TCC893X STB Android SDK Application Start Guide

TCC893X-STB-Android 4.4.2(Kitkat-mr1.1)-V1.00E-Application Start Guide

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Telechips

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Revision History

Date	Version	Description
2014-02-13	0.01	Initial Release
2014-04-01	1.00	Android 4.4.2(Kitkat-mr1.1) Official version release – v14.04_tcc-android-4.4.2

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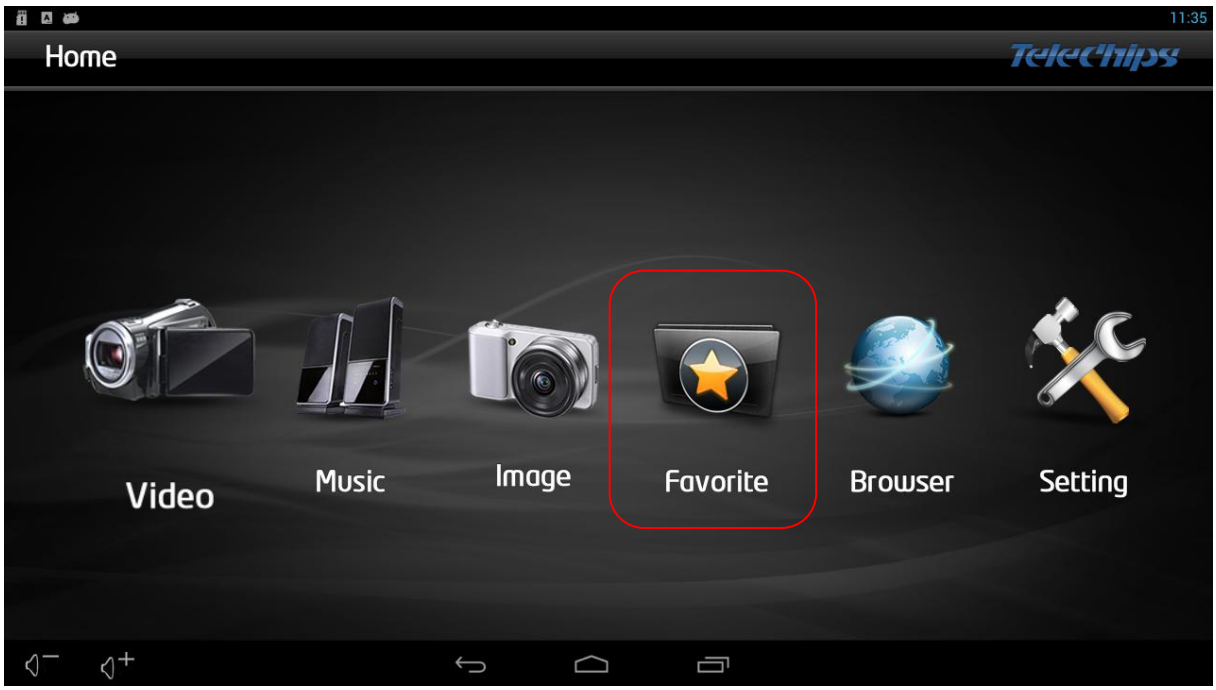
1 Introduction

Please refer to the following description to *execute an application*.

[Step_01] Select “Favorite” on launcher screen.



[Step_02] Select “Application” on the tab.

[Step_03] Execute an application (ex. Video Player).

Please refer to the following description to *add an application to "Favorite" tab*.

[Step_01] Select an application to add to "Favorite" tab (ex. WFDSink).

[Step_02] Push “Menu” button on the remocon to show “Confirm” popup message. If you use USB mouse, press and hold “left” button on the mouse to show it.

[Step_03] Select “OK” to add an application.

[Step_04] You can check an added application in “Favorite” tab.

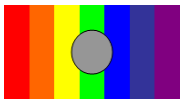
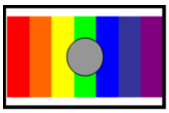
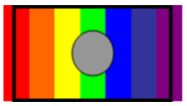
2 Video Player

TCCVideoPlayer is used to playback video instead of gallery3D. It can't support thumbnail image of video file but the preview screen.

TCCVideoPlayer supports specific function below.

No.	Function	Setting	Description	Remark
1	Video Preview	-	Support preview of selected video	
2	Video Repeat	Normal	Play one video track	
		Repeat One	Repeat playing one video track	
		Repeat All	Repeat playing all video track	
3	Video Subtitle	Enable/Disable	Support the subtitle of video	
4	Subtitle Font Size	24/28/32/36/40	Support various font size of subtitle	
5	Multi-subtitle Selection	-	Support multi-subtitle selection	
6	Multi-audio Selection	-	Support multi-audio selection	Keyboard: F12 Remocon: 음성다중
7	Force Deinterlace	Enable/Disable	Use de-interlace path for all videos	
8	Playback Speed	±2/4/8/16/32	Support various speed of playback	
9	Screen Mode	Box	Video displayed on the screen to the original ratio	Keyboard: F11 Remocon: 크기
		Pan&Scan	The crop side of a video displayed on the screen	
		Full Screen	Video is displayed full screen	

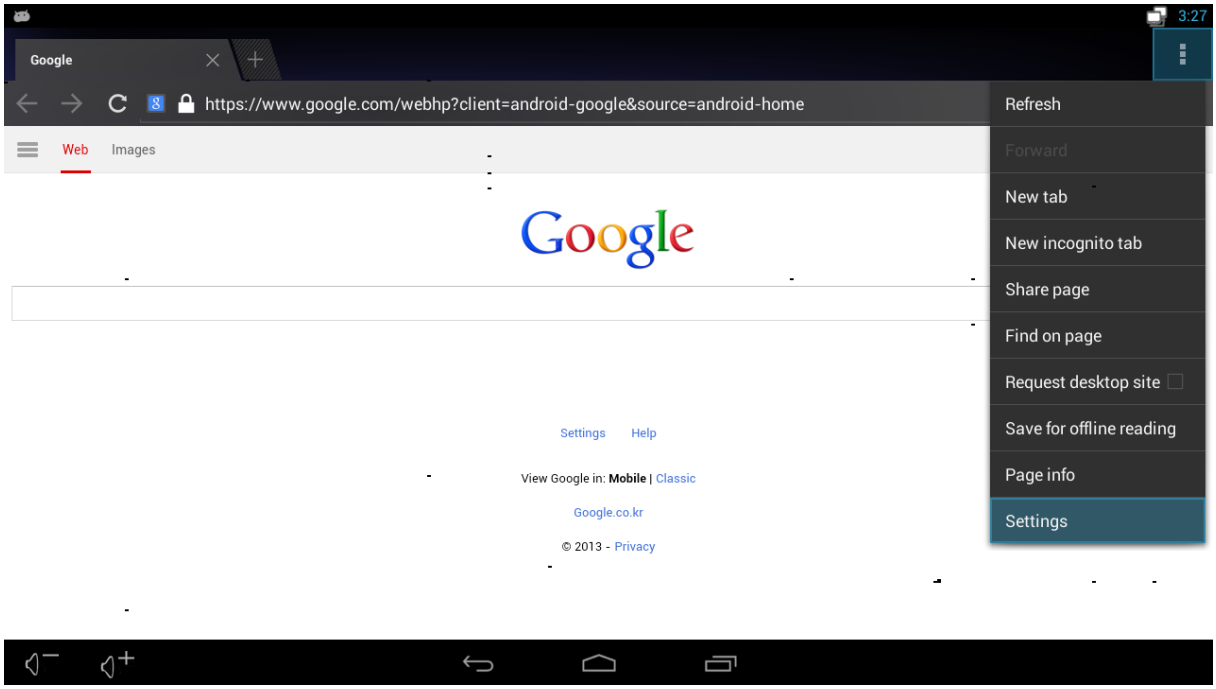
Please refer to the following description about screen mode.

Input Image	Output Type	Output Image
	Box	
	Pan&Scan	
	Full Screen	

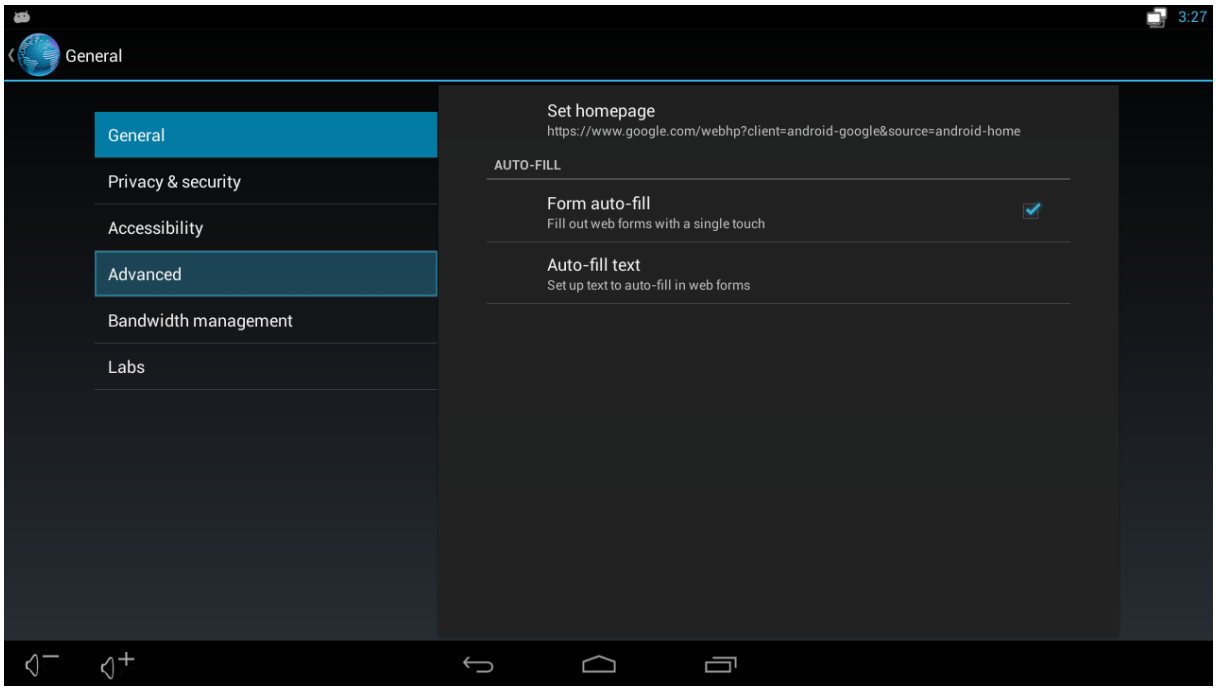
3 How to support HTML5 video playback

You might want to play a video clip on a web site without any installation of the browser plug-in (i.e. flash player). By changing the default user agent of Android web browser as below, http live streaming playback could be supported.

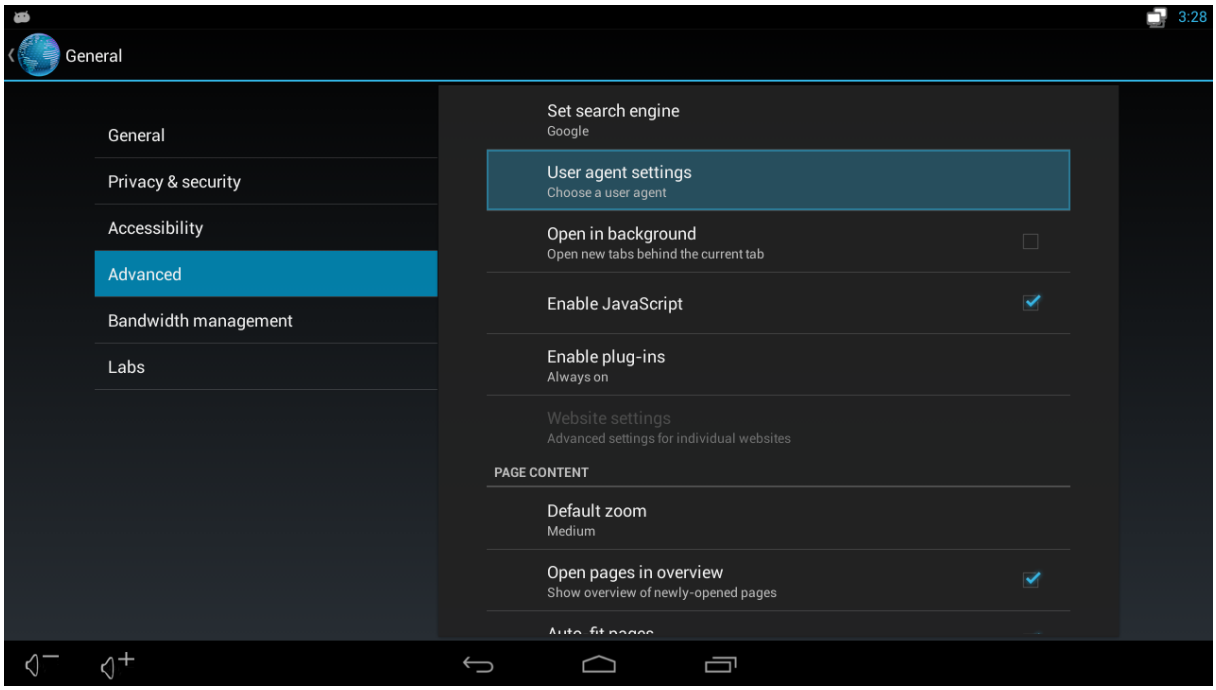
Step 1> Run 'Browser', click the right-top icon and select 'Settings'.



