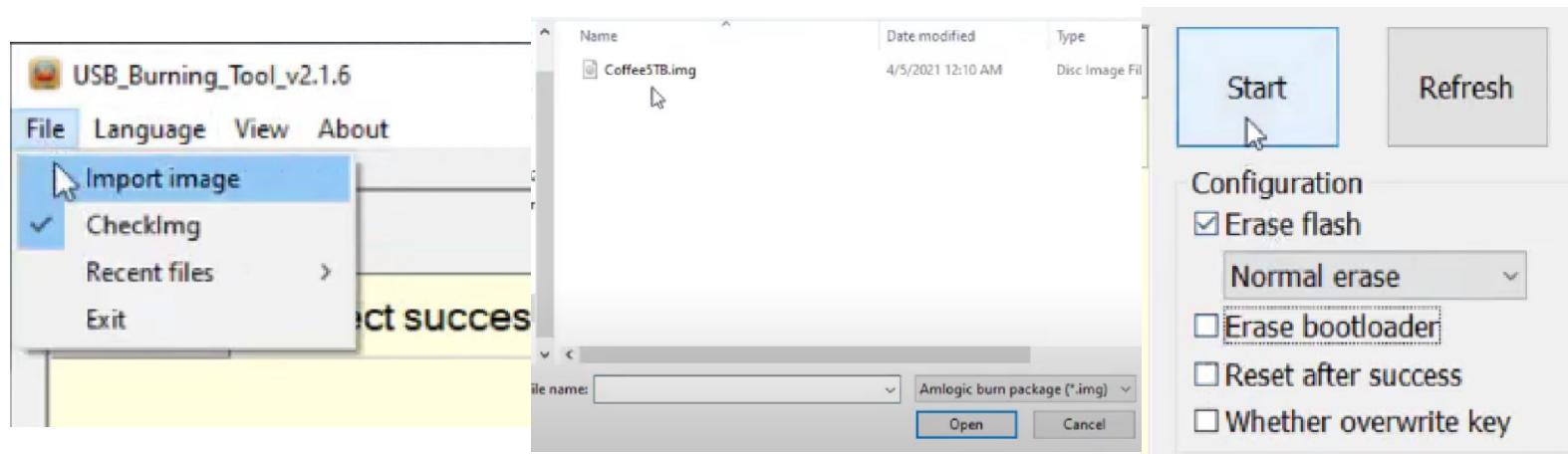
```
gl2a_u212_v1#update  
InUsbBurn  
[MSG] sof  
Set Addr 12  
Get DT cfg  
Get DT cfg  
Get DT cfg  
set CFG  
[]
```





Steps to Flash:

- Once connect success, go to File > Import Image. Select the firmware image. And **UNCHECK “ERASE BOOTLOADER”** then Click on Start.





Steps to Flash:

11. Now just wait until the process is finished. You can see the flashing output directly by the PUTTY console. **Do not turn off or unplug any cable.**

Device ID	Status
HUB1-1	13%:Download logo

```
BULKcmd[verify shalsum 2639cf0c060768aa042552b69d722bb2f9d3c8cd1]
[MSG]Verify Start...
[MSG]To verify part dtbo in fmt normal
[MSG]Verify End
[MSG]VERIFY OK
[info]success

ID[16]
tplcmd[download store logo normal 3145728]
[MSG]flash LOGIC partCap 0x800000B
[MSG]Down(store) part(logo) sz(0x300000) fmt(normal)
[MSG]totalSlotNum = 0, nextWriteBackSlot 1
[info]success
[MSG]Burn Start...
[MSG]Burn complete
BULKcmd[download get_status]
[info]success
BULKcmd[verify shalsum 878c0f74717169d3a41b5008edf52617d7425866]
[MSG]Verify Start...
[MSG]To verify part logo in fmt normal
[MSG]Verify End
[MSG]VERIFY OK
[info]success
```



Steps to Flash:

12. If you do the steps correctly, this will shows up. The progress bar turned green and an output “Burning successfully”. Your rooted STB is ready!.

