Android

Application Start Guide

for STB

TCC892x-STB-Android-ICS-V1.03E-Application Start Guide

June 25, 2012

Telechips

Preliminary

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Revision History

Date	Version	Description
2012-01-27	1.00	Initial Release
2012-03-02	1.01	Update for ICS v12.03_r1-tcc-android-4.0.3 official release
2012-04-20	1.02	Update for ICS v12.04_r1-tcc-android-4.0.4 official release
2012-06-25	1.03	Update for ICS v12.06_r1-tcc-android-4.0.4 official release

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1 Introduction

This document describes how to start applications. If you follow description, you can execute applications.

2 Music player

When the device normally boot up, you can see below screen from output device.

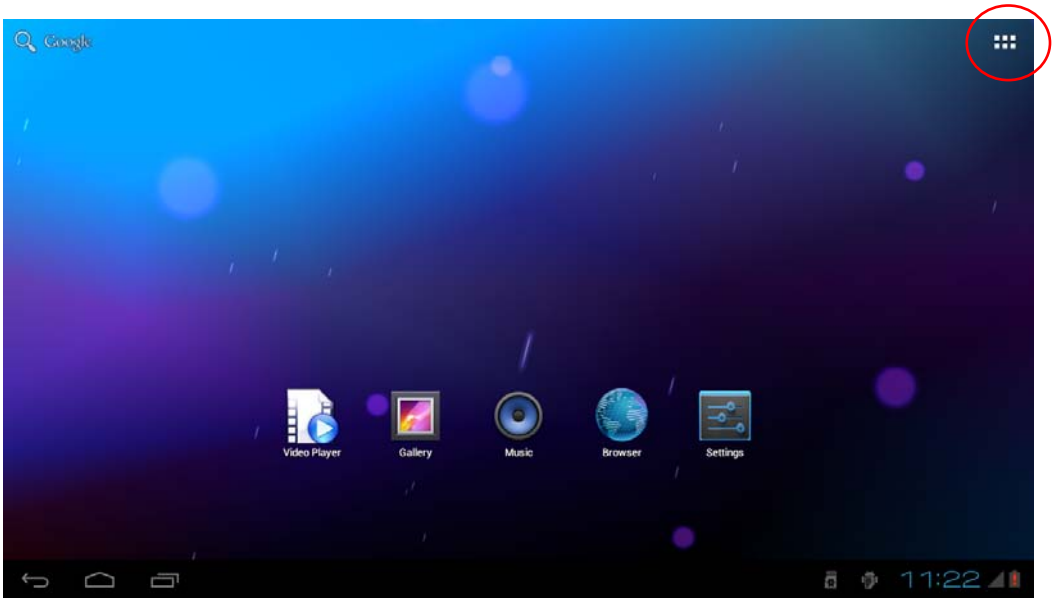


Figure 1. Screen after android is boot up

When you select red circle area, then you can see below screen.

Figure 2. Applications which you can select

If you select “Music” icon, you can see below screen (there must be music files in storage).

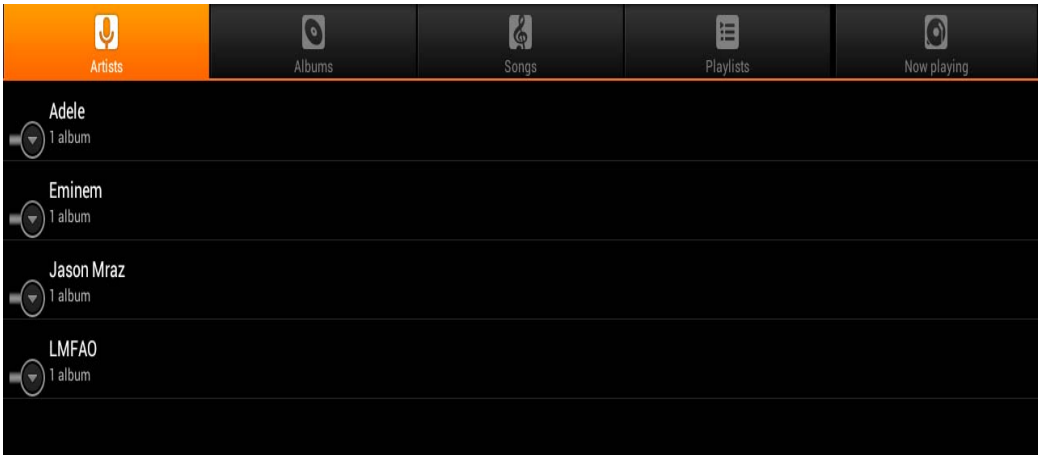


Figure 3. Music player

Select one of “Artists”, “Albums”, “Songs” or “Playlists”, then you can see list of songs. Select one of them. Then you can see below screen with playing music.

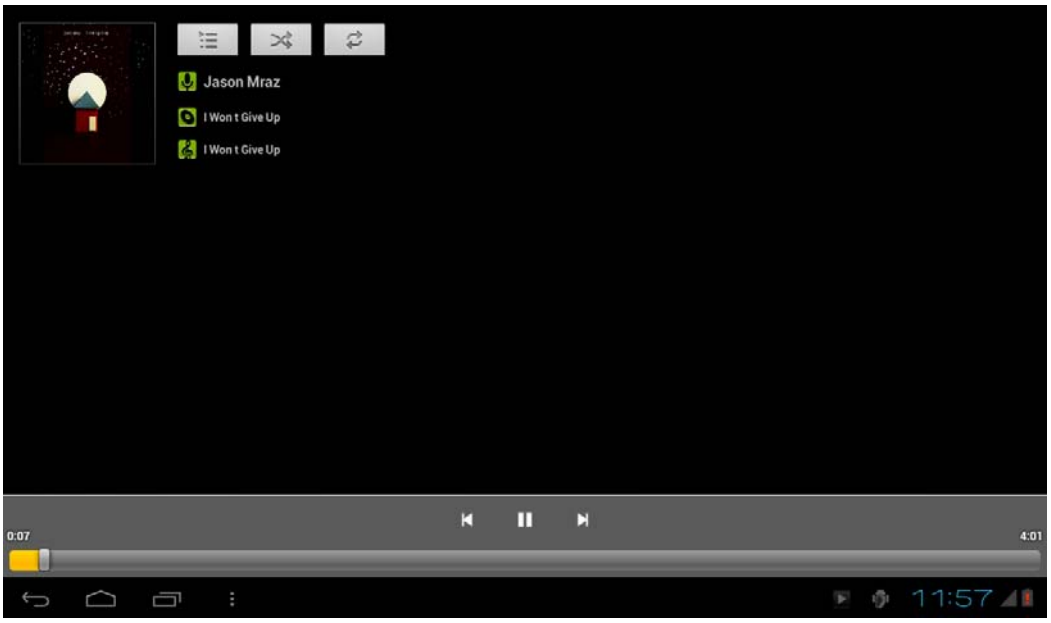


Figure 4. Play music

3 Video player

If you select “VideoPlayer” from Figure 2 screen, you can see below screen and this is only video player. If you want to view image file(s), select “Gallery” from Figure 2.

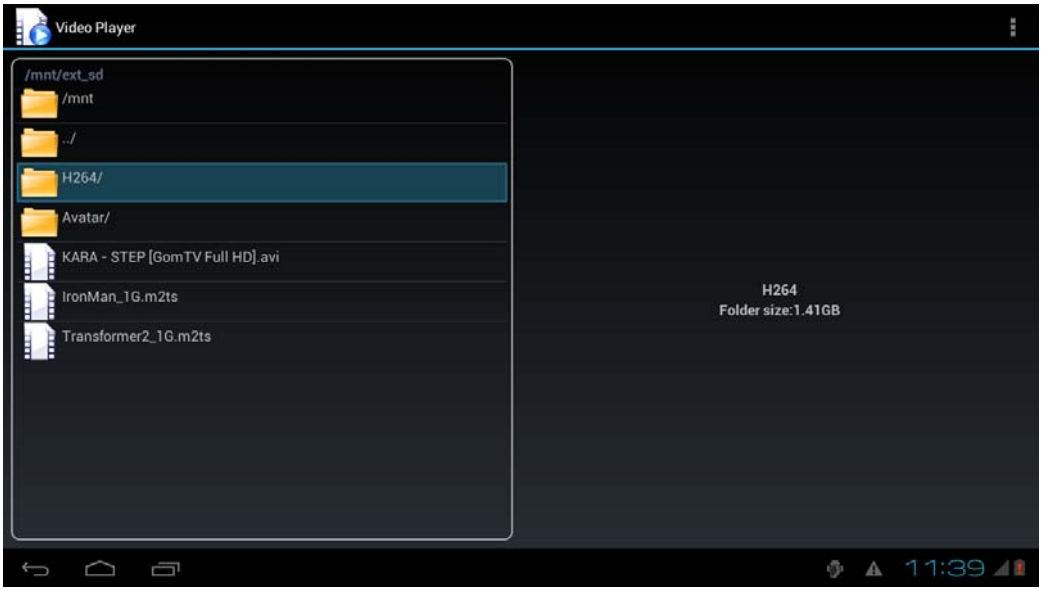


Figure 5. Video player

When you select a folder, you can see subfolder(s) ,video file(s) and subtitle file(s) under the selected folder. If you focus on a video file, you see the preview of the video like Figure 6. If you want to play a video with full size of screen, select it.