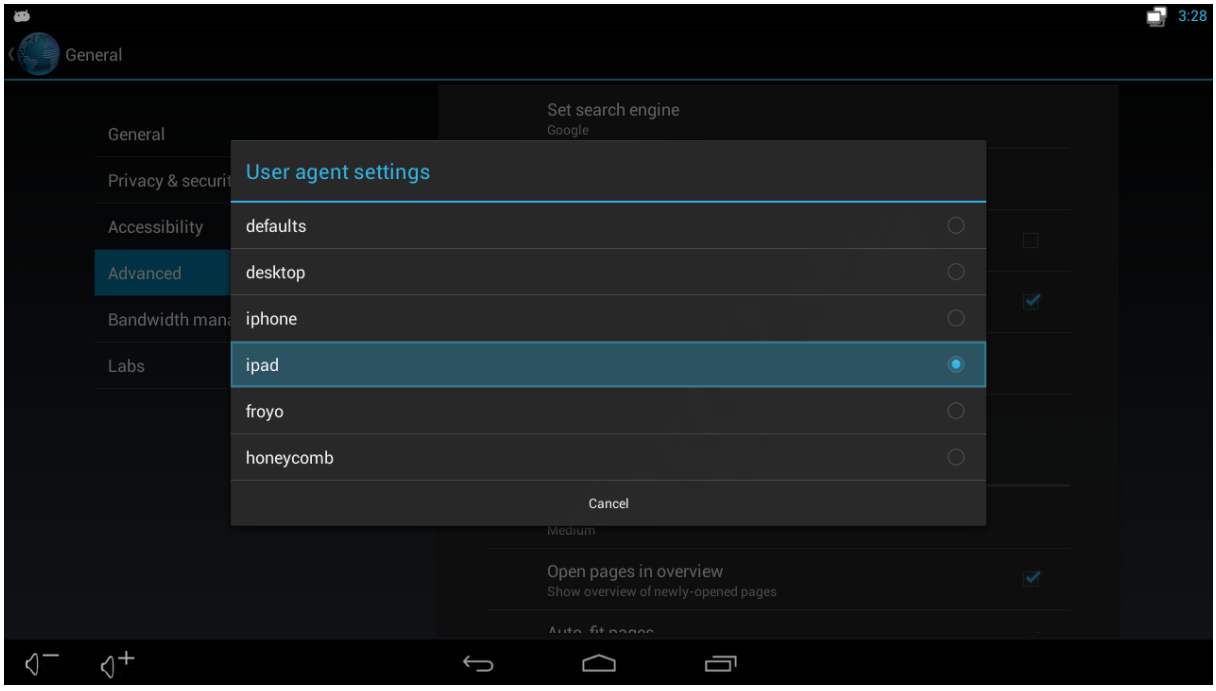
Step 2> Select 'Advanced'.



Step 3> Select 'User agent settings'.



Step 4> Select 'iPad'.



4 Ethernet

1) Kernel

Please refer below kernel setting to use Ethernet. (This feature is enabled as default.)
Please execute "`make menuconfig`" command from kernel folder and select configurations.

1. Select "`Networking support ---> Networking options ---> TCP/IP networking`".
   Then you can see more configurations

2. Select "`IP: multicasting`" and "`IP: kernel level autoconfiguration`".
   Then also, you can see more configurations.

3. Select "`IP: DHCP support`", "`IP: BOOTP support`" and "`IP: RARP support`".

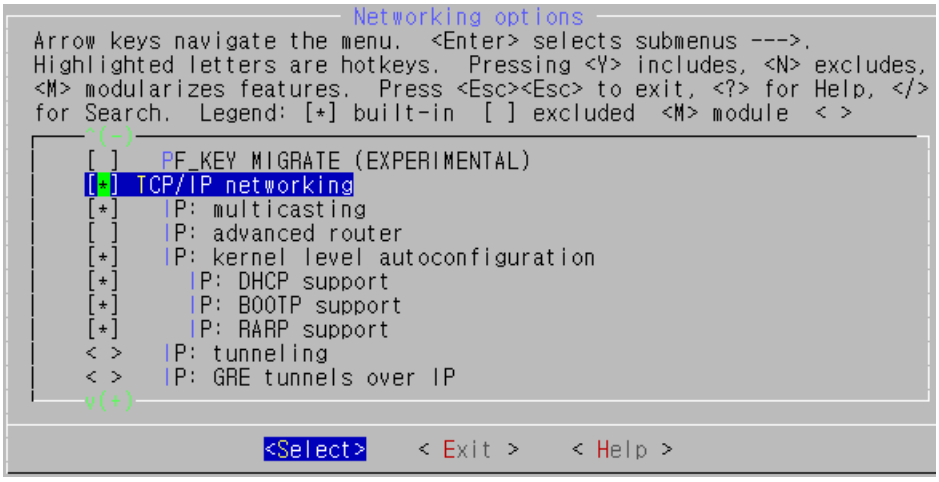


Figure 1. Configurations for Ethernet

You have to set Ethernet driver. **Check which PHY chip is used for Ethernet device**.

4. Select "`Device Drivers ---> Network device support`"

You have to check below two settings.

If **Realtek 8211** is used,

4.1. Select "`Ethernet driver support ---> Telechips 10/100/1000 Ethernet Driver ---> Rx has priority over Tx (NEW) ---> Phy Interface (RGMII)`"

4.2. And select "`PHY Device support and infrastructure (NEW) Drivers for Realtek PHYs Telechips support`".

If **Realtek 8201** is used,

4.1. Select "`Ethernet driver support ---> Telechips 10/100/1000 Ethernet Driver ---> Rx has priority over Tx (NEW) ---> Phy Interface (MII)`"

4.2. And select "`PHY Device support and infrastructure (NEW) Drivers for Realtek PHYs Telechips support`".

After booting, you can see "eth0" with below command.

```
# busybox ifconfig -a
```

2) Android Menu
You can use Ethernet Menu to set IP, DNS, Gateway, etc.
Please select “Settings” and enter “Ethernet Settings”.

3) Setting MAC address
There are two methods to set Mac address of Ethernet device. One is setting through FWDN, another is reading Chip ID.

In case of setting through FWDN, if you need to set softMAC of Ethernet device, you can use WIFI MAC address as Ethernet MAC address by sharing it. Refer to Figure 13 MAC address setting from FWDN.exe.

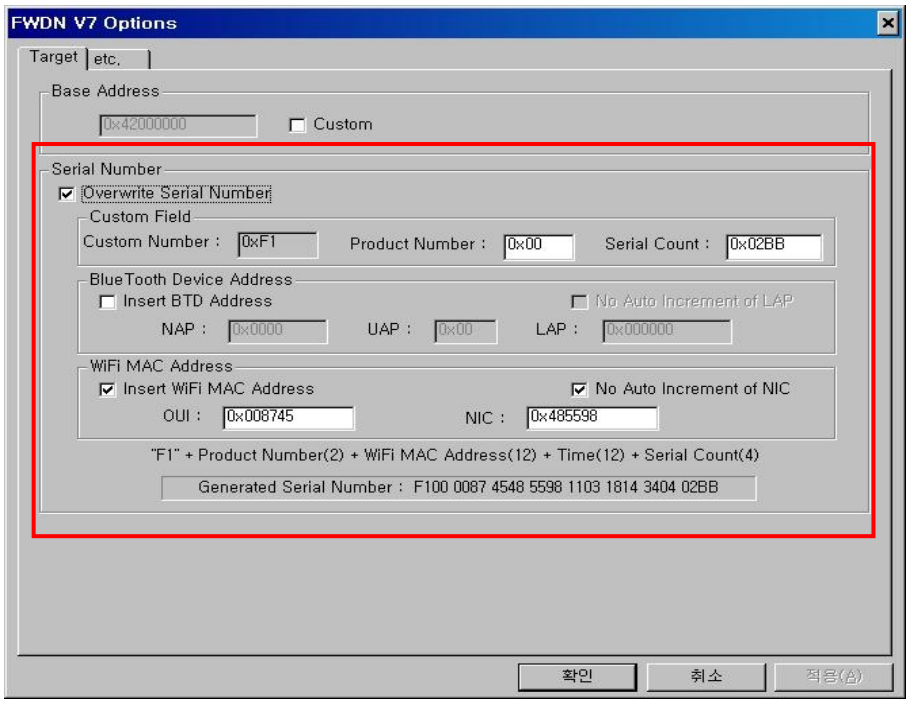


Figure 2. MAC address setting from FWDN.exe

In case of reading Chip ID, if you contract something about Mac address with Telechips, you can set Mac address by reading Chip ID which includes Mac address bits.
To set Mac address from Chip Id, select “`Ethernet driver support ---> Mac address is set by reading TCC Chip ID`” in kernel configuration.

If you use gigabit Ethernet (e.g. Realtek8211) and remove “Netfilter” and “IPv6” option (Kernel Configuration – Networking support – Networking options), the performance of gigabit Ethernet will be improved.

5 NTP (Network Time Protocol) – Date & Time

This is related to "Settings" -> "Date & Time".
If there is no connection of Mobile Network (3G or GSM), The 'Automatic date & time' setting menu is not working. NTP makes the 'Automatic date & time' menu is useful although no connection of Mobile Network.

NTP is protocol to set Date & Time automatically with connecting to NTP server.

To connect NTP server, there must be internet connection through Ethernet or WIFI.

[Android Menu]

You can use NTP through "Settings" -> "Date & Time"

To enable NTP, you must make 'Automatic date & time' set to 'enable'.

And you have to select time zone which is your local time in the list of the 'Select time zone' menu.

If you want to set default local time zone, use property like below.
'tcc.default.timezone' property is used and defined in device\telechips\tccXXXX\device.mk,
ex) tcc.default.timezone = Asia/Seoul or tcc.default.timezone = Asia/Shanghai

Also, you can change 'NTP Server'. (If you need)

Default settings related to NTP are like below.

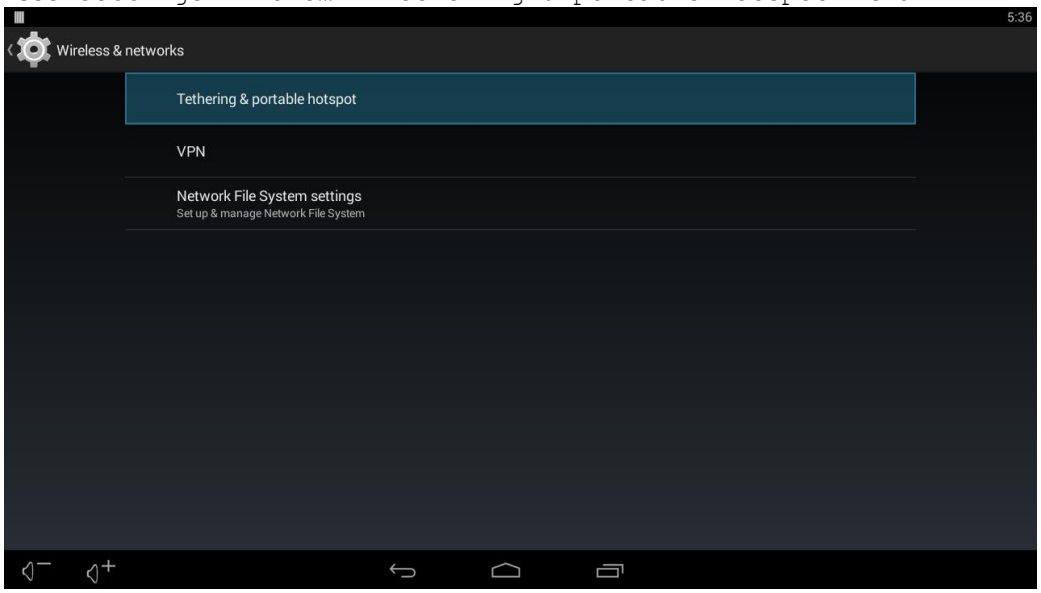
-. 'Automatic date & time' is 'enable' as default.
-. 'NTP Server' is set to '2.android.pool.ntp.org' as default.