The screenshot displays a software interface for flashing a device. At the top, there's a header with the text "Device ID" and "Status". Below this is a table with one row. The first column is "HUB1-1", the second column is "Status" which contains the text "100%:Burning successfully" highlighted in green, the third column is "Time" with the value "4:49", and the fourth column is "Statistic" with the value "0/1". To the right of the table are two buttons: "Stop" and "Refresh". Below the table is a large yellow rectangular area. To the right of this area is a "Configuration" section containing several checkboxes: "Erase flash" (checked), "Normal erase" (selected), "Erase bootloader" (unchecked), "Reset after success" (unchecked), and "Whether overwrite key" (unchecked). Further down is a "Key(Overwrite)" section with a "Available" button. At the bottom of the interface is a "Notice" section with the following text:
1. Make sure the devices and hub is connected;
2. Select "File"->"Import image" to load burning image package;
3. Click "Burn" to start burning.

Device ID	Status	Time	Statistic
HUB1-1	100%:Burning successfully	4:49	0/1

Device ID	Time	Result
HUB1-1	2021-05-10 14:03:18 476	[0x00000000]Burning successfully



Chapter E: Turning it to a server.





About Armbian

Armbian is a computing build framework that allows users to create ready-to-use images with working kernels in variable user space configurations for various single board computers.

It provides various pre-build images for some supported boards. These are usually Debian or Ubuntu flavored.

(Source: wikipedia.org)





Armbian Focal Server

The Armbian Focal is based on Ubuntu Focal (20.04)

<https://www.mediafire.com/file/f4urfcvpekca216/m03l.id-armbian-focal-current-5.9.0-fullsetting-servermode.docker.inject.AP.img.xz/file>

<https://bit.ly/ArmbianFocalImage>

```
Welcome to Armbian 20.08.2 Bionic with Linux 5.8.6-sunxi64
System load: 1.22 0.90 0.36 Up time: 2 min
Memory usage: 9 % of 1925MB IP: 192.168.43.225
CPU temp: 29°C
Usage of /: 34% of 15G

[ General system configuration (beta): armbian-config ]

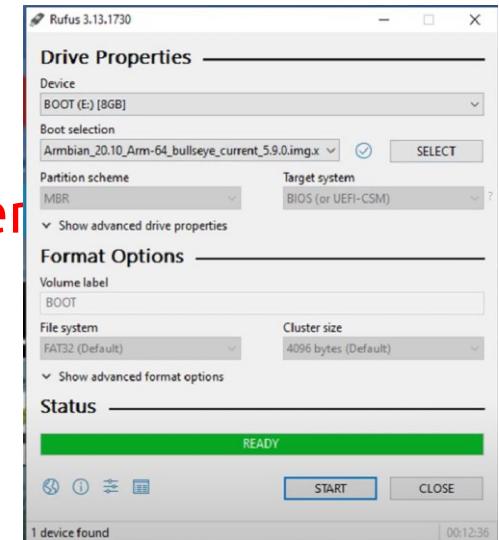
Last login: Sun Nov 8 17:36:14 2020 from 192.168.43.136
root@bananapim64:~#
```



Steps to Flash:

1. Prepare the SD Card and it's adapter. And open up Rufus or other image flashing softwares. Simply import the image file, and select the Device.

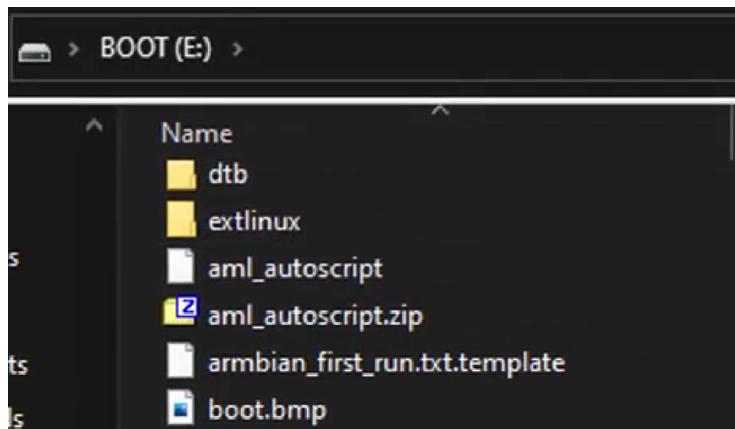
(Make sure to set File System FAT32, Partition Scheme MBR, and Target System is BIOS)