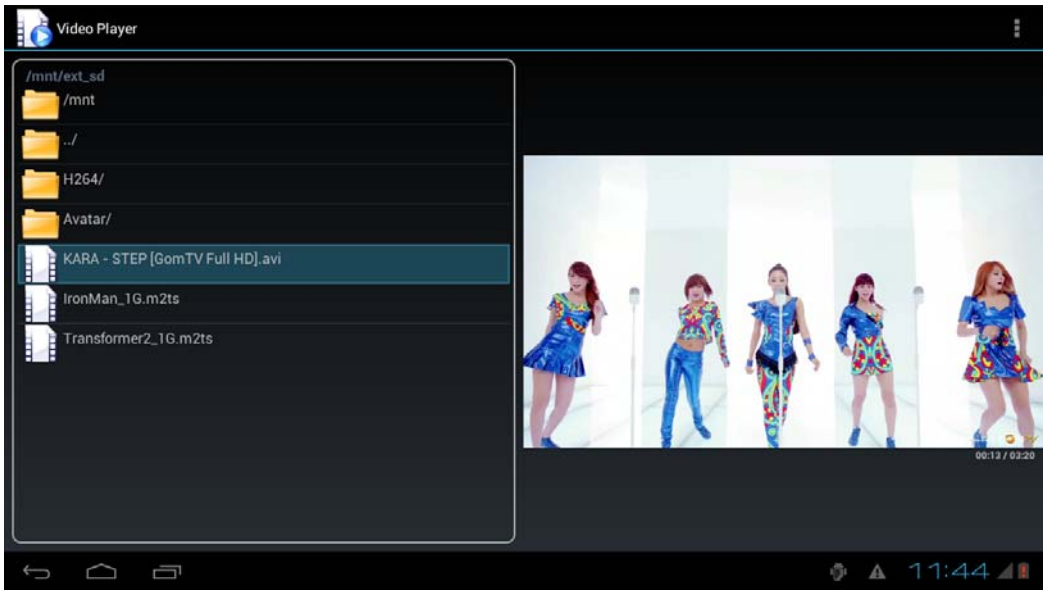


Figure 6. Preview for video player

3.1 Support video out synchronized to H/W interrupt

It makes video out can be displayed more smoothly,
To use this function, you have to set as below. (This feature is enabled as default.)

1) Bootloader

Change "TCC_VIDEO_DISPLAY_BY_VSYNC_INT" option from "false" to "true" in *bootable/bootloader/lk/target/tcc8920st_evm/rules.mk* file as below.

```
#-----------------------------------------------------------------------
# Support video displaying by hw vsyn interrupt
#-----------------------------------------------------------------------
TCC_VIDEO_DISPLAY_BY_VSYNC_INT := true
```

2) Kernel

It needs to change kernel configuration. Execute "`make menuconfig`" command from kernel folder and select "`Device Drivers --> Graphics support --> Displaying video frame by hw vsync interrupt`"

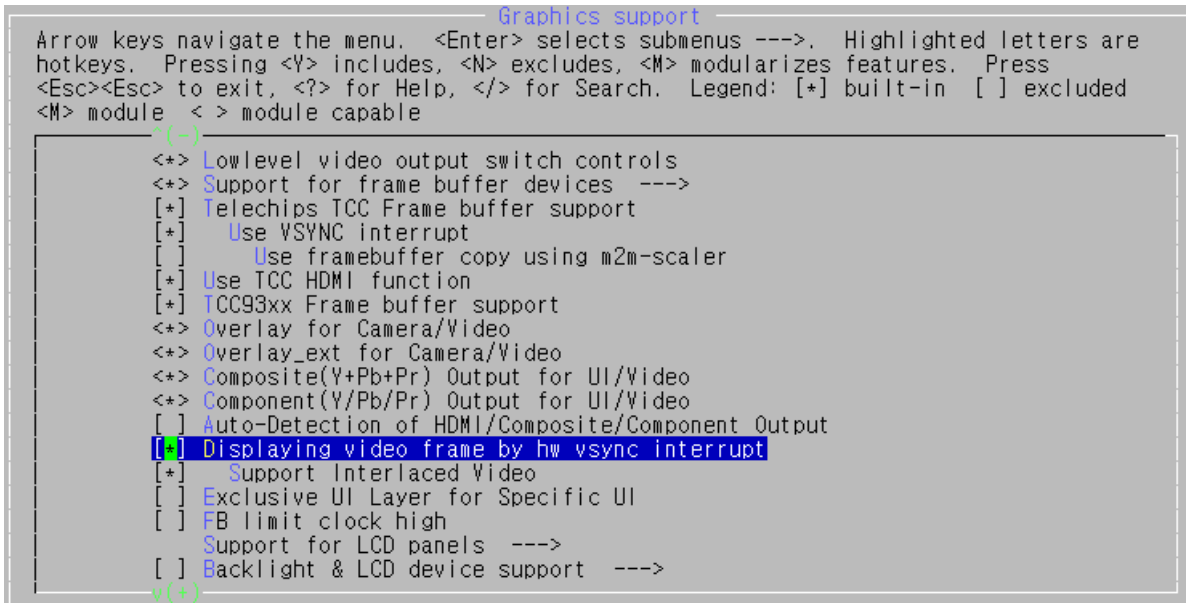


Figure 7. Configurations for VSYNC interrupt

3) System

Check *"device/telechips/tcc8920st/BoardConfigBase.mk"*.

```
BOARD_VIDEO_DISPLAY_BY_VSYNC_INT_FLAG := true
```

Check *"device/telechips/tcc8920st/device_base.mk"*.

```
PRODUCT_PROPERTY_OVERRIDES += \
       tcc.video.vsync.support = 1
```

3.2 Support de-interlace

It makes interlaced video can be displayed more smoothly by using de-interlacing process. To support de-interlace, you have to set "`video out synchronized to H/W interrupt(3.1)`" firstly. And then, you have to set as below to support this function. (This feature is enabled as default.)

1) Kernel

It needs to change kernel configuration. Execute "`make menuconfig`" command from kernel folder and select "`Device Drivers --> Graphics support --> Displaying video frame by hw vsync interrupt --> Support Interlaced Video`"

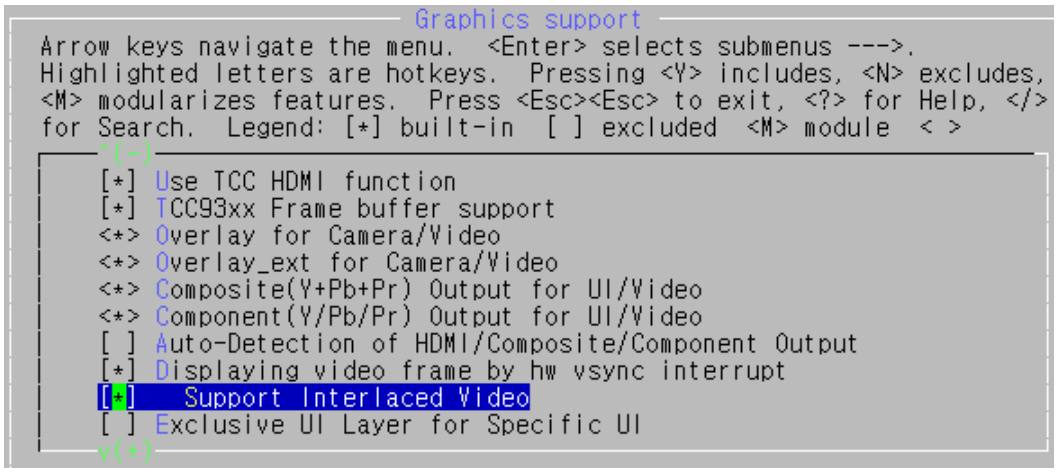


Figure 8. Configurations for de-interlace

2) System

Check *"device/telechips/tcc8920st/BoardConfigBase.mk"*.

```
BOARD_VIDEO_DEINTERLACE_SUPPORT_FLAG := true
```

4 DxB player

* To test DxB player, you must has DxB sub board. (ATSC, T-DMB, DVB-T or ISDB-T)
* You must select proper baseband. Please refer another document. (Broadcasting Application User Guide)

If you select one of mobile TV from figure 2 screen, you can see below screen and this is DxB player.

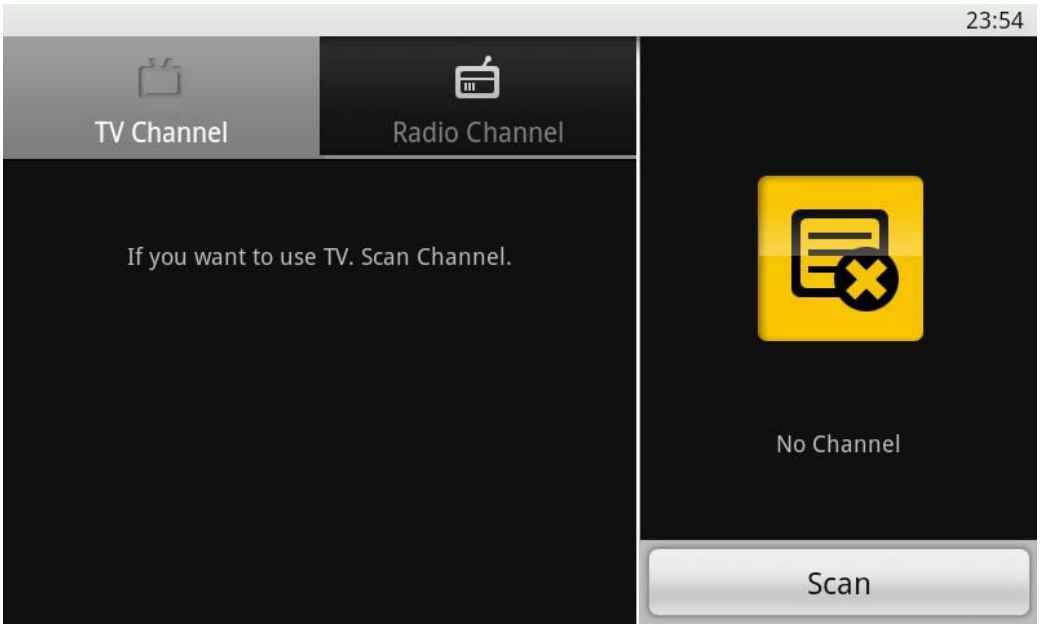


Figure 9. DxB player (DVB-T)

When you press “Scan” key, channel will be searched. If channels are searched, channel list and preview can be seen. If you select preview screen, it will be expanded and you can see full screen with menu. Menu will be disappeared.