If above menus are set right and network connection works, you will see date and time changed.

6 Ethernet Tethering (Software AP with Ethernet + Wi-Fi)

You can use Ethernet tethering – Wi-Fi with Ethernet connection like 3G+Wi-fi tethering

You can see "`Settings – More… - Tethering & portable hotspot`" Menu.



.

Figure 3. Portable hotspot Menu

Enable "`Portable Wi-Fi hotspot`" after setting the configuration using "`Set up Wi-Fi hotspot`" Menu.

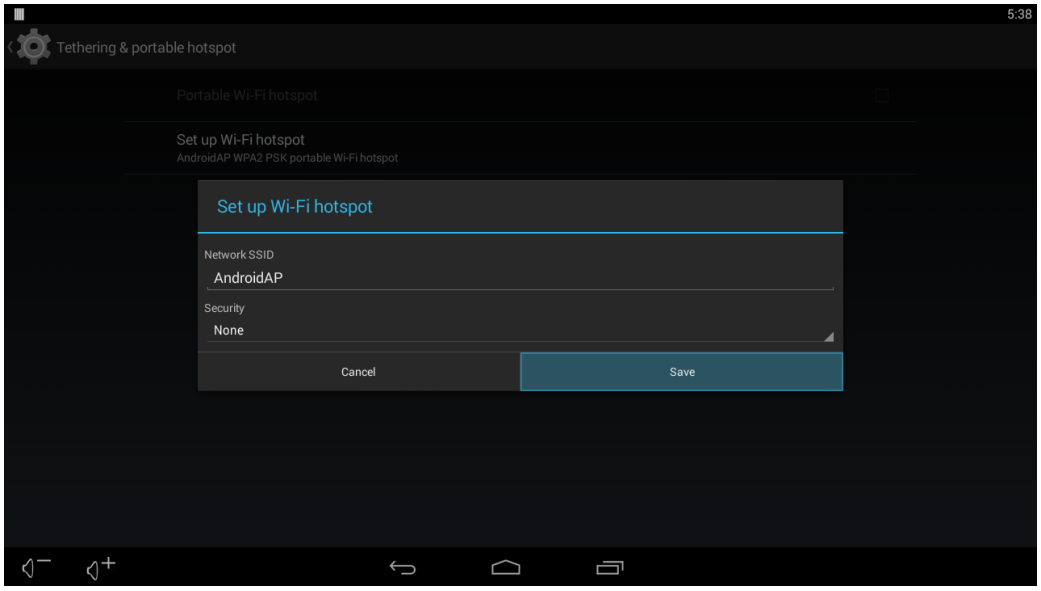


Figure 4. Setting SSID and Security Open mode

7 Key Input

7.1 Kernel & Android

Three types of key input are supported – Keyboard, Remote Control and Mouse.

To use Remote Control, you must change kernel configuration (This feature is enabled as default). You can set the type and clock source of "`Remote Controller`" by changing the configuration below.

```
$ cd kernel
$ make menuconfig

Device Drivers
   → Input device support
      → Miscellaneous devices
         → <*> Telechips Remote Controller
           → Remocon Controller Select (CS2000 X Canvas)  --->
           → Remocon Core Clock Select (XTIN Clock)  --->
```

Refer to the key code and basic function in the table below.

Keyboard	Remocon	ID	Android Key code	Basic Function	Gallery Function
	전원	0x8877	ENDCALL		
NUM 1	NUM 1	0xC43B	KEYCODE_1	NUM 1	
NUM 2	NUM 2	0xA45B	KEYCODE_2	NUM 2	
NUM 3	NUM 3	0xE41B	KEYCODE_3	NUM 3	
NUM 4	NUM 4	0x946B	KEYCODE_4	NUM 4	
NUM 5	NUM 5	0xD42B	KEYCODE_5	NUM 5	
NUM 6	NUM 6	0xB44B	KEYCODE_6	NUM 6	
NUM 7	NUM 7	0xF40B	KEYCODE_7	NUM 7	
NUM 8	NUM 8	0x8C73	KEYCODE_8	NUM 8	
NUM 9	NUM 9	0xCC33	KEYCODE_9	NUM 9	
NUM 0	NUM 0	0x847B	KEYCODE_0	NUM 0	
	NUM -	0x9966	KEYCODE_TV	Execute DTV	
.	이전 채널	0xAC53	KEYCODE_DOT	.	
	MUTE	0xC837	KEYCODE_MUTE		
F3	TV	0xE817	KEYCODE_F3	Change output	
Shift + Ctrl + "="	Volume +	0xA05F	KEYCODE_VOLUME_UP	Volume Up	
Shift + Ctrl + "-"	Volume -	0xE01F	KEYCODE_VOLUME_DOWN	Volume Down	
Page Up	Channel +	0x807F	KEYCODE_PAGE_UP		
Page Down	Channel -	0xC03F	KEYCODE_PAGE_DOWN		
	취침예약	0xB847	KEYCODE_BOOKMARK		
Delete	취소	0xED12	KEYCODE_BACK	Goto previous activity	
F1	Menu	0xE11E	KEYCODE_MENU	Activate Menu	
HOME	안내	0xCAB5	KEYCODE_HOME	Goto Home	
↑	▲	0x817E	KEYCODE_DPAD_UP	Up	
↓	▼	0xC13E	KEYCODE_DPAD_DOWN	Down	
←	◀	0xF00F	KEYCODE_DPAD_LEFT	Left	
→	▶	0xB04F	KEYCODE_DPAD_RIGHT	Right	
KEYPAD ENTER	확인	0x916E	KEYCODE_DPAD_CENTER	Select	
F2	자동채널	0x956A	KEYCODE_F2	Mouse Pointer	
BACKSPACE	기억/지움	0xD52A	KEYCODE_DEL	Delete	
F11	크기	0xF708	KEYCODE_FUNCTION		
F12	음성 다중	0xA857	KEYCODE_BUTTON_1		
Shift + Ctrl + "0"	■	0xC6B9	KEYCODE_MEDIA_STOP		Media Stop
Shift + Ctrl + "9"	▶	0x86F9	KEYCODE_MEDIA_PLAY		Media Play
Shift + Ctrl + "9"	❙❙	0xAED1	KEYCODE_MEDIA_PAUSE		Media Pause
F9	●	0xDEA1	KEYCODE_RECORD		
Shift + Ctrl + "5"	◀◀	0xB8C7	KEYCODE_MEDIA_REWIND		Media Rewind
Shift + Ctrl + "6"	▶▶	0xF887	KEYCODE_MEDIA_FASE_FORWARD		Media FF
Tab	현재방송	0xBCC3	KEYCODE_GUIDE		

7.2 Bootloader

In bootloader, you can use the remote controller for three purpose.

First, the system boots up by putting ‘power’ key. To use this function, please change “*bootable/bootloader/lk/target/tcc8930st_evm/rules.mk”* file as below.

```
BOOTING_BY_REMOTE_KEY := true
```

Second, the system enters recovery mode by putting ‘9’ key when system boots up. To use this function, please change “*bootable/bootloader/lk/target/tcc8930st_evm/rules.mk”* file as below.

```
RECOVERY_BY_REMOTE_KEY := true
```

Third, the system enters FWDN mode by putting ‘0’ key when system boots up. To use this function, please change “*bootable/bootloader/lk/target/tcc8930st_evm/rules.mk”* file as below.

```
START_FWDN_BY_REMOTE_KEY := true
```

8 Firmware Upgrade

8.1 User firmware upgrade

You can upgrade firmware with below sequences. If you want to more in detail, please request document about firmware upgrade.

User firmware can be upgrade with "`update.zip`" in storage. "`update.zip`" can be created with below sequences.

```
$ make otapackage
```

Then, output will be `out/target/product/<your product>/xxx-ota-xxx.zip`.
This output zip file should be renamed as "`update.zip`" to be used for updating system. Copy "`update.zip`" file to storage.

In STB solution, you can use '`Internal Storage`', '`External SD Card`' and '`External USB Storage`' to upgrade firmware.

Select "`Settings -> About phone -> System updates -> Install system update`". Then, select storage with "`update.zip`".

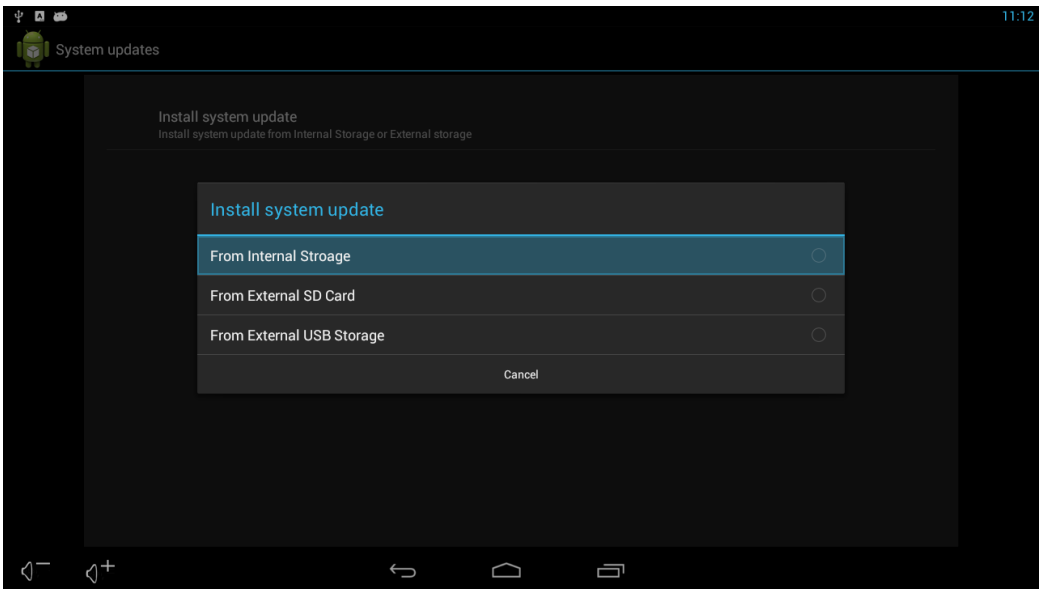


Figure 5. Select a storage for firmware upgrade

8.2 Recovery mode

Recovery mode can be entered by putting 'r' key on console window when system boots up. After boot with recovery mode, you can see the menu by putting 'context key' in keyboard or 'menu key' in remote controller. In the menu, you can select 'Apply update from USB device' or 'Apply update from SD Card'. Then, select the file for firmware upgrade.

9 Storage

NAND, T-Flash and USB storage can be connected. Mount path of storage is as follows.

Device	Partition	Mount path	Link
Internal Storage		/mnt/shell/emulated/0	/sdcard, /storage/sdcard0 /storage/emulated/legacy
External SD Card		/storage/sdcard1	
External USB Storage(SDA)	First	/storage/usb0	
	Second	/storage/usb0/usb_sda2	
	Third	/storage/usb0/usb_sda3	
	Fourth	/storage/usb0/usb_sda4	
External USB Storage(SDB)	First	/storage/usb1	
	Second	/storage/usb1/usb_sdb2	
	Third	/storage/usb1/usb_sdb3	
	Fourth	/storage/usb1/usb_sdb4	

Table 1. Mount path of storages

10 NFS (Network File System)

To use NFS, there must be network connection through Ethernet or WIFI. (This feature is enabled as default.)