Steps to Flash:

- Once the file is flashed, go into the SD Card and open extlinux/extlinux.conf in your text editor. And scroll down, uncomment the second part of # aml s9xxx



```
#FDT /dtb/rockchip/rk3399-roc-pc-mezzanine.dtb
#APPEND root=LABEL=ROOTFS rootflags=data=writeback rw console=uart

# rk-3328
#FDT /dtb/rockchip/rk3328-roc-pc.dtb
#FDT /dtb/rockchip/rk3328-box-trn9.dtb
#FDT /dtb/rockchip/rk3328-box.dtb
#APPEND root=LABEL=ROOTFS rootflags=data=writeback rw console=uart

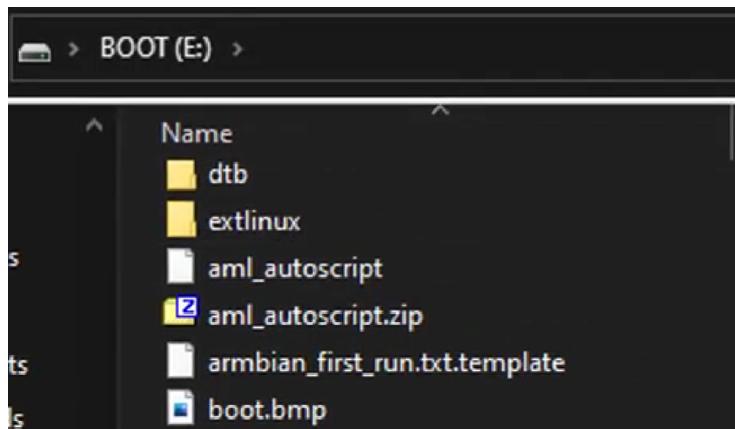
# aw h6
#FDT /dtb/allwinner/sun50i-h6-tanix-tx6.dtb
#APPEND root=LABEL=ROOTFS rootflags=data=writeback rw console=ttyS
#APPEND root=LABEL=ROOTFS rootflags=data=writeback rw console=ttyS

# aml s9xxx
#FDT /dtb/amlogic/meson-gxbb-p200.dtb
#FDT /dtb/amlogic/meson-gxl-s905x-p212.dtb ←
#FDT /dtb/amlogic/meson-q200.dtb
#FDT /dtb/amlogic/meson-g12a-x96-max.dtb
```



Steps to Flash:

- Once the file is flashed, go into the SD Card and open extlinux/extlinux.conf in your text editor. And scroll down, uncomment the second part of # aml s9xxx



```
#FDT /dtb/rockchip/rk3399-roc-pc-mezzanine.dtb
#APPEND root=LABEL=ROOTFS rootflags=data=writeback rw console=uart

# rk-3328
#FDT /dtb/rockchip/rk3328-roc-pc.dtb
#FDT /dtb/rockchip/rk3328-box-trn9.dtb
#FDT /dtb/rockchip/rk3328-box.dtb
#APPEND root=LABEL=ROOTFS rootflags=data=writeback rw console=uart

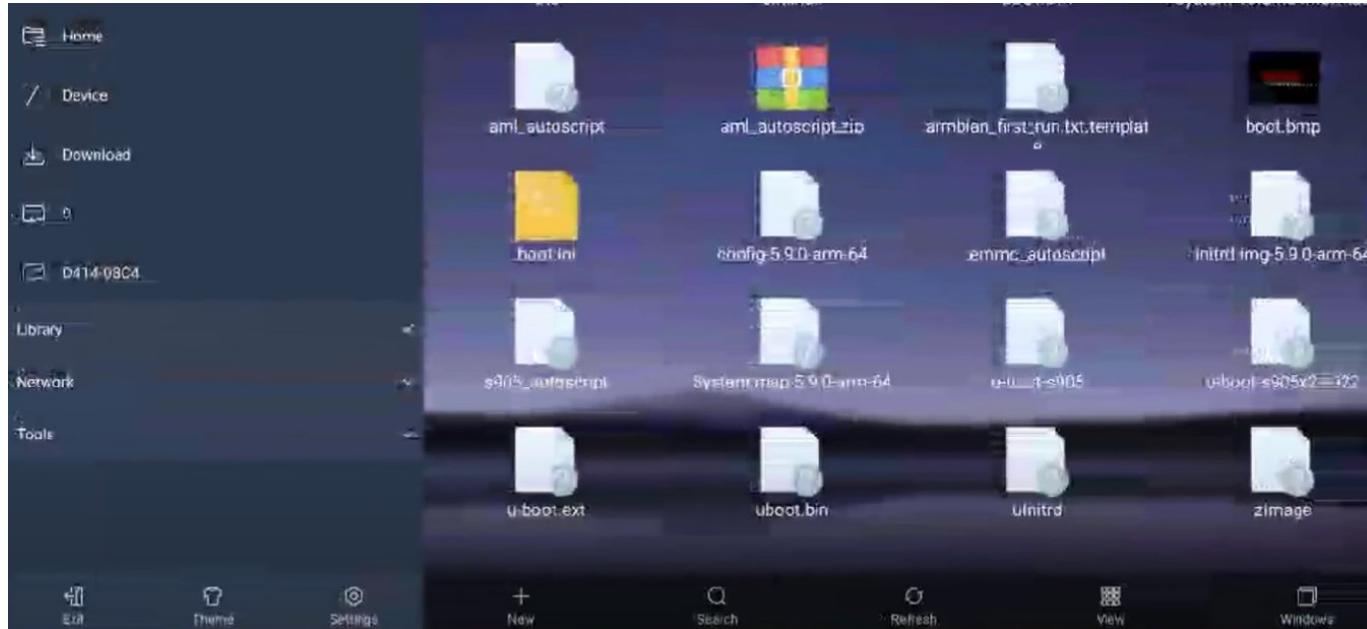
# aw h6
#FDT /dtb/allwinner/sun50i-h6-tanix-tx6.dtb
#APPEND root=LABEL=ROOTFS rootflags=data=writeback rw console=ttyS
#APPEND root=LABEL=ROOTFS rootflags=data=writeback rw console=ttyS

# aml s9xxx
#FDT /dtb/amlogic/meson-gxbb-p200.dtb
#FDT /dtb/amlogic/meson-gxl-s905x-p212.dtb ←
#FDT /dtb/amlogic/meson-q200.dtb
#FDT /dtb/amlogic/meson-g12a-x96-max.dtb
```



Steps to Flash:

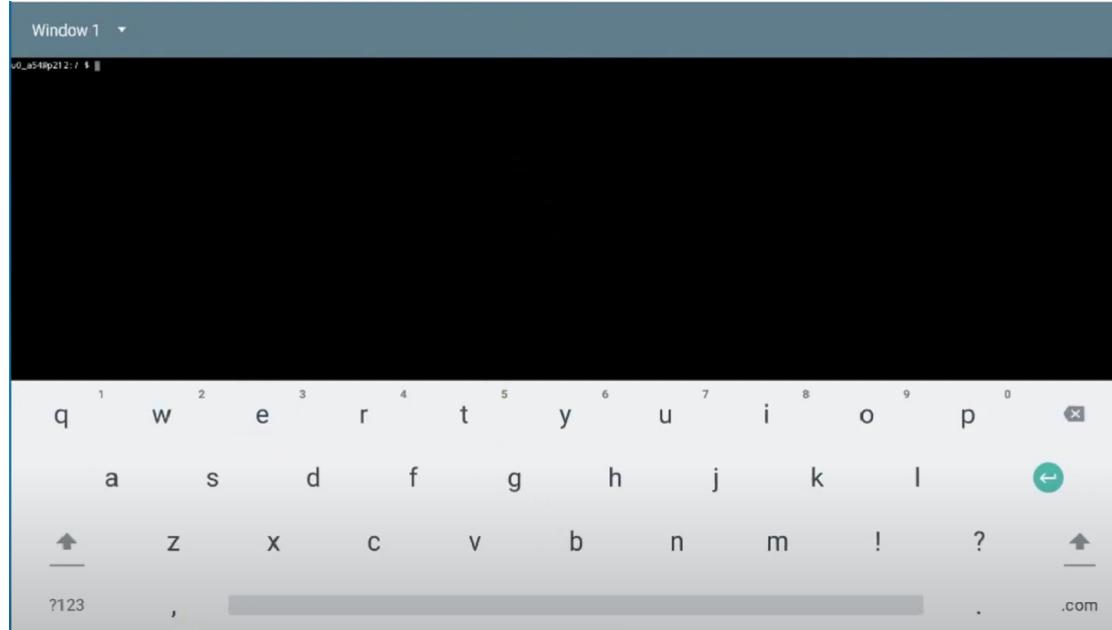
3. Eject the SD Card from PC, and insert it to the STB.