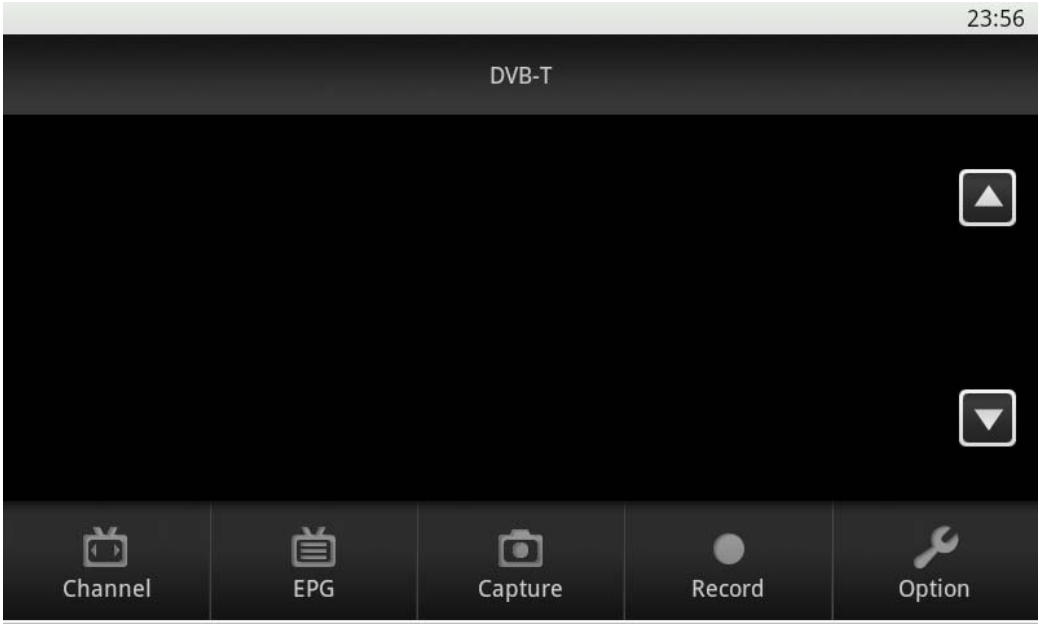
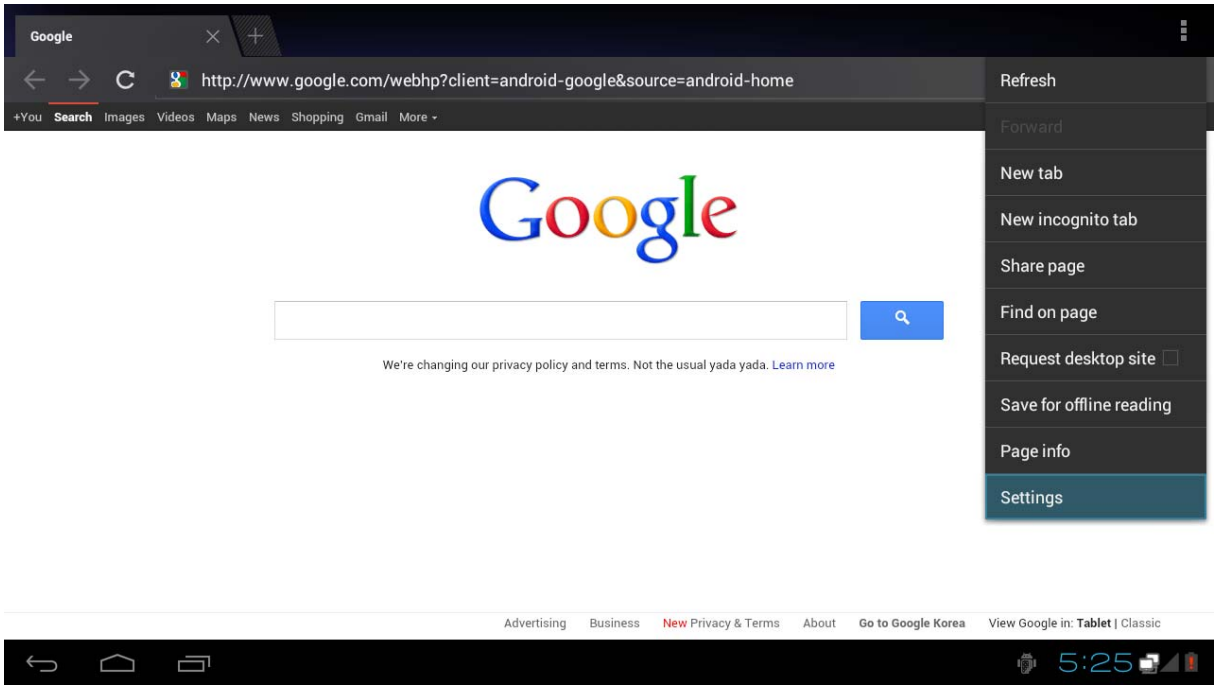


Figure 10. Menus for DxB player (DVB-T)

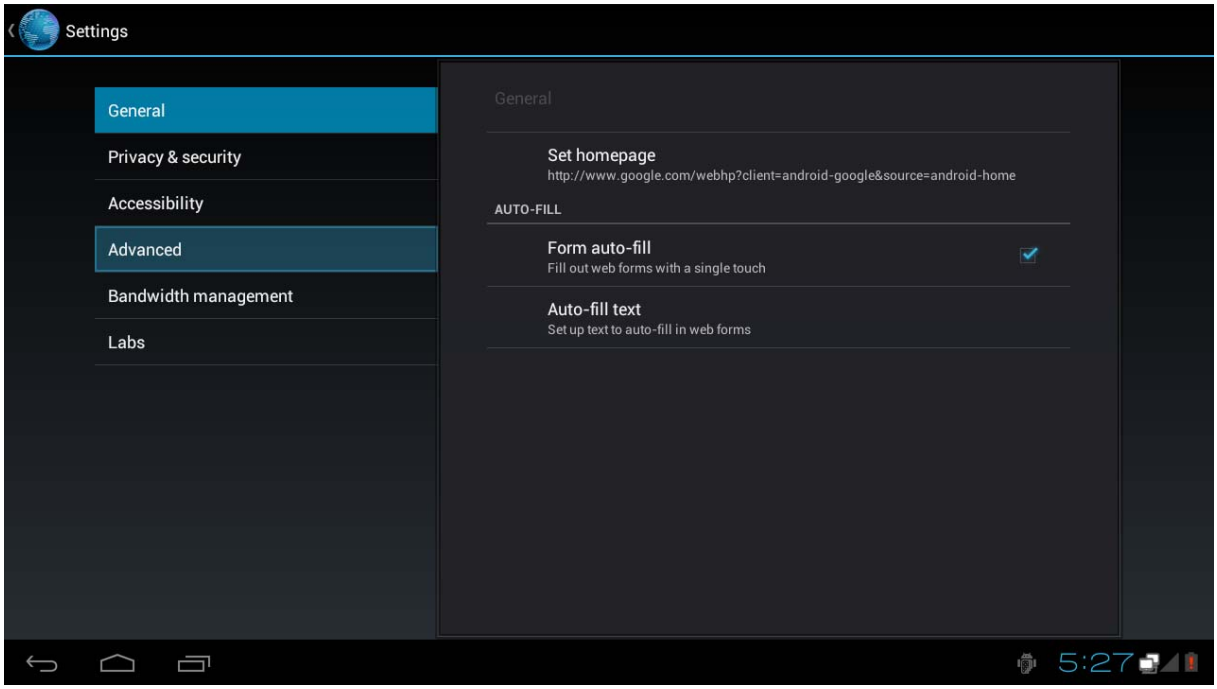
5 How to support HTML5 video playback

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 :