Enter "More…". Then you can see "Network File System Settings"

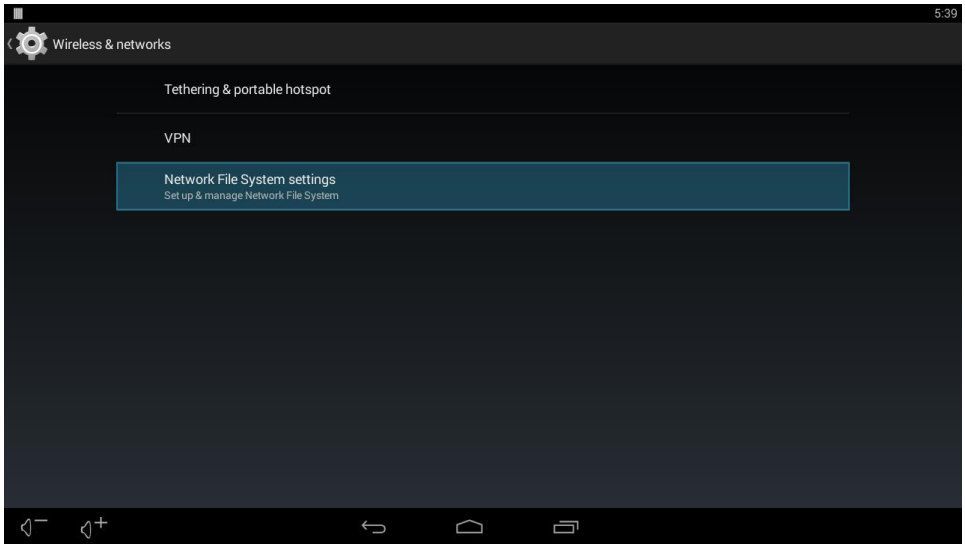


Figure 6. NFS Setting Menu

Please select "Network File System configuration" to set configurations of NFS
There are two Protocol types. One is NFS, the other is CIFS.
To use "NFS" protocol type, a program in PC must be needed. (For example, if your PC is Window OS, you can use "Allegro NFS Server for Windows" http://www.nfsforwindows.com/home)

To use "CIFS", you must set the folder which you want to share as sharing folder in PC.

If IP address of your PC is 192.168.1.2 and you share a folder with the share name "test", set IP address and Path like below Figure 10.

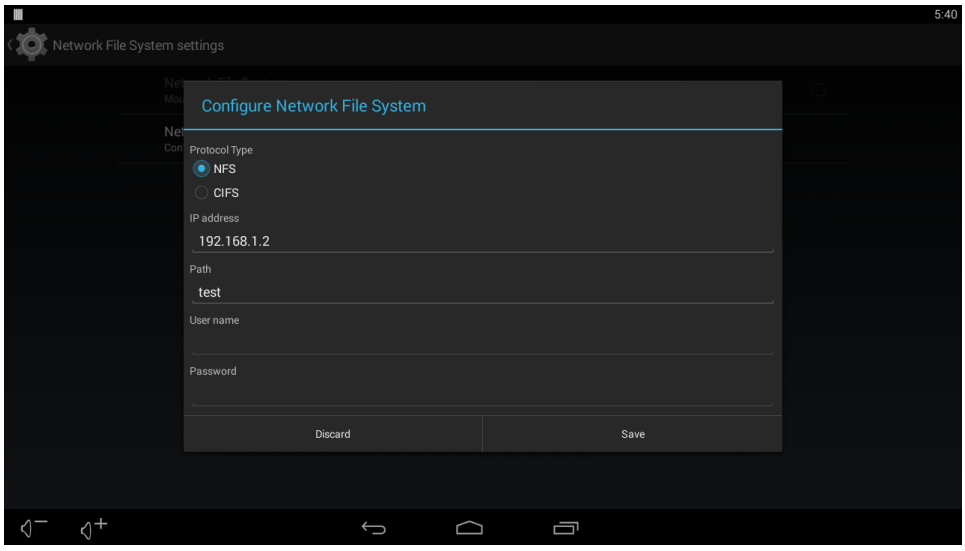


Figure 7. NFS configuration

Set User name and Password if you use them.
If you complete to set and save it, select “Network File System” to enable NFS.

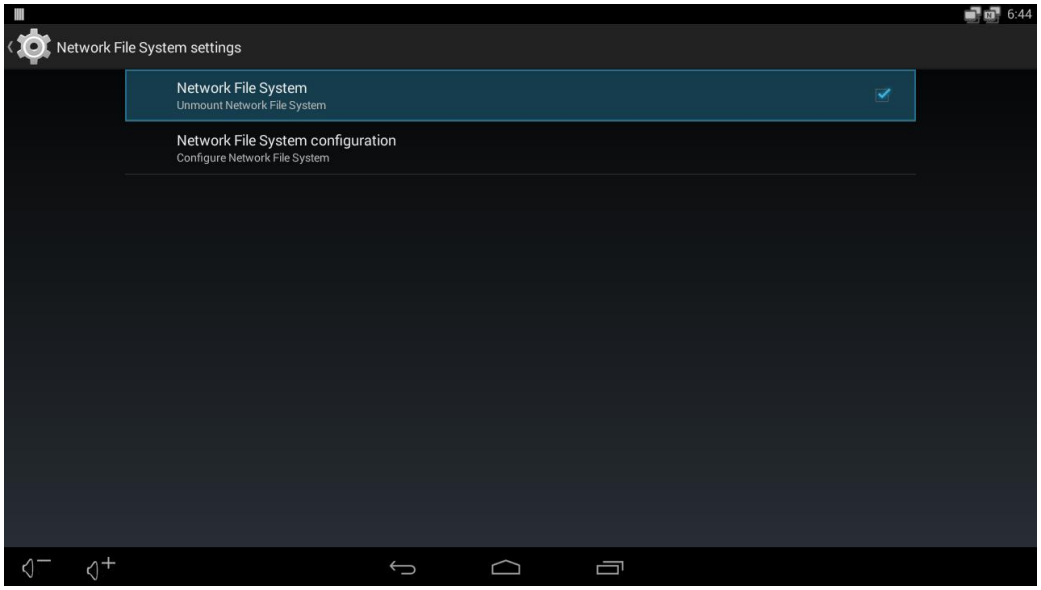


Figure 8. NFS Enabled

11 Application Rotation

You can see below screen when you select “Menu” -> “Settings” -> “Display” -> “Application Rotation” menu In STB solution. You can set application rotation in this menu.

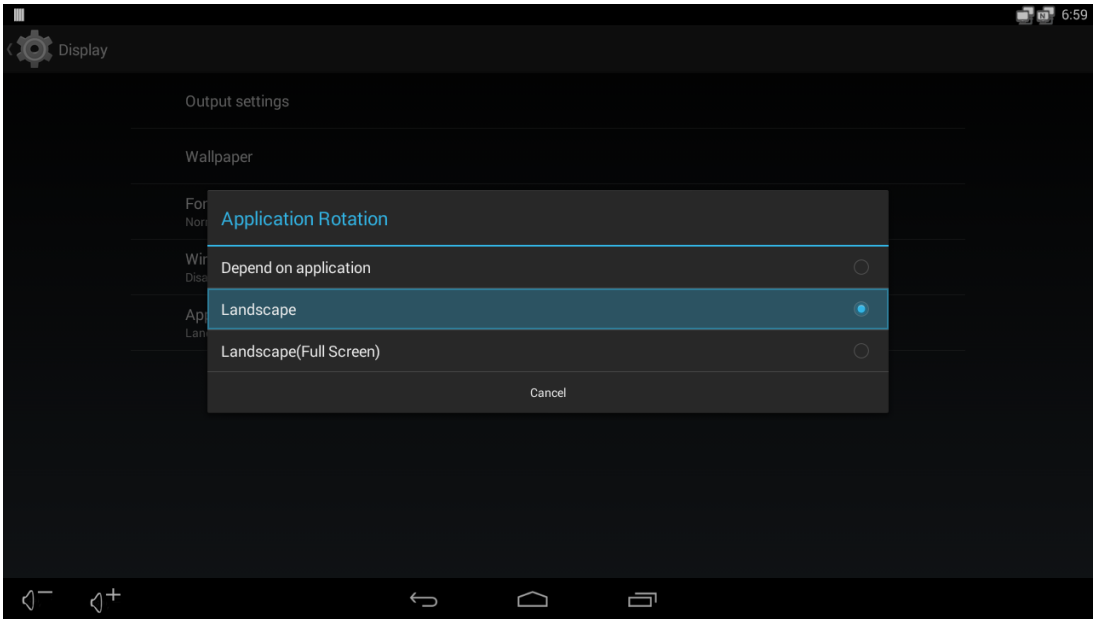


Figure 9. Application Rotation

12 Audio Output

You can see below the screen when you select "Settings" -> "Sound" -> "Audio Output" menu in STB solution,

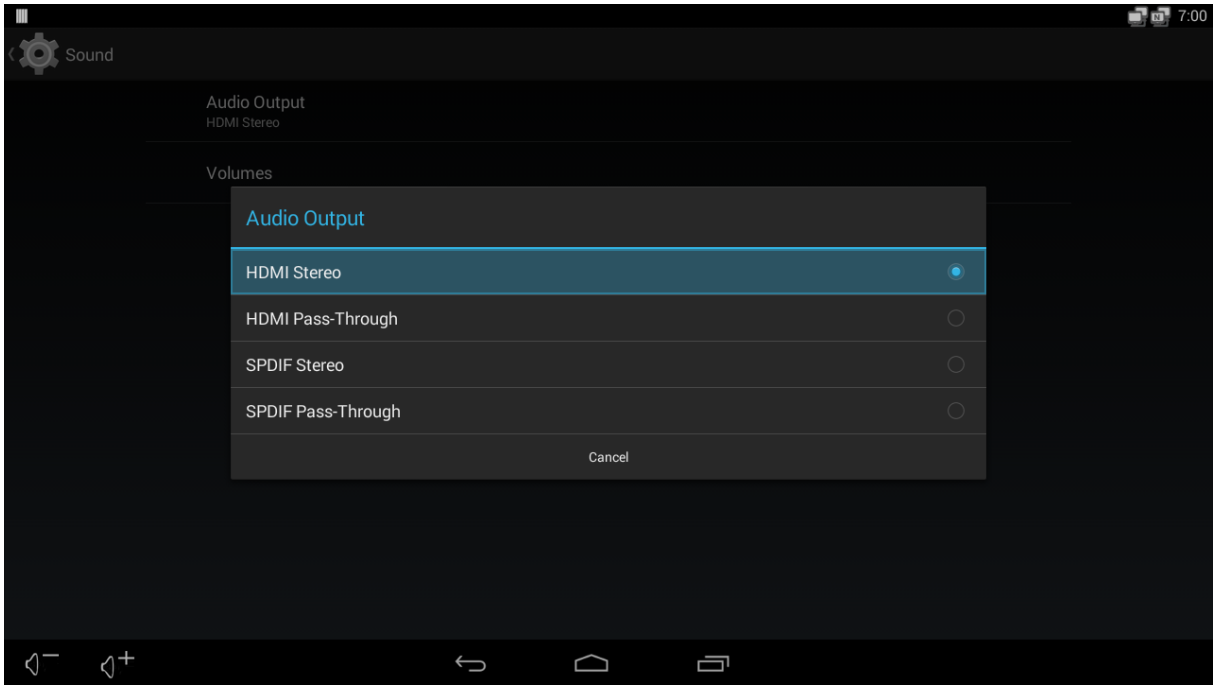


Figure 10. Audio Output

Before using HDMI Pass-Through menu, you should check kernel configuration (This feature may be enabled as default).

```
$ make menuconfig

Device Drivers --->
       [*]Sound card support  --->
          [*] Advanced Linux Sound Architecture  --->
             [*] ALSA for SoC audio support --->
                [*] TCC MultiChannel
```

```
--- ALSA for SoC audio support
<*>   SoC Audio for the Telechips TCC chip
[*]     WM8524
[*]     TCC MultiChannel
< >   Build all ASoC CODEC drivers
```

Figure 11. Configuration for HDMI Pass-Through

12.1 HDMI Stereo

"HDMI Stereo" means that the audio is out as a PCM data (L/R) by using DAI block.
If you use "HDMI Stereo", the audio is out through HDMI and L/R, 2 channels.

12.2 HDMI Pass-Through

"HDMI Pass-Through" means that the audio is out as compressed up to 7.1 channels. If you
If a audio codec support 7.1 surround channels like DTS HD MA, enhanced AC3, multichannel PCM data or 5.1 channels like AC3, DTS and If you have an external A/V receiver that support those audio codec pass-through, use this menu..

12.3 SPDIF Stereo

"SPDIF Stereo" means that the audio is out as a PCM data (L/R) by using DAI block.
If you use "SPDIF Stereo", the audio is out through SPDIF and L/R, 2 channels.

12.4 SPDIF Pass-Through

"SPDIF Pass-Through" means that the audio is out as a compressed data by using SPDIF block. If audio codec is DTS, it is worked as a pass-through.