Steps to Flash:

4. Open the Terminal App or Connect to ADB Shell.





Steps to Flash:

5. Type the following command in the Terminal.

```
su  
cd /sdcard/Download  
dd if=uboot.bin  
of=/dev/block/bootloader  
reboot update
```

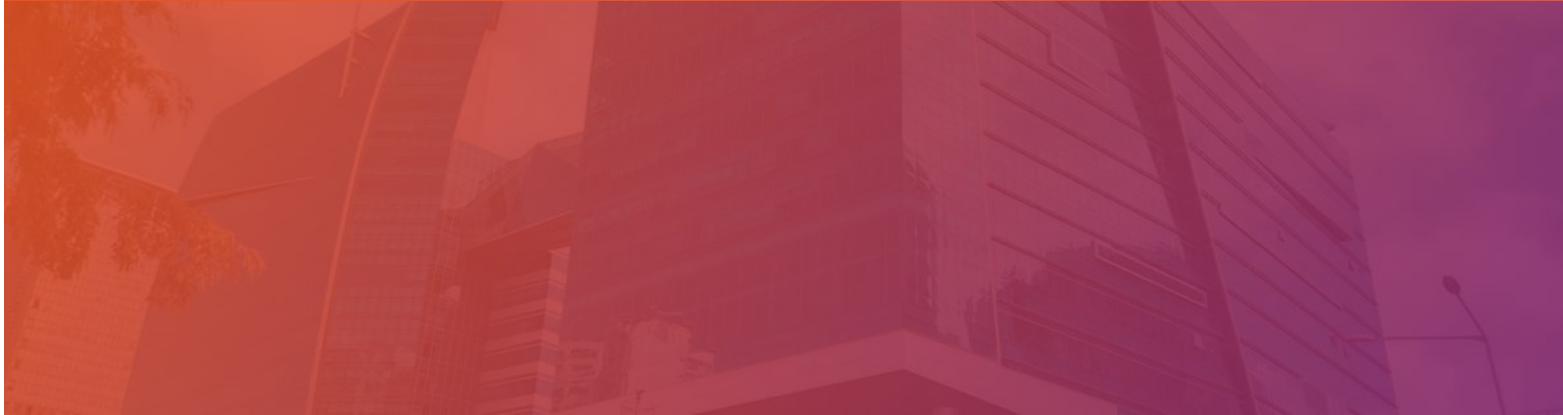
After executing, the STB screen might be frozen or even restarts. Meaning that it's booting to the server.

```
u0_a54@p212:/ $ su  
root@p212:/ # cd /sdcard/Download  
root@p212:/sdcard/Download # ls  
1619330505915_redboxtv_v2.1.apk  
Kode_Aktivasi.txt  
test.txt  
uboot.bin  
root@p212:/sdcard/Download # dd if=uboot.bin of=/dev/block/bootloader  
8192+0 records in  
8192+0 records out  
4194304 bytes transferred in 0.365 secs (11491243 bytes/sec)  
root@p212:/sdcard/Download # reboot update  
#
```



Chapter F:

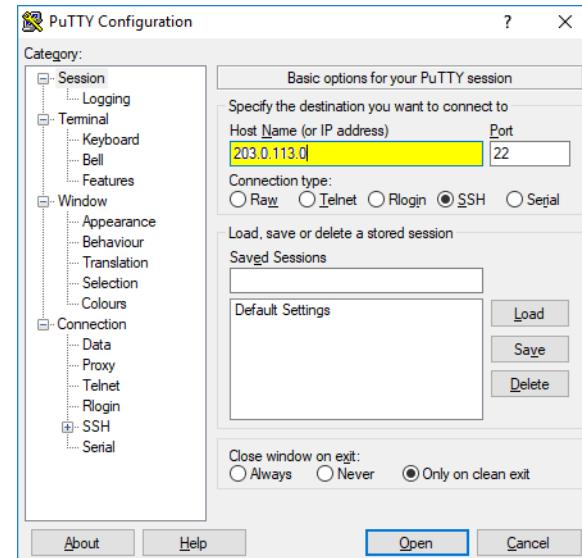
How do we use it?