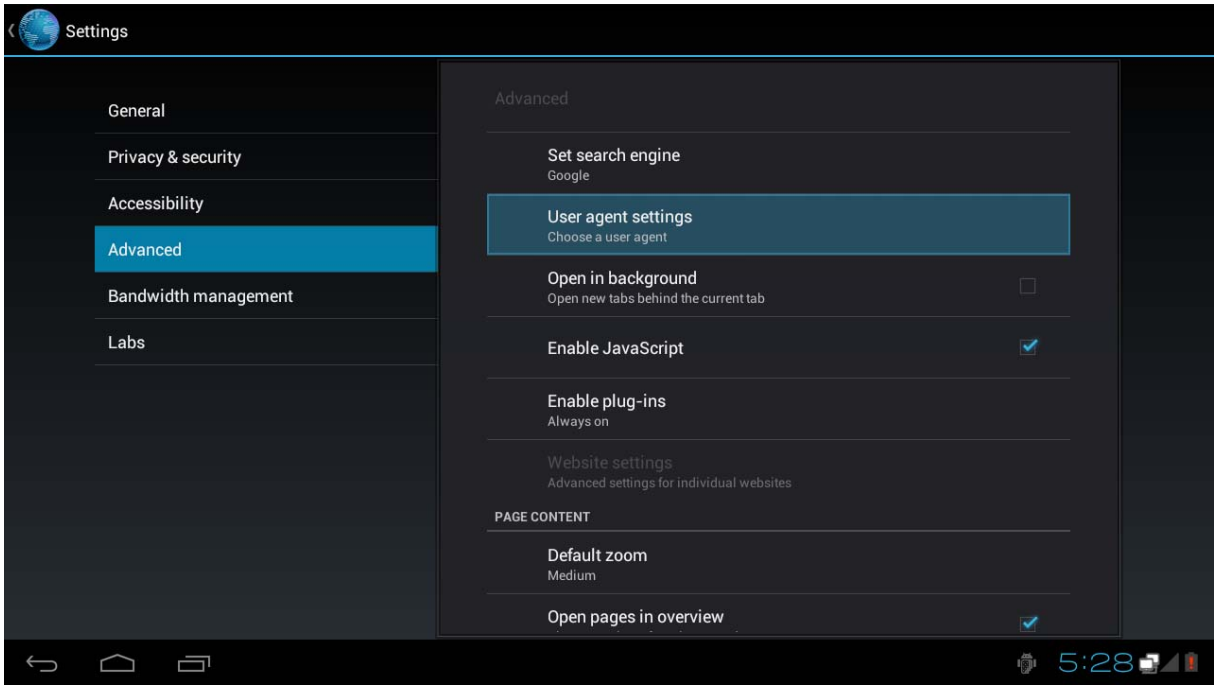
Step 1> Run 'Browser', click the right-top icon and select 'Settings' .



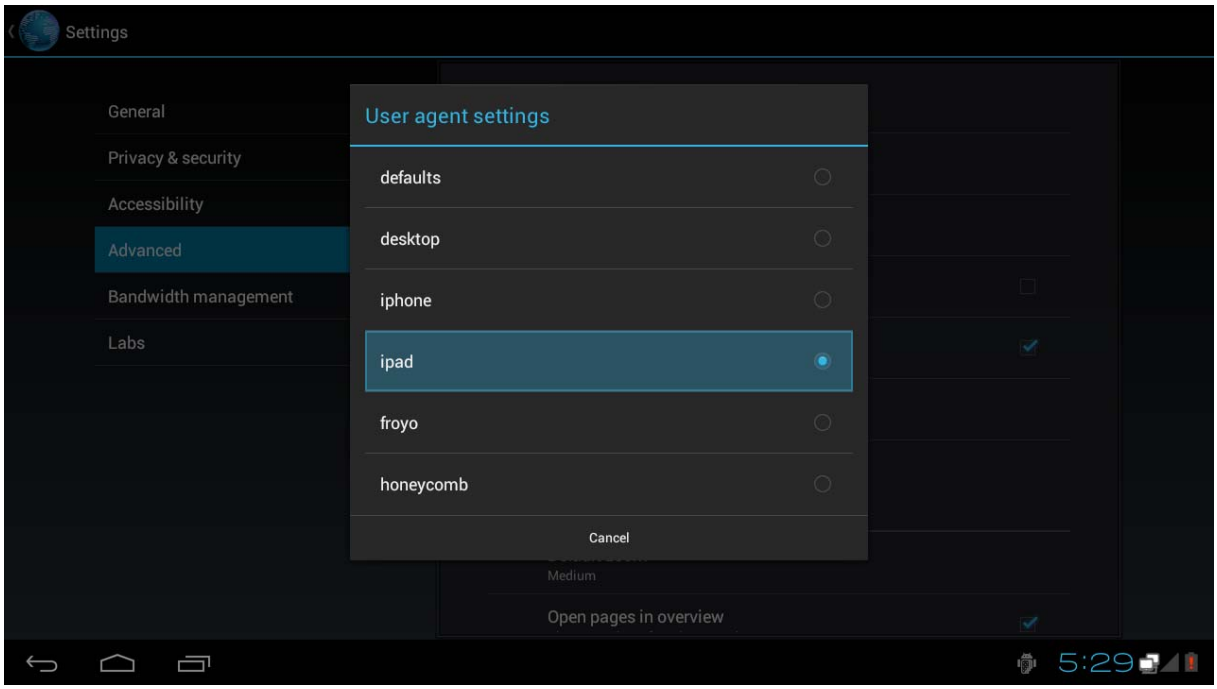
Step 2> Select 'Advanced'.



Step 3> Select 'User agent settings' .



Step 4> Select 'iPad' .



6 Output settings

You can see below screen when you select “Menu” -> “Settings” -> “Display” -> “Output settings”. menu. In STB solution, HDMI (1920 x 1080p 60Hz) is selected as default.

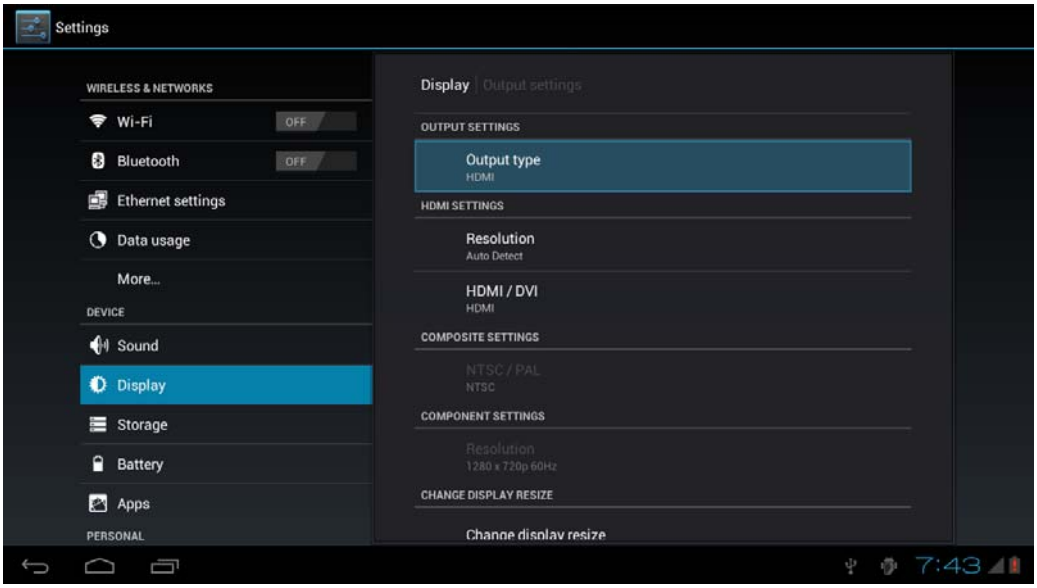


Figure 11. HDMI is selected as default

When you select “Output mode” menu, you can see various output devices which you can select.

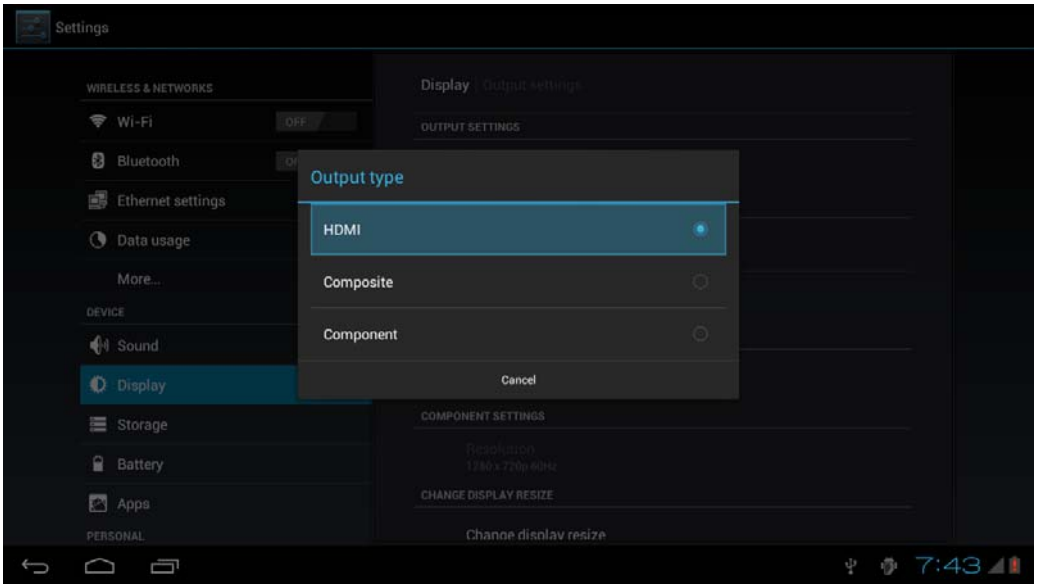


Figure 12. Output devices which supported in STB solution

When you select “Composite”, you can change “Video 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-plug. 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 HDMI resolution setting popup window and change HDMI resolution.