If you use SPDIF pass-Through, the max channel of audio is 5.1ch.
The audio is out via SPDIF optical output

Please refer to the description in the table below about "Audio Output" menu

Setting	Audio Output	Description	Remark
Settings - > Sound - > Audio Output	HDMI Stereo	PCM data through HDMI	PCM
	HDMI Pass-Through	Compressed data through HDMI	DD, DDP, DTS, DTS-HD MA, LPCM
	SPDIF Stereo	PCM data through SPDIF	PCM
	SPDIF Pass-Through	Compressed data through SPDIF	DD, DDP, DTS, DTS-HD MA

Please check whether pass-through of multi-channel audio codec is supported or not in table below.

Multi-channel Audio Codec		Audio Pass-through		Remark
		SPDIF (Max 5.1 CH)	HDMI (Max 7.1 CH)	
AAC	AAC	X	X	
Dolby	AC3 (DD)	O	O	
	eAC3 (DDP)	O	O (Max 7.1 CH)	Support DDP to DD
	Dolby True HD	X	X	MAT license issue
DTS	DTS	O	O	
	DTS-HD MA	O	O (Max 7.1 CH)	
LPCM	LPCM	-	O (Max 7.1 CH)	Support only 16bit mode

13 Video Output

Three types of external video output are supported - HDMI, Composite (CVBS), Component (Y/Pb/Pr).

Refer to supported resolution and frame-rate below according to output type. External chipset is needed for component output (THS8200).

No.	Output Type	Resolution	Remark
1	HDMI	Auto Detection	
		1920x1080p 60Hz	
		1920x1080p 50Hz	
		1920x1080i 60Hz	
		1920x1080i 50Hz	
		1280x720p 60Hz	
		1280x720p 50Hz	
		720x576p 50Hz	
		720x480p 60Hz	
		640x480p 60Hz	
2	Composite (CVBS)	NTSC (720x480i)	NTSC_M
		PAL(720x576i)	PAL_B
3	Component (Y/Pb/Pr)	1280x720p	THS8200 Chip
		1920x1080i	THS8200 Chip

Each output type can be selected by changing the “Output settings” menu of android menu. You can see below screen when you select “Menu” -> “Settings” -> “Display” -> “Output settings” menu. In STB solution, HDMI (Auto Detect) is selected as default.

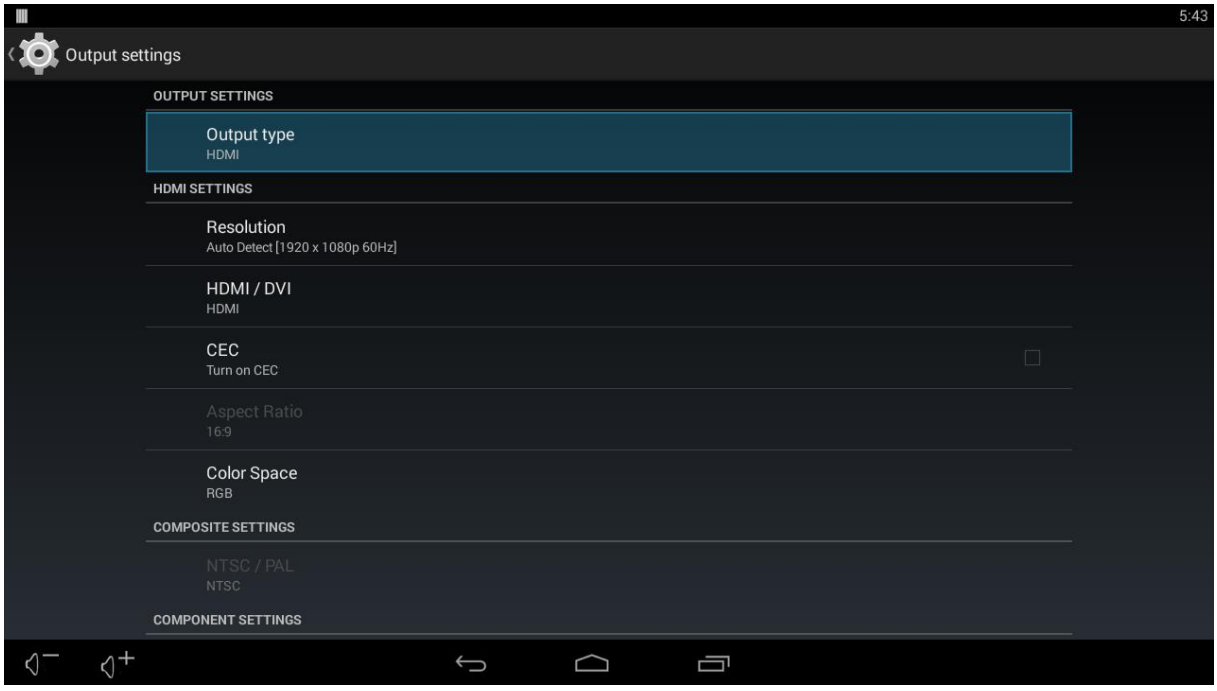


Figure 12. HDMI is selected as default

When you select “Output type” menu, you can see various output types which you can select.

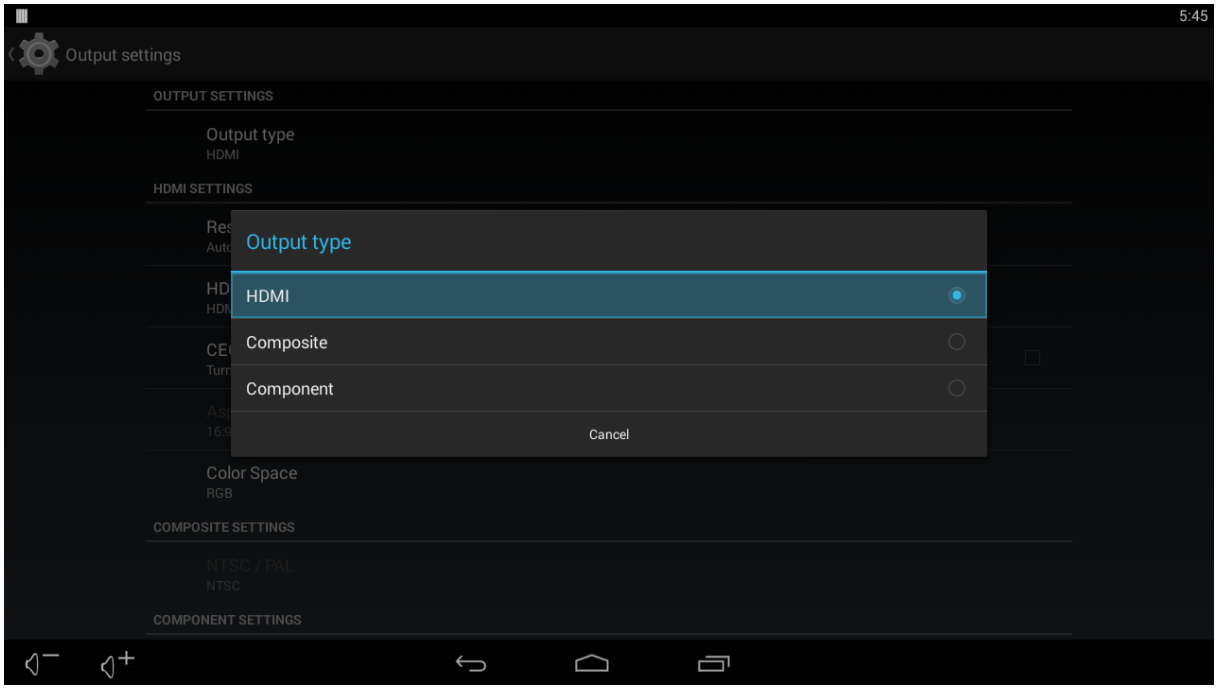


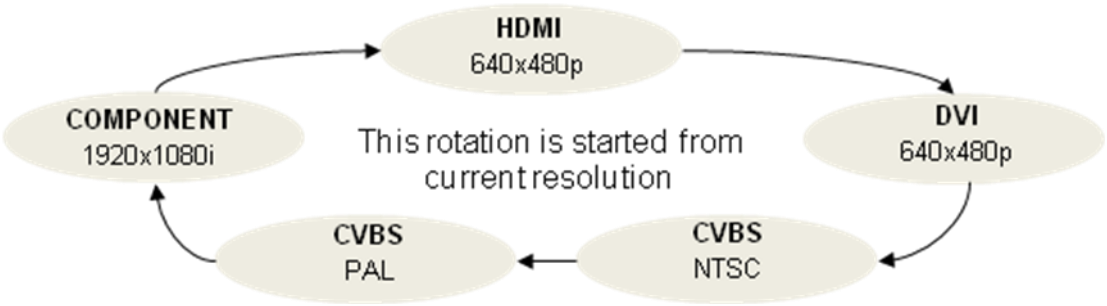
Figure 13. Output types which supported in STB solution

When you select “Composite”, you can change “Composite mode (NTSC or PAL)” from “Composite settings” menu. When you select “Component”, you can change “Resolution (720p or 1080i)” from “Component settings” menu.

HDMI is operated with hot-plugged-detection (HPD). In other word, when you plug-in HDMI, you can see UI and VIDEO screen from HDMI device. If you select “Resolution” menu in “HDMI settings” menu, you can see popup menu for HDMI resolution and change HDMI resolution.

Figure 14. HDMI resolution which supported in STB solution

Without “Output settings” menu, each output type can be changed in order below by pushing specific key of remocon (TV/외부입력) and keyboard (F3).



Progressive and interlaced video can be displayed through the same frame-rate of HDMI output. Movie title which has progressive 23.976/24Hz frame-rate can be processed without changing the frame-rate (cinema mode).

Output Type	Video Frame-rate	HDMI Resolution	Remark
HDMI	Progressive 23.976 fps	1920x1080p 23.976Hz	Cinema Mode
	Progressive 24 fps	1920x1080p 24Hz	Cinema Mode
	Progressive 50 fps	1920x1080p 50Hz	
	Progressive 30/60 fps	1920x1080p 60Hz	
	Interlace 25 fps	1920x1080i 50Hz	
	Interlace 30 fps	1920x1080i 60Hz	

In case of interlaced video, if the resolution of current output is same with the resolution of video, video data can be processed without de-interlace operation.

Output Type	Video Resolution	Output Resolution	Remark
HDMI	1920x1080i	1920x1080i 50/60Hz	
Component	1920x1080i	1920x1080i 60Hz	
Composite	720x480i	NTSC	
	720x576i	PAL	

14 Default Resolution

You can set default resolution of each output (HDMI, composite, component) and It will be applied after writing ROM files by using FWDN or executing “factory reset”. To set this, you should change the points below for the resolution that you want to set.

1) Bootloader

You can set define below in *bootable/bootloader/lk/platform/tcc_shared/include/lcd/HDMI_TCC.h* in case of HDMI output.

```
//------------------------------------------------------------------------
// [HDMI Video Mode Selection]
//------------------------------------------------------------------------
#define HDMI_VIDEO_MODE_TYPE      (14)
```

You can set initial value of variables below in *bootable/bootloader/lk/platform/tcc893x/lcdc.c* in case of composite/component output.
(“*bootable/bootloader/lk/platform/tcc892x/lcdc.c”* if you use TCC892x chip)

```
static char defalut_composite_resolution = LCDC_COMPOSITE_NTSC;
static char defalut_component_resolution = LCDC_COMPONENT_720P;
```

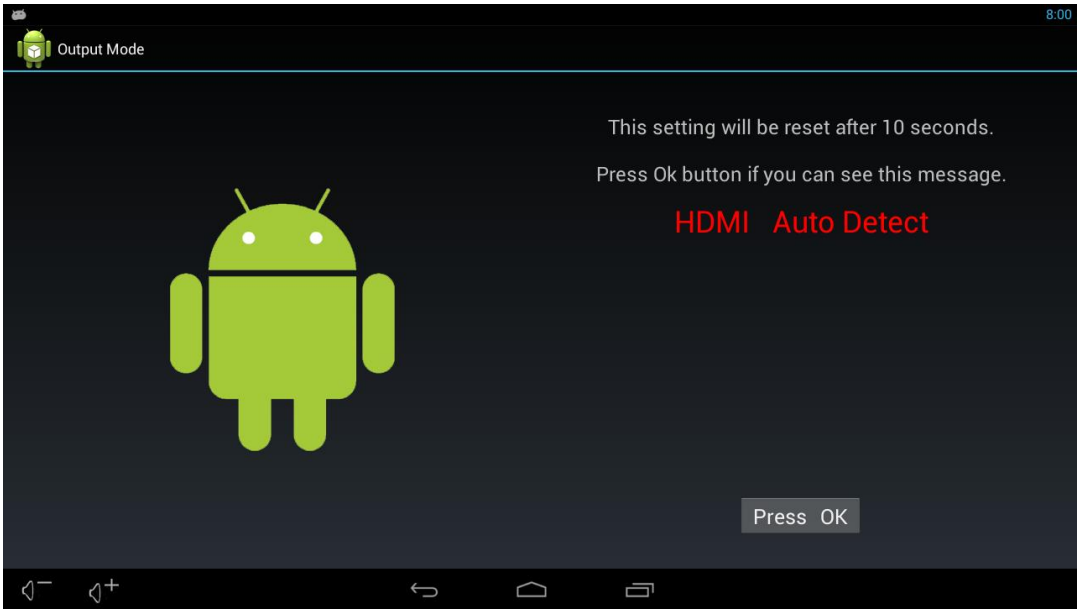
2) Kernel

You can set initial value of variables below in *kernel/drivers/char/tcc_output_starter.c*.

```
static char default_hdmi_resolution = STARTER_HDMI_1280x720P_60Hz;
static char default_composite_resolution = STARTER_COMPOSITE_NTSC;
static char default_component_resolution = STARTER_COMPONENT_720P;
```

3) System

You can set output mode by using “TCCSettingScreen” below. “TCCSettingScreen” will be displayed automatically when it boots-up after writing ROM images by FWDN.