Weird thing.

After the reboot, the STB screen will gone completely black. As if it was turned off. The only was to use it, is to find out the IP Address of the STB (which should be connected to LAN) and connect to it via SSH.





How to find the IP Address?

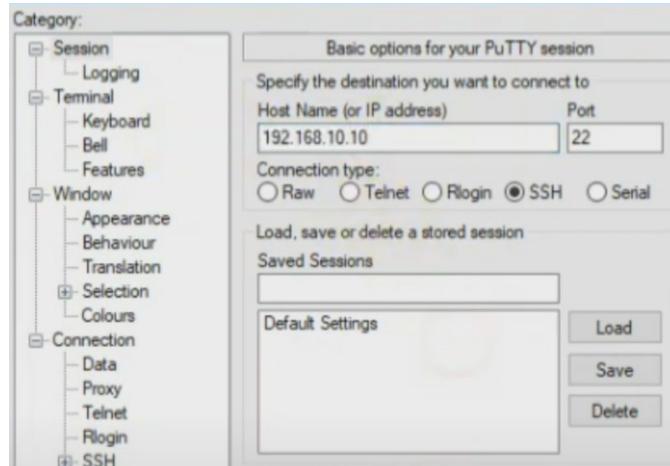
We can just search the IP via Router or IP Scanner.
And search for device called “arm-64”.

DHCP Clients List				
ID	Client Name	MAC Address	Assigned IP	Lease Time
1	Galaxy-M11	96-AE-17-E4-A2-9E	192.168.0.103	01:19:45
2	E59123046	EC-9C-32-7F-D4-61	192.168.0.100	Permanent
3	OPPO-A7	D8-1E-DD-5B-DB-25	192.168.0.101	01:29:09
4	V2043	0E-B8-86-D5-3C-6C	192.168.0.104	01:32:37
5	DESKTOP-LQ8IJ26	6C-71-D9-79-D1-43	192.168.0.105	01:19:34
6	50100499007037000000585FF670F5B	58-5F-F6-70-F5-BE	192.168.0.108	01:06:39
7	50100499007037000000585FF670F5B	58-5F-F6-70-F5-BD	192.168.0.106	01:04:47
8	arm-64	46-D4-EE-98-C2-F9	192.168.0.107	01:59:30



How to find the IP Address?

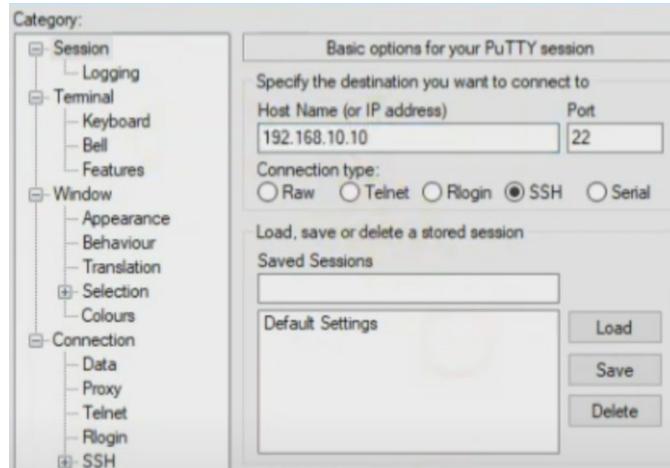
Simply type in the IP Address of the STB, and use Port “22”. If prompted for a password, use “root” as username. The password is either “root” or “rootroot”.





How to find the IP Address?

Simply type in the IP Address of the STB, and use Port “22”. If prompted for a password, use “root” as username. The password is either “root” or “rootroot”.





Thank you!