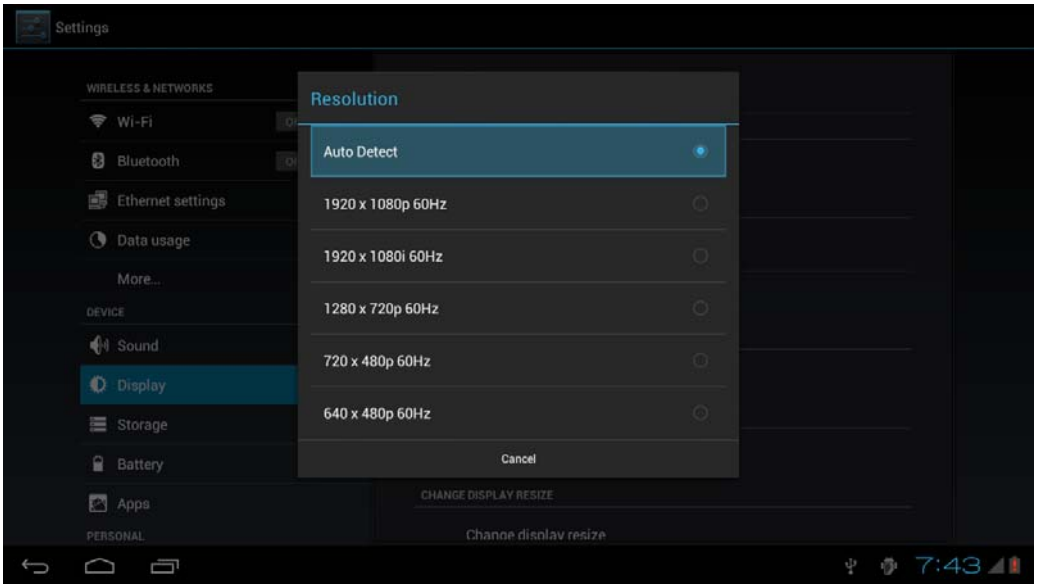


Figure 13. Change HDMI resolution

7 HDMI CEC

HDMI CEC is enabled as default.
If you want to enable or disable HDMI CEC, it is possible to change below definition.

`device/telechips/telechips/tcc8920st/BoardConfig.mk`..

```
BOARD_HDMI_CEC := -DTCC_HDMI_CEC
```

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.

Below functions are supported by HDMI CEC.

-. 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.

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*)

8 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`".

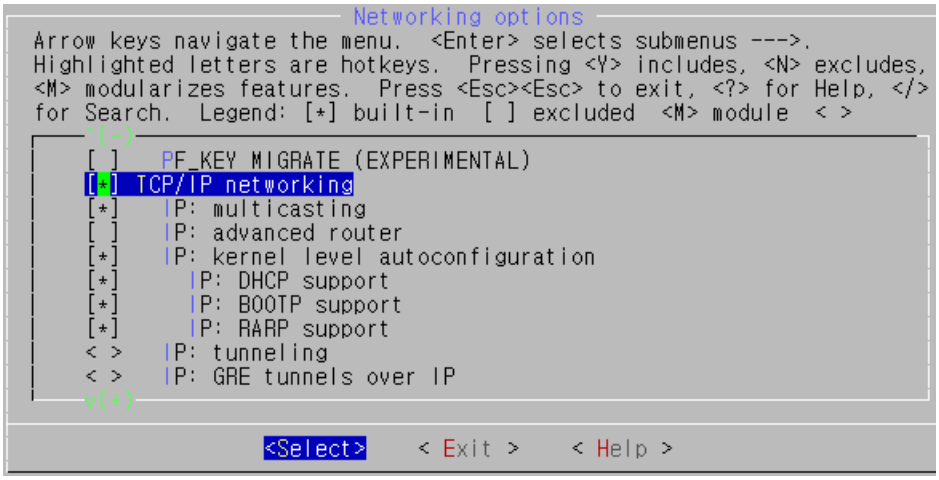


Figure 14. Configurations for Ethernet

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 (1000Mbit) ---> 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 RTL8211 PHY Telechips support`".

If **Realtek 8201** is used,

4.1. Select "`Device Drivers ---> Network device support ---> Ethernet (1000Mbit) ---> 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 RTL8201 PHY 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.

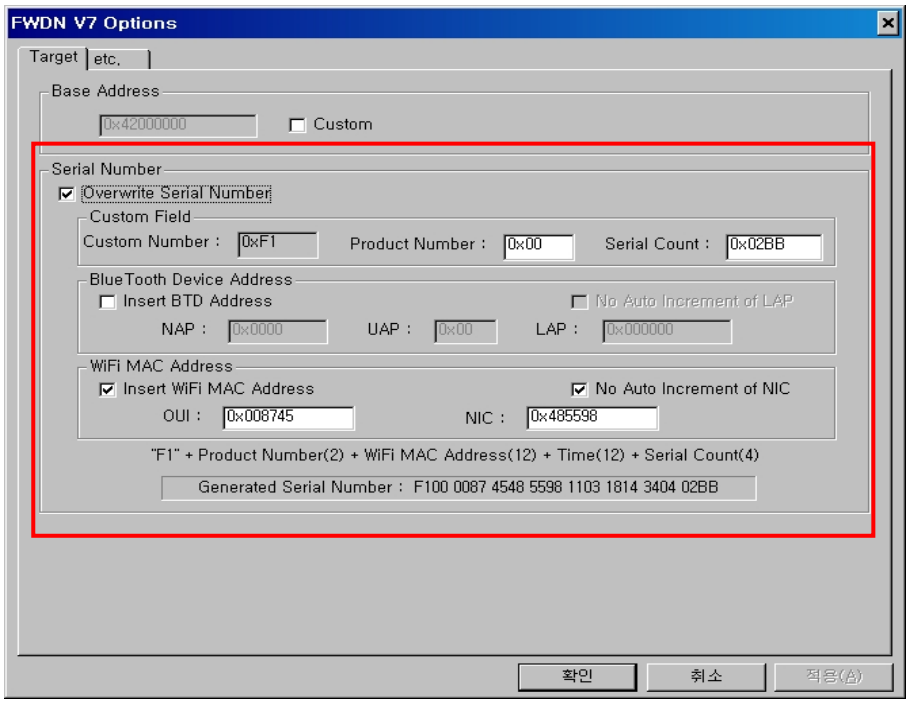


Figure 15. MAC address setting from FWDN.exe

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 (1000Mbit) ---> Telechips 10/100/1000 Ethernet Driver ---> 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.

9 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 be 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_base.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 'pool.ntp.org' as default.

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

10 Ethernet Tethering (Software AP with Ethernet + Wifi)

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

You can see “Settings – More… – Tethering & portable hotspot” Menu.

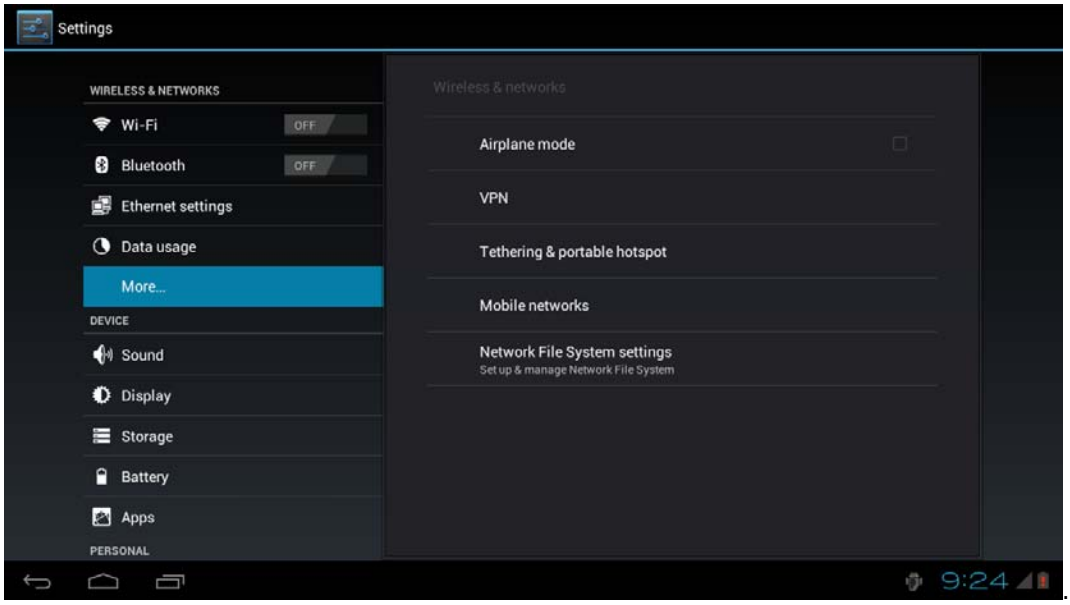


Figure 16. Portable hotspot Menu

Enable “Portable Wi-Fi hotspot” after setting the configuration using “Configure Wi-Fi hotspot” Menu.