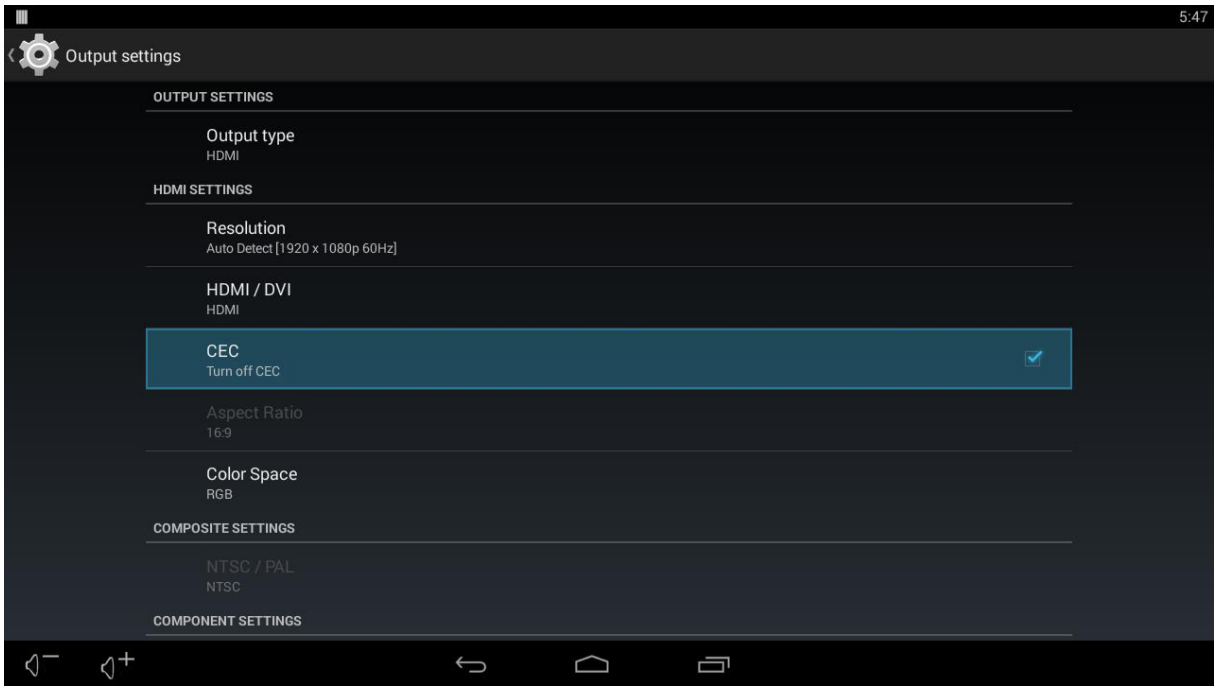


15 HDMI CEC

Telechips tested only the physical path of HDMI CEC to verify CEC command can be transmitted.

To do this, only LG and Samsung TV sets are tested.

If you want to enable or disable HDMI CEC, it is possible to change setting menu.



To control STB EVM with TV remocon, TV and STB EVM must be connected with HDMI and TV must support HDMI CEC. In other word, you can find HDMI CEC menu from TV.
When HDMI CEC menu in TV is selected, there are below menus. (From Samsung TV)

-. View TV
-. Device List
-. Player MENU
-. Player INFO
-. Setup

To connect TV and STB EVM, “Device List” menu must be selected and execute "search" operation. TV must find STB EVM and register it as Player. Local address of STB EVM is 4 (it means “Playback Device 1”) and it is displayed as “Player” in Samsung TV.

To control not TV but Player (STB EVM) with TV remocon, “Player MENU” menu must be selected. After this, Player (STB EVM) can be controlled with TV remocon.

Because main purpose of the CEC is verifying physical path, Telechips checked a few commands as below. (If you want to know details, please refer the HDMI specification Supplement1 CEC part)

One Touch Play
<Active Source> : Support as initiator.
<Image View On> : Support as initiator.
<Text View On> : Support as initiator.
Routing Control
<Request Active Source> : Support as follower.
<Inactive Source> : Support as Initiator.
Standby
<Standby> (Directly Addressed/Broadcast) : Support as initiator.
System Information
<Give Physical Address> : Support as follower.
Deck Control
<Deck Control> : Supported Operand is STOP(0x03). Support as follower.
<Play> : Supported Operands are Play Forward(0x24) and Play Still(0x25). Support as follower.
Remote Control Pass Through
<User Control Pressed> <User Control Release> : Support as follower.
- Select(0x00), Up(0x01), Down(0x02), Left(0x03), Right(0x04), Exit(0x0D)
- Play(0x44), Stop(0x45), Pause(0x46), Rewind(0x48), Fast forward(0x49)
- F1(Blue)(0x71), F2(Red)(0x72), F3(Blue)(0x73), F4(Yellow)(0x74)

To use TV remocon, below button only can be supported.

-. Play / Pause / Fast Forward / Rewind / Stop button
-. Up / Down / Right / Left / Select / Exit button
-. 0~9, - button
-. F1 (Blue) / F2 (Red) / F3 (Green) / F4 (Yellow) button

F1~F4 buttons are not connected with Android framework, and data are only handled under kernel level. You can add the function, if you want to use.

About “play” command,
- Samsung TV used <Play> op code (0x41) in “Desk Control Feature”
- LG TV used <Play> user operation (0x44) in <User Control Pressed> op code (0x44) in “Device Menu Control Feature”

About “User Control Pressed” command,
- Samsung TV sends user operation with “0-9” and “-“ buttons.
- LG TV doesn’t send user operation with “0-9” and “-“ buttons.

Because HDMI CEC includes a wide range of command sets, Telechips supports only the above commands. If customers want to support a specific command set, they have to add it by themselves.

To help customer, Telechips provides sample source code so that customer can add commands easily. You can understand how TV remocon input can be mapped with Android key when you review TccCECInterface_ParseMessage( ) function. (*kernel/drivers/char/hdmi/cec/tcc_cec_interface.c*)

Notes) some commands may require system modification include frameworks. These modifications have to be done by customers.

Notes) HDMI CEC solution of Telechips can’t guarantee CEC CTS and compatibility.

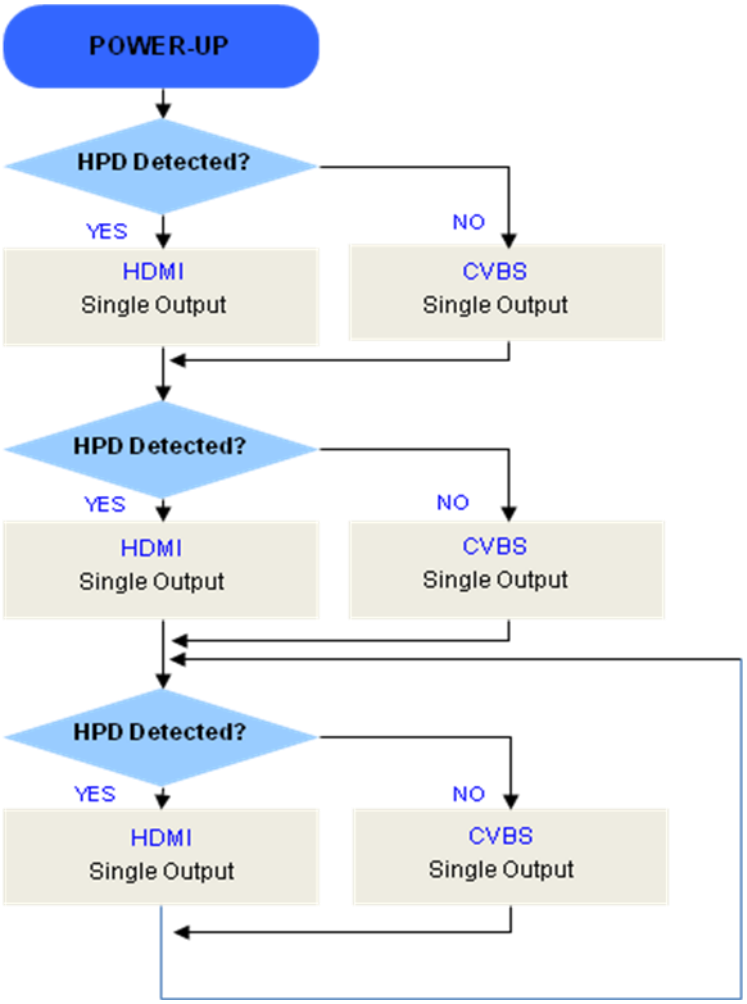
16 Auto-Detection with HDMI/CVBS

There are two types of output.

If HDMI cable is plugged in → HDMI
If HDMI cable is plugged out → CVBS (Composite)

"HDMI" and "CVBS" are switched automatically according to the detection of HDMI cable (HPD).

Please refer to the flowchart below



The description below supposes that you use TCC8935 YJ8935T board.

1) Bootloader
Change "*bootable/bootloader/lk/target/tcc8930st_evm/rules.mk"* file as below.
("*bootable/bootloader/lk/target/tcc8920st_evm/rules.mk"* if you use TCC892x chip)

```
# Defines Display Type
ifeq ($(TARGET_BOARD_STB),true)
 ifneq ($(filter $(HW_REV),0x6230),)
 endif

 ifneq ($(filter $(HW_REV),0x7230 0x7231 0x7430 0x7300 0x7310),)
  DEFINES += DISPLAY_STB_AUTO_HDMI_CVBS
 endif

endif
```

2) Kernel
It needs to change kernel configuration below

```
$ cd kernel
$ make menuconfig

Device Drivers
   → Graphics support
      → TCC Extend Display
         → [*] Auto-Detection for HDMI/CVBS Output
```

3) System
Change *"device/telechips/tcc8930st/device.mk"* file as below.
("*device/telechips/tcc8920st/device.mk"* if you use TCC892x chip)

```
# Define display mode for external output
PRODUCT_PROPERTY_OVERRIDES += \
       persist.sys.display.mode = 1
```

17 Dual Output with HDMI/CVBS

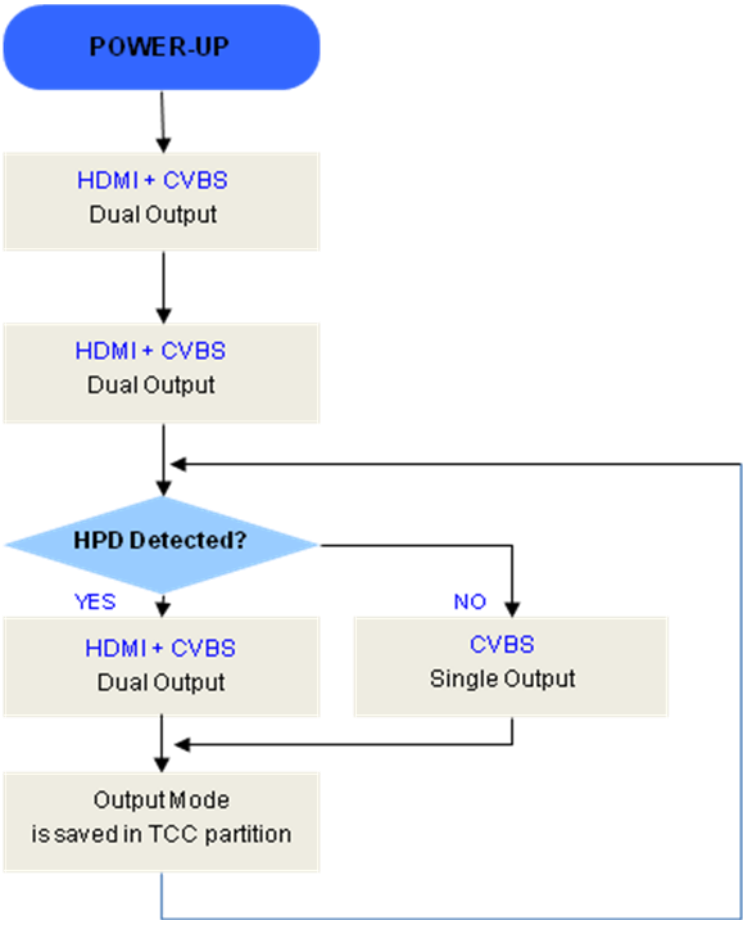
There are two types of output.