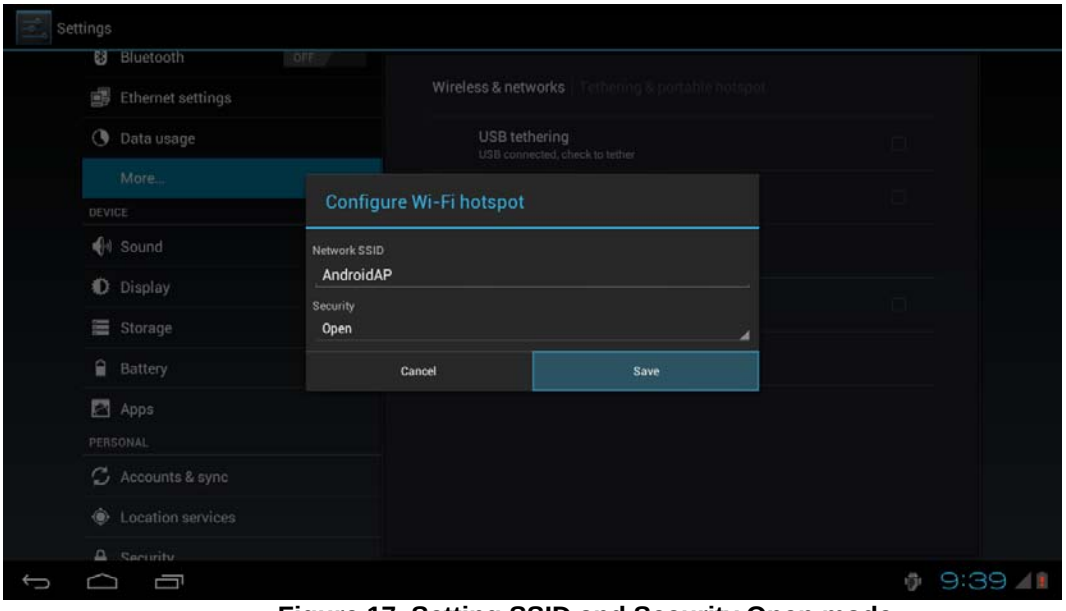


Figure 17. Setting SSID and Security Open mode

11 UMS

Select "`Device Drivers --> USB support --> USB Gadget Support --> USB Gadget Drivers`". In this menu, you can select "`Android Gadget`" to use ADB and UMS, or "`File-backed Storage Gadget`" to use only UMS.

To use NAND UMS, you must partition NAND driver. Please refer "Quick Start Guide" document.

After boot up, please connect USB cable. After USB connection, you can see icon which indicates that USB is connected.

Figure 18. Icon which indicates that USB is connected

To select USB connect menu, scroll title bar. Then you can see below USB connect menu.

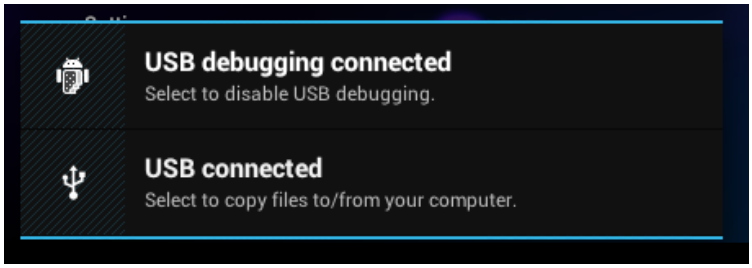
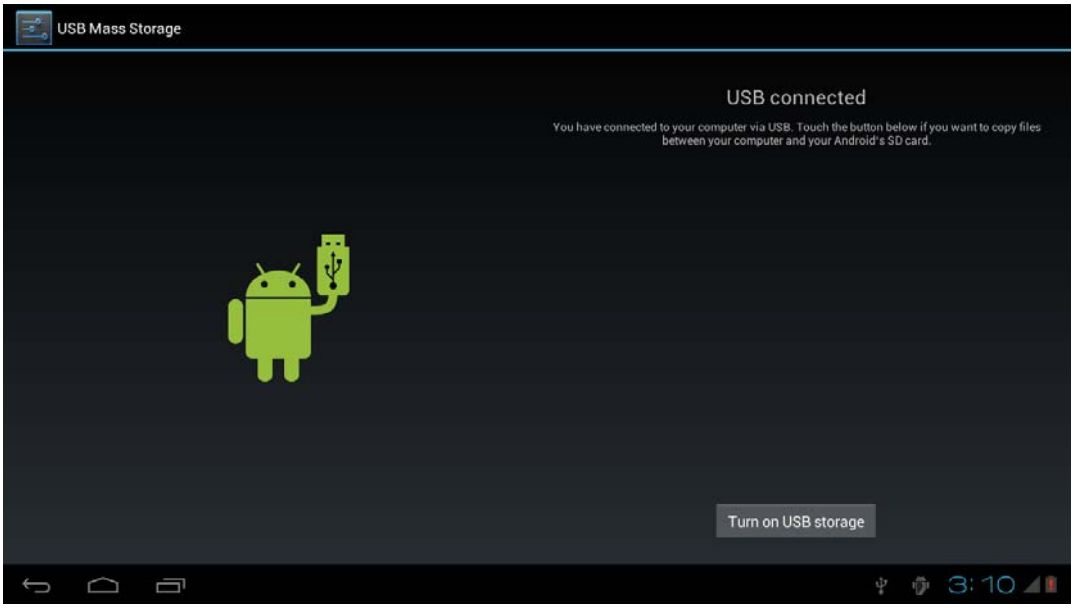


Figure 19. USB connect menu

Recently, these were changed. You can see "`USB connected(Internal)`", "`USB connected(External)`", and "`USB debugging connected`". If you wan to connect NAND, you must select "`USB connected(Internal)`", or if you want to connect SD card, you must select "`USB connected(External)`". Then "Mount" menu will be popped up. Select "`Mount`". Then you can see NAND or SD card with UMS.



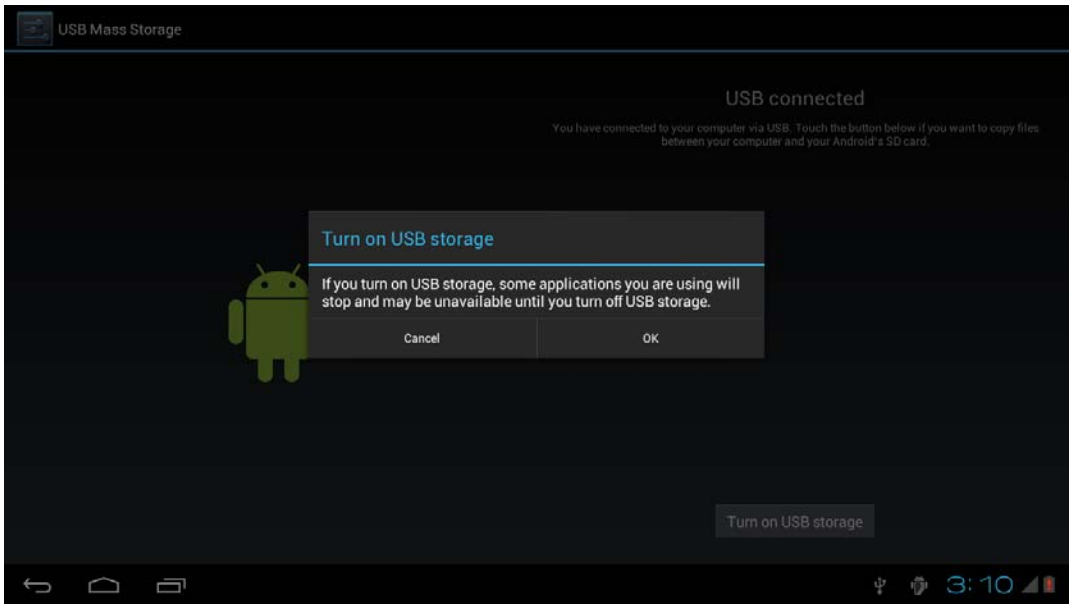


Figure 20. USB connected and mount menu

You can disconnect UMS with below.

-. Disconnect USB cable
-. Scroll title bar, then you can see "`Turn off USB storage`". Select it, and select "`Turn off`" pop-up menu.

12 USB OTG Host

To use USB OTG Host, you must change kernel configuration. (This feature is enabled as default.)

Please execute "`make menuconfig`" command from kernel folder and select configurations.

Select "`Device Driver --> SCSI device support --> SCSI device support`". Then menus will be expanded. Then Select "`SCSI disk support (NEW)`", "`SCSI generic support`", "`Probe all LUNs on each SCSI device (NEW)`". Please refer below figure.

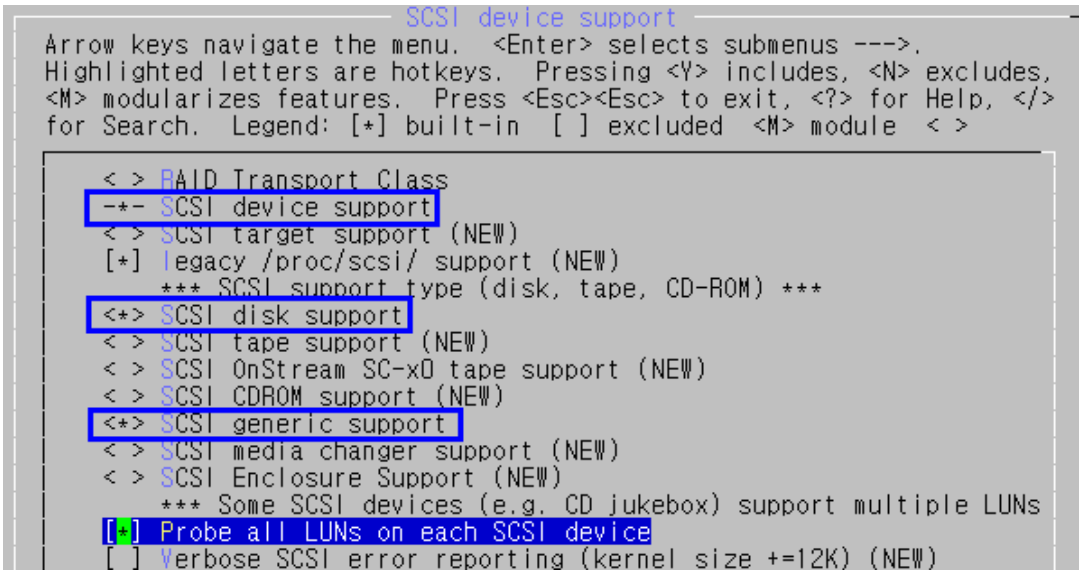


Figure 21. Select configurations for USB OTG Host operation.

Select "`Device Driver --> USB support --> Telechips DWC OTG support --> Telechips DWC OTG mode (OTG Device only mode) --> OTG Dual-role mode`".

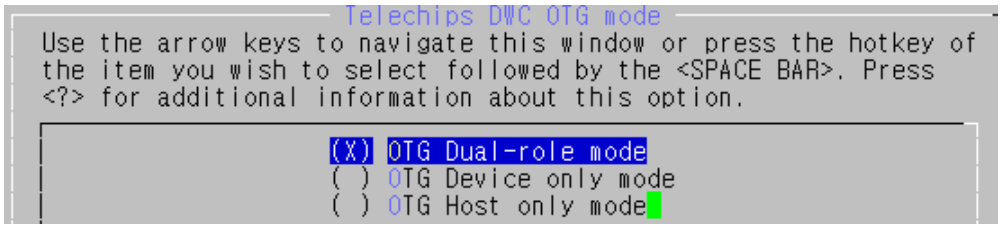


Figure 22. Select OTG Dual-roll mode for USB OTG Host operation.

Select “Device Driver --> USB support --> USB Mass Storage support”.

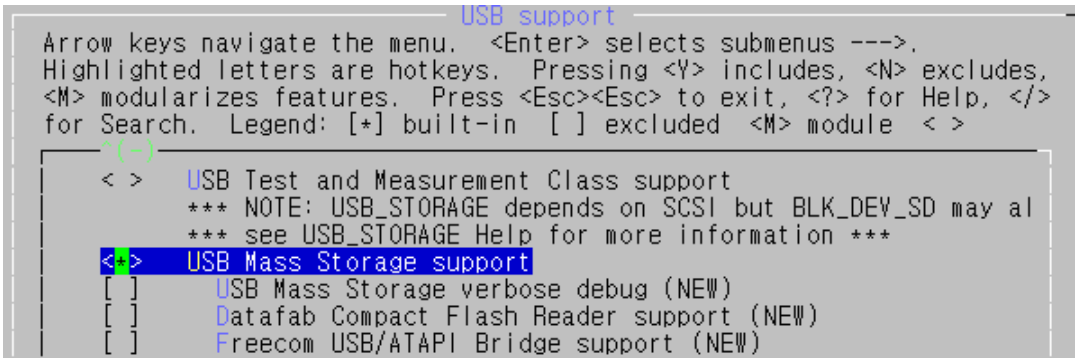


Figure 23. Select USB Mass Storage support for USB OTG Host operation.

13 USB HOST 2.0

To use USB Host 2.0(EHCI&OHCI), you must change kernel configuration.

Please execute "`make menuconfig`" command from kernel folder and select configurations.

Select "Device Driver --> USB support -> EHCI HCD (USB 2.0) support" as 'M'odule
Then select 'Root Hub Transaction Translators & Support for Telechips on-chip EHCI USB controller'
And select "Device Driver --> USB support -> OHCI HCD support" as 'M'odule.

After kernel compile finished, You can find 'ehci-hcd.ko' and 'ohci-hcd.ko' modules in $project_root/kernel/drivers/usb/host directory.
If you want to update those modules, You should copy it to $project_root /device/telechips/tcc892x-common directory.

```
<M>   EHCI HCD (USB 2.0) support
[*]     Root Hub Transaction Translators
[ ]     Improved Transaction Translator scheduling (EXPERIMENTAL)
[*]     Support for Telechips on-chip EHCI USB controller
< >   OXU210HP HCD support
< >   ISP116X HCD support
< >   ISP 1760 HCD support
< >   ISP1362 HCD support
<M>   OHCI HCD support
```

Figure 24. Select configurations for USB HOST 2.0

14 Remote Control

To use Remote Control, you must change kernel configuration. (This feature is enabled as default.)

Please execute "`make menuconfig`" command from kernel folder and select configurations

Select "`Device Drivers --> Input device support --> Miscellaneous devices --> Telechips Remote Controller`".

15 Firmware Upgrade

15.1 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 SD card, NAND, USB to upgrade firmware.

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

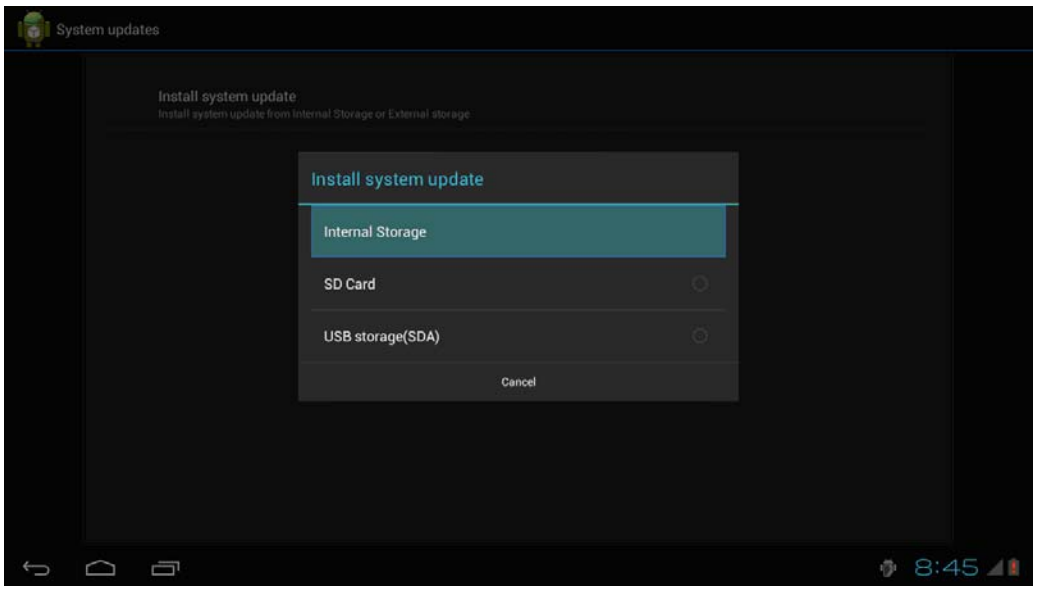


Figure 25. Select a storage for firmware upgrade

15.2 Recovery mode

Recovery mode can be entered by putting 'r' key on console window when system start booting-up. After boot with recovery mode, you can select "`apply from /usb`". In recovery mode, only USB storage is supported. Then, select the file for firmware upgrade.

16 Storage

Nand, T-Flash and USB Storage can be simultaneously connected. The USB storages can have up to four partitions. Mount path of each storage is as follows.

Device	Partition	Mount path
Nand		/mnt/sdcard
T-Flash		/mnt/ext_sd
USB Storage(SDA)	First	/mnt/usb_sda1
	Second	/mnt/usb_sda1/usb_sda2
	Third	/mnt/usb_sda1/usb_sda3
	Fourth	/mnt/usb_sda1/usb_sda4
USB Storage(SDB)	First	/mnt/usb_sdb1
	Second	/mnt/usb_sdb1/usb_sdb2
	Third	/mnt/usb_sdb1/usb_sdb3
	Fourth	/mnt/usb_sdb1/usb_sdb4

Table 1. Mount path of storages

17 NFS(Network File System)

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

Enter "`Wireless & network settings`". Then you can see "`Network File System Settings`"

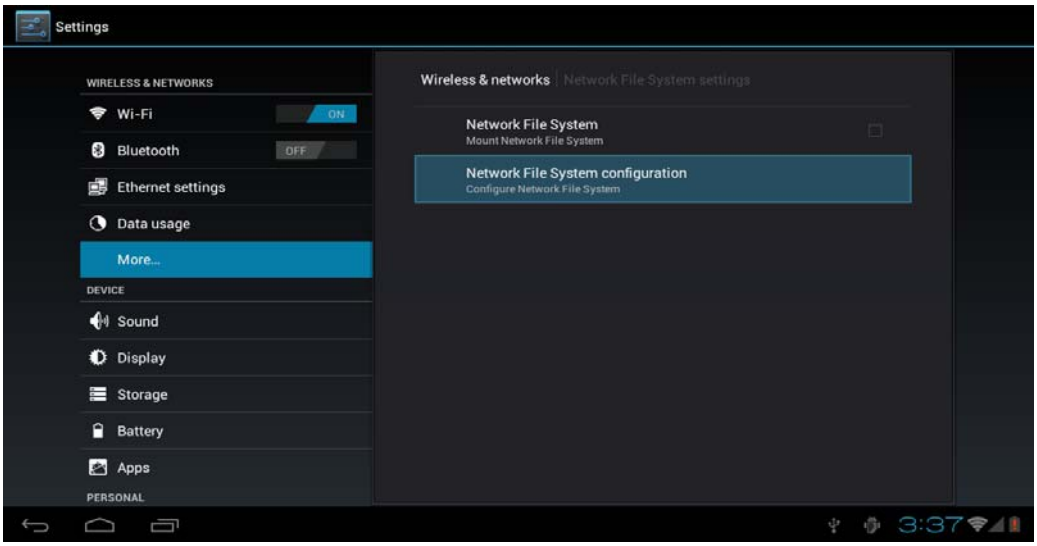


Figure 26. NFS Setting Menu

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 25.