If HDMI cable is plugged in → HDMI + CVBS (Dual Output)
If HDMI cable is plugged out → CVBS (Single Output)

"HDMI+CVBS" and "CVBS" are switched automatically according to the detection of HDMI cable (HPD). So CVBS is always displayed.

Dual output can't be supported with 1080p UI, YUV output and MVC because of performance issue.

Please refer to the flowchart below



The description below supposes that you use TCC8935 YJ8935T board.

1) Bootloader
Change "*bootable/bootloader/lk/target/tcc8930st_evm/rules.mk"* file as below.
("*bootable/bootloader/lk/target/tcc8920st_evm/rules.mk"* if you use TCC892x chip)

```
# Defines Display Type
ifeq ($(TARGET_BOARD_STB),true)
 ifneq ($(filter $(HW_REV),0x6230),)
 endif

 ifneq ($(filter $(HW_REV),0x7230 0x7231 0x7430 0x7300 0x7310),)
  DEFINES += DISPLAY_STB_ATTACH_HDMI_CVBS
 endif

endif
```

2) Kernel
It needs to change kernel configuration below

```
$ cd kernel
$ make menuconfig

Device Drivers
   → Graphics support
      → TCC Extend Display
         → [*] Attach Additional Output for Dual Display
            → Select Attach Mode
               → (X) HDMI/CVBS Mode
```

3) System
Change *"device/telechips/tcc8930st/device.mk" file as below*.
("*device/telechips/tcc8920st/device.mk"* if you use TCC892x chip)

```
# Define display mode for external output
PRODUCT_PROPERTY_OVERRIDES += \
       persist.sys.display.mode = 2
```

18 Dual Output with HDMI/Component/CVBS

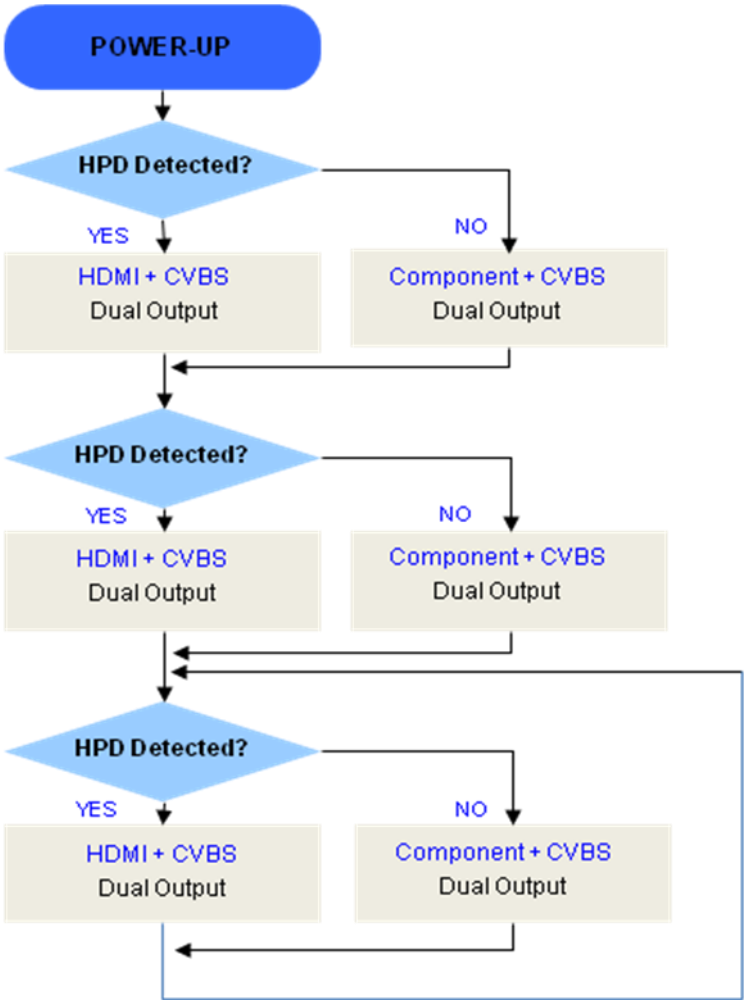
There are two types of output.

If HDMI cable is plugged in → HDMI + CVBS (Dual Output)
If HDMI cable is plugged out → Component + CVBS (Dual Output)

"HDMI+CVBS" and "Component+CVBS" are switched automatically according to the detection of HDMI cable (HPD). So CVBS is always displayed.

Dual output can't be supported with 1080p UI, YUV output and MVC because of performance issue.

Please refer to the flowchart below



The description below supposes that you use TCC8930 STBM board.

1) Bootloader

Change "*bootable/bootloader/lk/target/tcc8930st_evm/rules.mk"* file as below.
("*bootable/bootloader/lk/target/tcc8920st_evm/rules.mk"* if you use TCC892x chip)

```
# Defines Display Type
ifeq ($(TARGET_BOARD_STB),true)
 ifneq ($(filter $(HW_REV),0x6230),)
  DEFINES += DISPLAY_STB_ATTACH_DUAL_AUTO
 endif

 ifneq ($(filter $(HW_REV),0x7230 0x7231 0x7430 0x7300 0x7310),)
 endif

endif
```

2) Kernel

It needs to change kernel configuration below

```
$ cd kernel
$ make menuconfig

Device Drivers
   → Graphics support
      → TCC Extend Display
         → [*] Attach Additional Output for Dual Display
           → Select Attach Mode
              → (X) Auto Dual Mode
```

3) System

Change *"device/telechips/tcc8930st/device.mk" file as below*.
("*device/telechips/tcc8920st/device.mk"* if you use TCC892x chip)

```
PRODUCT_PROPERTY_OVERRIDES += \
      persist.sys.display.mode = 3
```

19 1080p UI

You can use 1920x1080p frame buffer for Android UI and should change build option below. This feature has some limitations below because of performance issue.

- It can be supported with only 32bit memory bus (TCC8930)
- It can't be supported with dual output (HDMI + CVBS)
- It can't be supported with MVC decoding
- It can fail in the result of Google CTS

This is default option in TCC8930 STBM/YJ8930T board.

1) Bootloader
Change "*bootable/bootloader/lk/include/arch/tcc_used_mem_tcc8930st.h"* file as below.

```
#define USE_FB_1080P
```

2) Kernel
It needs to change kernel configuration below

```
$ cd kernel
$ make tcc8930st_defconfig
$ make menuconfig

Device Drivers
   → Graphics support
      → UMP memory size
         → 128
      → Support for LCD panels --->
         → [*] HDMI 1920X1080 LCD support
```

3) System
Change *"device/telechips/tcc8930st/device.mk" file as below*.

```
USE_FB_1080P = true
```

20 UVC/UAC

To use UVC (USB Video Class), you should change kernel configuration below.

```
$ cd kernel
$ make tcc8930st_defconfig
$ make menuconfig

Device Drivers --->
       Multimedia devices --->
              <*> Video capture adapters
                     <*> V4L USB devices
                            <*> USB Video Class (UVC)
                                   [*] UVC input events device support
                            < > GSPCA based webcams
```

To use UAC (USB Audio Class), you should change kernel configuration below.

```
$ cd kernel
$ make tcc8930st_defconfig
$ make menuconfig

Device Drivers --->
       [*]Sound card support  --->
          [*] Advanced Linux Sound Architecture  --->
             [*] USB sound devices  --->
                <*> USB Audio/MIDI driver
                <*> Native Instruments USB audio devices
                 [*]  enable input devices for controllers
```

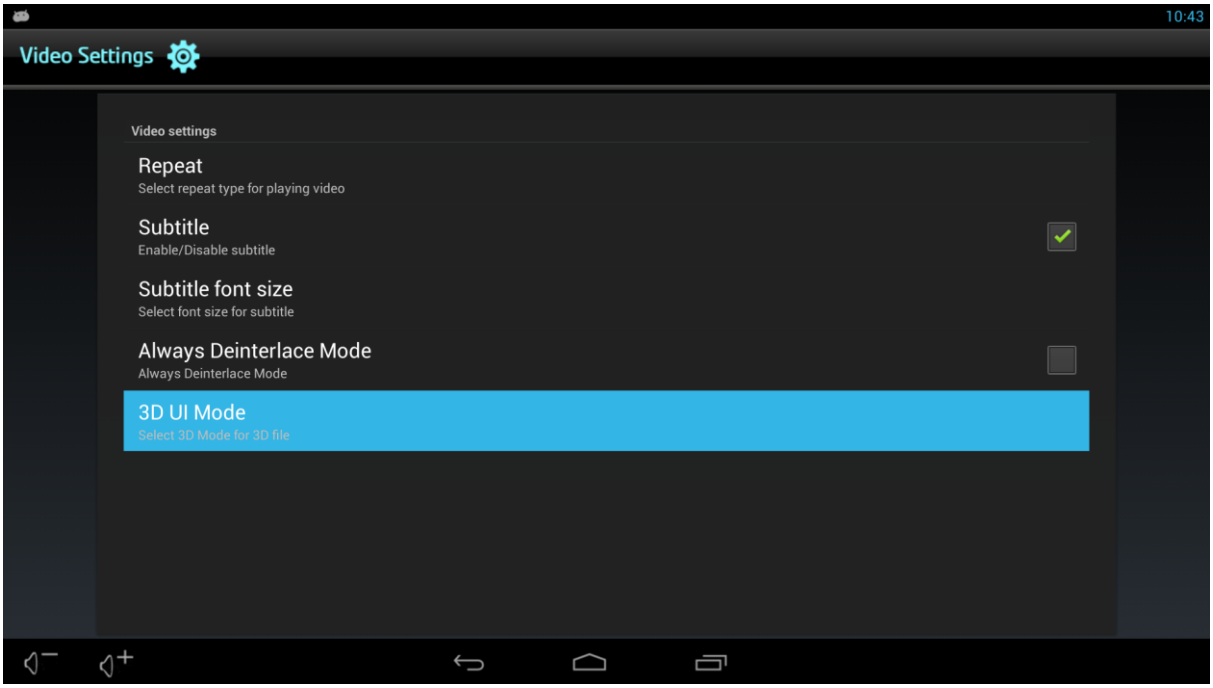
To test UVC/UAC, USB port can be used as USB HOST on your target board.

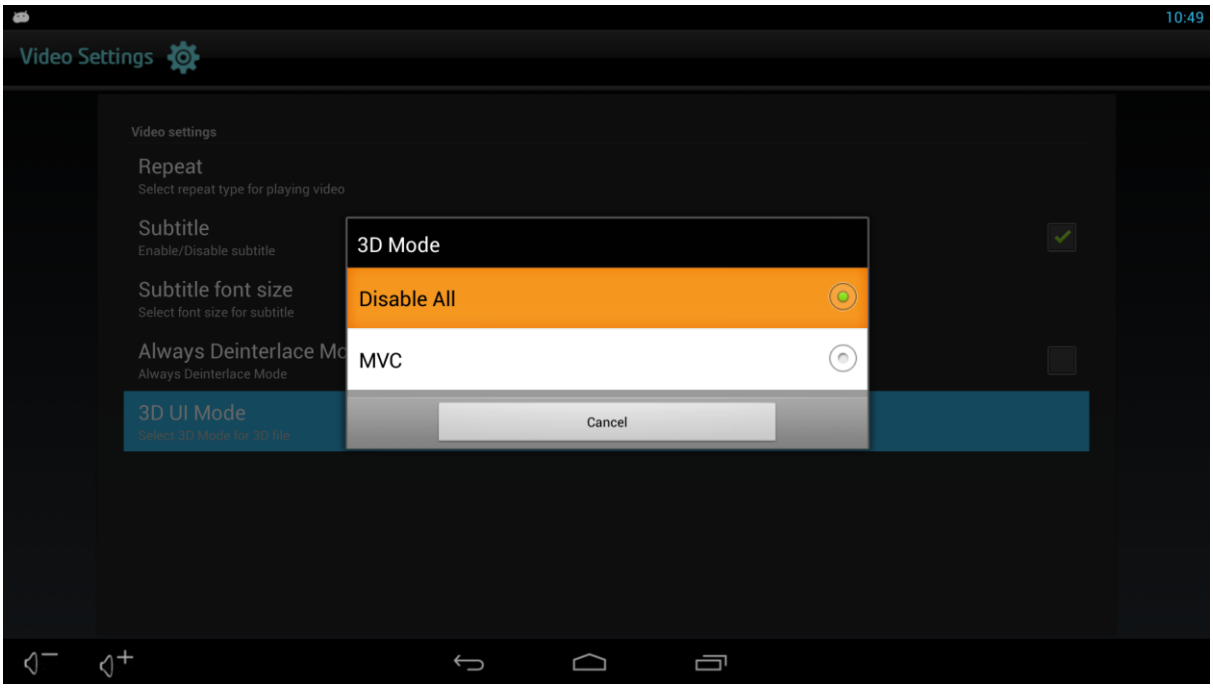
We support UAC function with some limitation in audio playback. User should use a certain UAC device which supports a specific sampling rate same as Android device's one. That is defined at /hardware/telechips/common/audio/audio_hw.c file. The default sampling rate is 44.1 KHz.

21 MVC

You can decode MVC contents of 1080p (24Hz) and 720p (30Hz) resolution. MVC decoding can't be supported with 1080p UI and dual output because of performance issue.

You should select UI mode on setting menu of video player below and UI mode is applied only during playing video. If you escape video playback screen, UI mode is automatically changed to normal mode.





But 3D Mode menu for MVC is hidden by default and you should change build option to show and apply this menu.

1) Bootloader
Change "*bootable/bootloader/lk/include/arch/tcc_used_mem_tcc8930st.h"* file as below.
("*bootable/bootloader/lk/include/arch/tcc_used_mem_tcc8920st.h"* if you use TCC892x chip)

```
#define MVC_PROCESS
```

2) System
Change *"device/telechips/tcc8930st/device.mk" file as below*.
("*device/telechips/tcc8920st/device.mk"* if you use TCC892x chip)

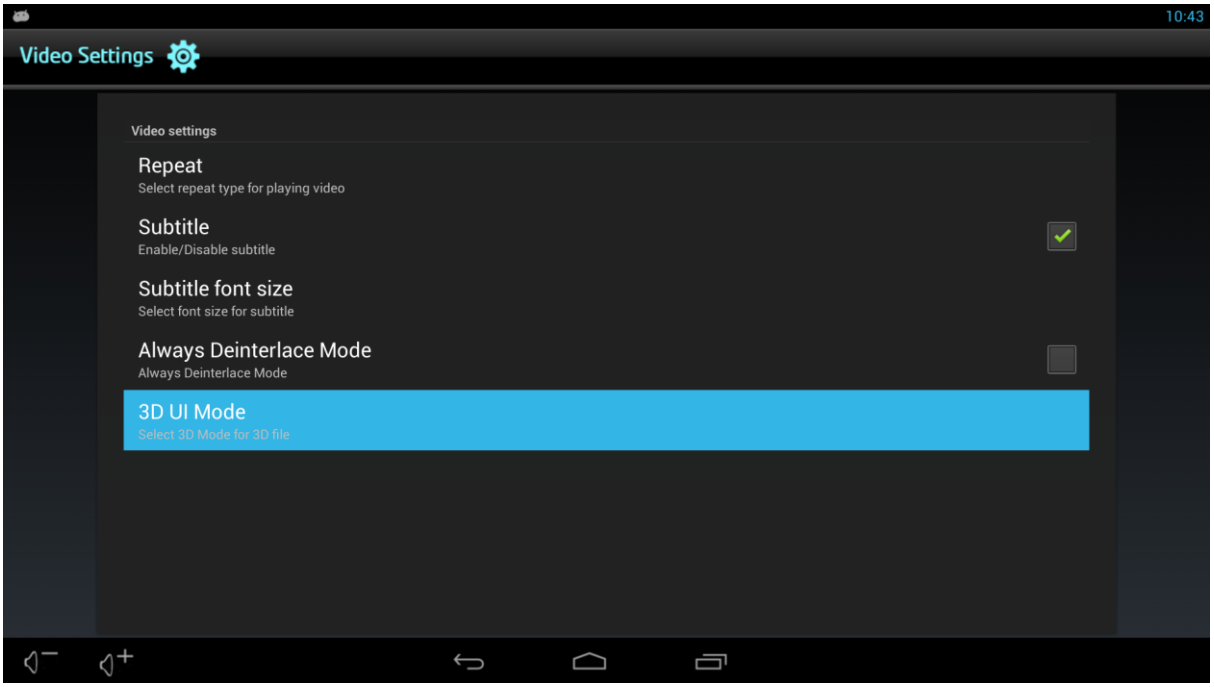
```
# Define TCC video vsync mode
PRODUCT_PROPERTY_OVERRIDES += \
       tcc.video.vsync.support = 1 \
       tcc.video.vsync.threshold = 0 \
       tcc.video.surface.support = 1 \
       tcc.video.mvc.support = 0 \
       tcc.video.mvc.enable = 1
```

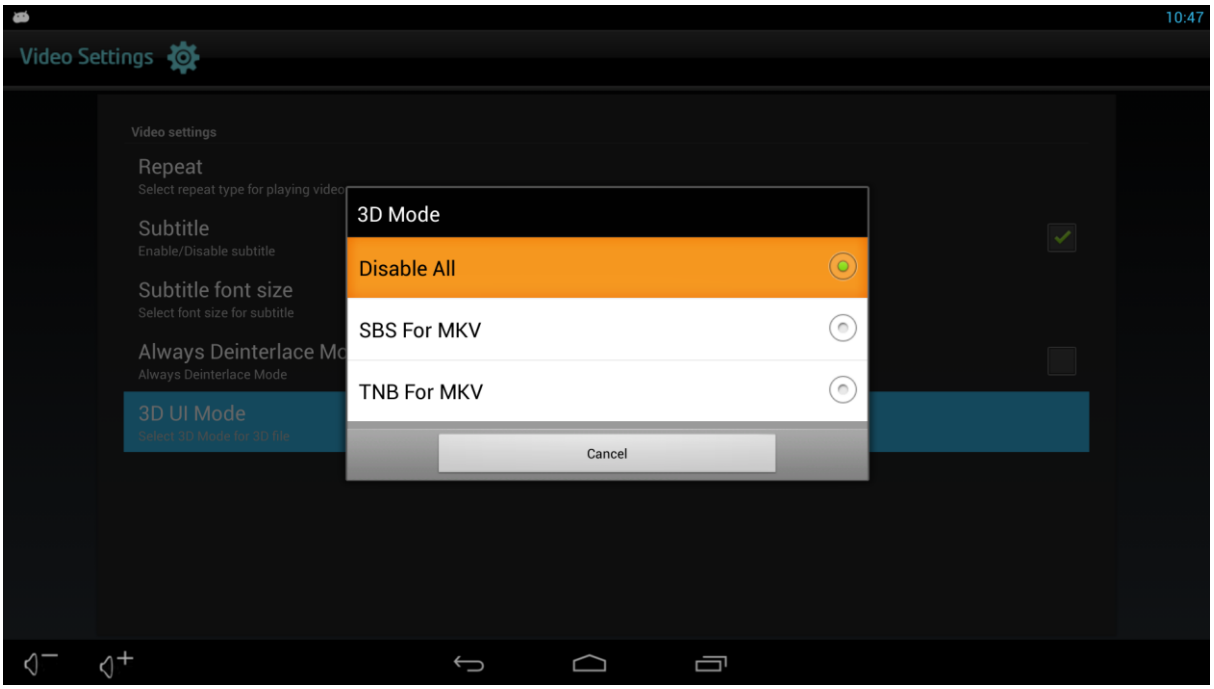
22 3D UI Display for MKV 3D files

There are two types of UI mode.

SBS (Side-By-Side) → UI screen will be divided vertically and copied same UI on it
TNB (Top-and-Bottom) → UI screen will be divided horizontally and copied same UI on it

You should select UI mode on setting menu of video player below and UI mode is applied only during playing video. If you escape video playback screen, UI mode is automatically changed to normal mode.





But 3D UI menu is hidden by default and you should change build option to show and apply this

menu.

1) Bootloader
Change "*bootable/bootloader/lk/include/arch/tcc_used_mem_tcc8930st.h"* file as below.
("*bootable/bootloader/lk/include/arch/tcc_used_mem_tcc8920st.h"* if you use TCC892x chip)

```
#define USE_3D_UI
```

2) Kernel
It needs to change kernel configuration below

```
$ cd kernel
$ make tcc8930st_defconfig
$ make menuconfig

Device Drivers
   → Graphics support
      → [*] Support 3D(SBS/TNB) UI Display for MKV 3D files
```

3) System
Change *"device/telechips/tcc8930st/device.mk" file as below*.
("*device/telechips/tcc8920st/device.mk"* if you use TCC892x chip)

```
PRODUCT_PROPERTY_OVERRIDES += \
       tcc.3d.ui.enable = 1
```

23 USB 3.0 Dual-Role Device (DRD)

CAUTION:
In case of STBM and YJ8930/33/35 board, DRD is only used as host default mode. It means that DRD port always supply +5V VBUS. So when you finished download by using FWDN, You should plug-out USB debug cable on the STBM or YJ8930/33/35. If not, it may cause some damages either STBM or your PC by VBUS confliction. Please carefully use under this condition.

For avoiding this inconvenience, you can set as device default mode by modifying kernel source code like below.

You can find a “DBG_FORCE_DRD_DEVICE_MODE” define in /kernel/drivers/usb/core/drd_otg.c

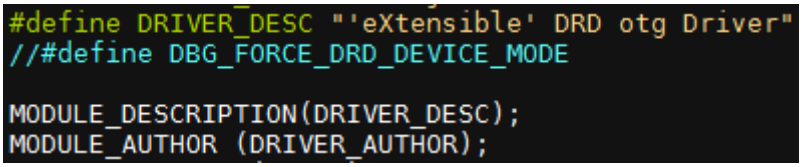


Figure 15. FORCE_DRD_DEVICE_MODE setting

Just uncomment and then update boot image again. After then DRD port will be worked as device default mode for development.

Board	DRD Mode
TCC8930 STBM	Host only
YJ8935	Host only
YJ8930	Host only
YJ8933	Device only
TCC8935 uPC	Device only
TCC8935 HDMI Dongle	Device only

Table 2. Default DRD Setting

24 Splash Image

You can use splash images as logo image in the bootloader. Three images can be supported according to each output (HDMI/Composite/Component). So you should prepare three images to be used as logo image and change the name of images as below. You can also use same images by changing their name.

logo_hdmi.xxx	: Logo image to display through HDMI
logo_composite.xxx	: Logo image to display through composite
logo_component.xxx	: Logo image to display through component

You should convert images to splash image (splash.img) by using the following command.

```
// In case of 16 bits data width (default data width)
$ mksplashimg 8192 16 3 logo_hdmi.jpg logo_composite.jpg logo_component.jpg splash.img   //NAND
$ mksplashimg 512 16 3 logo_hdmi.jpg logo_composite.jpg logo_component.jpg splash.img    //eMMC
// In case of 32 bits data width
$ mksplashimg 8192 32 3 logo_hdmi.jpg logo_composite.jpg logo_component.jpg splash.img   //NAND
$ mksplashimg 512 32 3 logo_hdmi.jpg logo_composite.jpg logo_component.jpg splash.img    //eMMC
// In case of two outputs (HDMI/Composite)
$ mksplashimg 8192 16 2 logo_hdmi.jpg logo_composite.jpg splash.img
// In case of single output (HDMI)
$ mksplashimg 8192 16 1 logo_hdmi.jpg splash.img
```

You can write “splash.img” to splash partition by using “fastboot” command or FWDN.

```
$ fastboot flash splash splash.imge // full path of splash.img
```