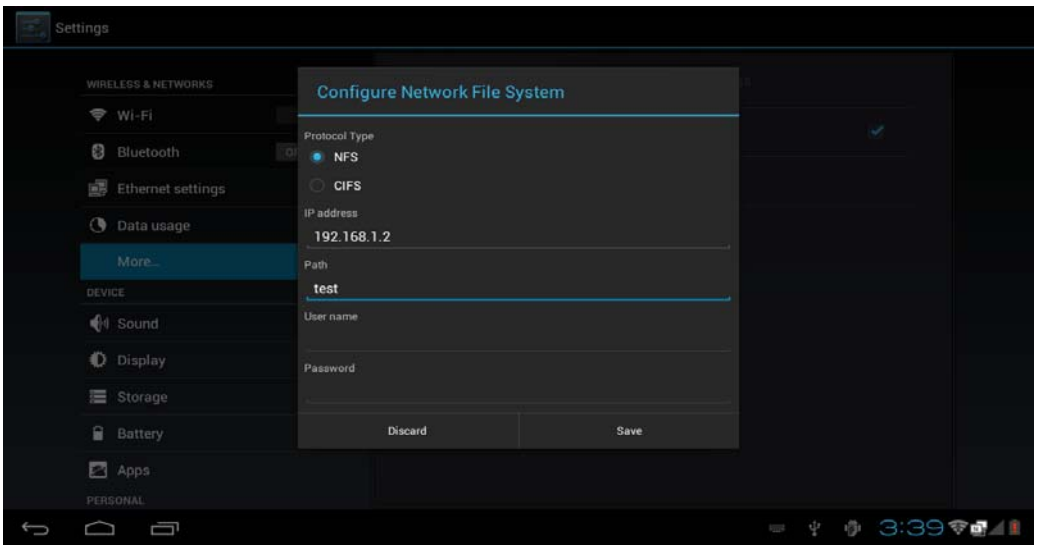


Figure 27. NFS configuration

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

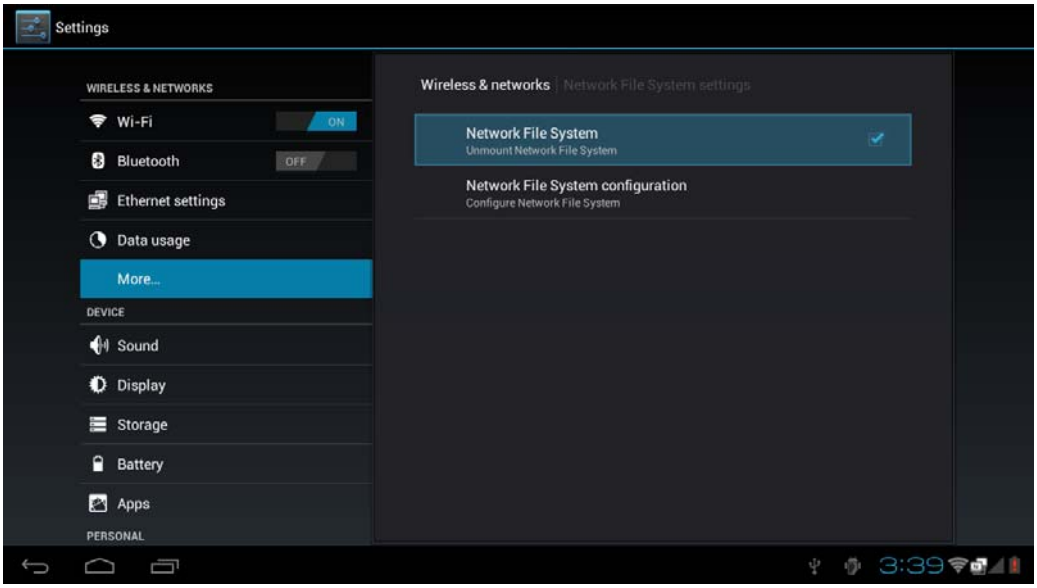


Figure 28. NFS Enabled

18 Audio Output

You can see below screen when you select “Menu” -> “Settings” -> “Sound” -> “Audio Output” menu In STB solution,

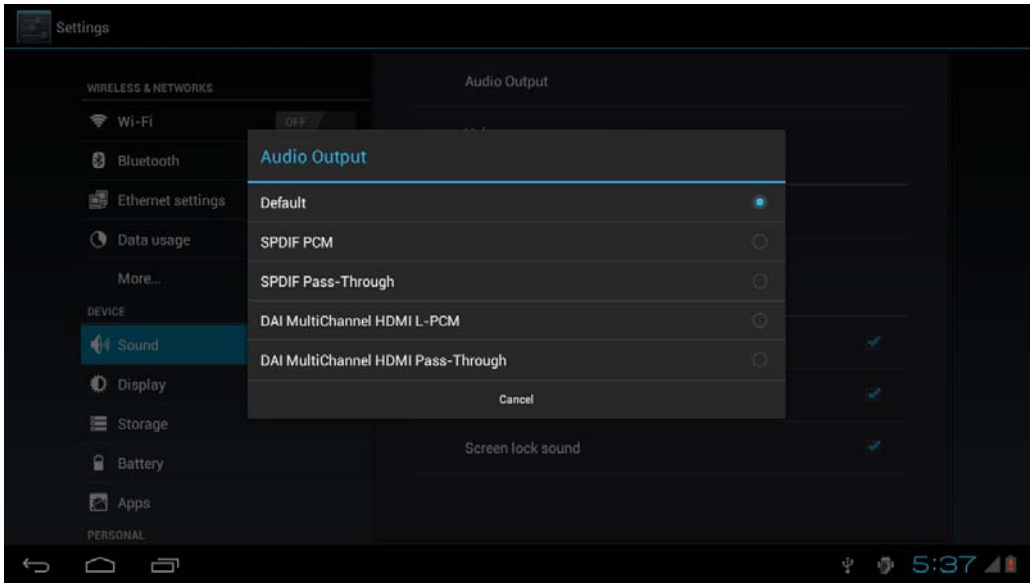


Figure 29. Audio Output

If you want to use DAI Multi Channel, you must change kernel configuration. (This feature is not enabled as default.)
Please execute “make menuconfig” command from kernel folder and select configurations
Select “Device Drivers --> Sound card support --> Advanced Linux Sound Architecture --> ALSA fir SoC audio support --> [*] TCC MultiChannel”.

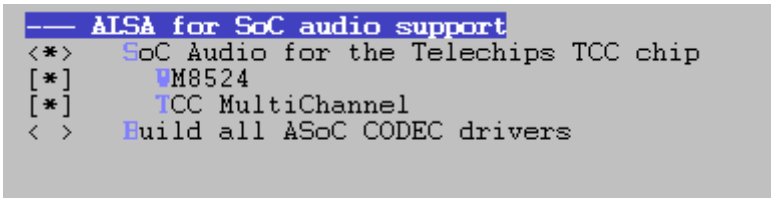


Figure 30. Configuration of DAI Multi-Channel

18.1 Default

“Default” means that the audio is out as a PCM data (L/R) by using DAI block.
If you use “Default”, the audio is 2ch and it is out with HDMI and L/R.

18.2 SPDIF PCM Data

“SPDIF PCM Data” means that the audio is out as a PCM data (L/R) by using SPDIF block.
If you use “SPDIF PCM Data”, the audio is 2ch and it is out with HDMI and optical output.

18.3 SPDIF Compressed Data

"SPDIF Compressed Data" means that the audio is out as a compressed data by using SPDIF block. If audio codec of content is DTS, it is worked as a pass-through.
(We only support DTS content.)

If you use SPDIF pass-through, the max channel of audio is 5.1ch.
The audio is out with HDMI and optical output.

18.4 DAI MultiChannel PCM Data

"DAI MultiChannel PCM Data" means that audio is out as Multi-channel PCM data by using DAI block. The audio is out multi channel PCM data. It is supported up to 7.1ch audio.
This is only supported by using HDMI.

18.5 DAI MultiChannel HBR Data

"DAI MultiChannel HBR Data" means that audio is out as compressed data by using DAI multi channel. If audio codec of content is DTS HD MA , it is worked as a pass-through.
(We only support DTS HD MA content.)

If you use HBR pass-through, the max channel of audio is 7.1ch.
The sampling rate must be fixed as 192 KHz, internally.
This is only supported by using HDMI.

19 Auto-Detection

It makes output mode can be configured by detecting connection to each output cable automatically. To use this function, you have to change your circuit diagram to add detection circuit in advance and set features as below. (This feature is disabled as default.)

1) Bootloader

Change define for display type from "DISPLAY_STB_DUAL" to "DISPLAY_STB_AUTO_DETECT" in *bootable/bootloader/lk/target/tcc8920st_evm/rules.mk* file as below.

```
#------------------------------------------------------------------------
# Defines Display Type
ifeq ($(DISP_DEFINES), DISPLAY_STB)
#DEFINES += DISPLAY_STB_DUAL
#DEFINES += DISPLAY_STB_SINGLE
DEFINES += DISPLAY_STB_AUTO_DETECT
endif
```

2) Kernel

It needs to change kernel configuration. Execute "make menuconfig" command from kernel folder and select "Device Drivers --> Graphics support --> Auto-Detection of HDMI/Composite/Component Output"

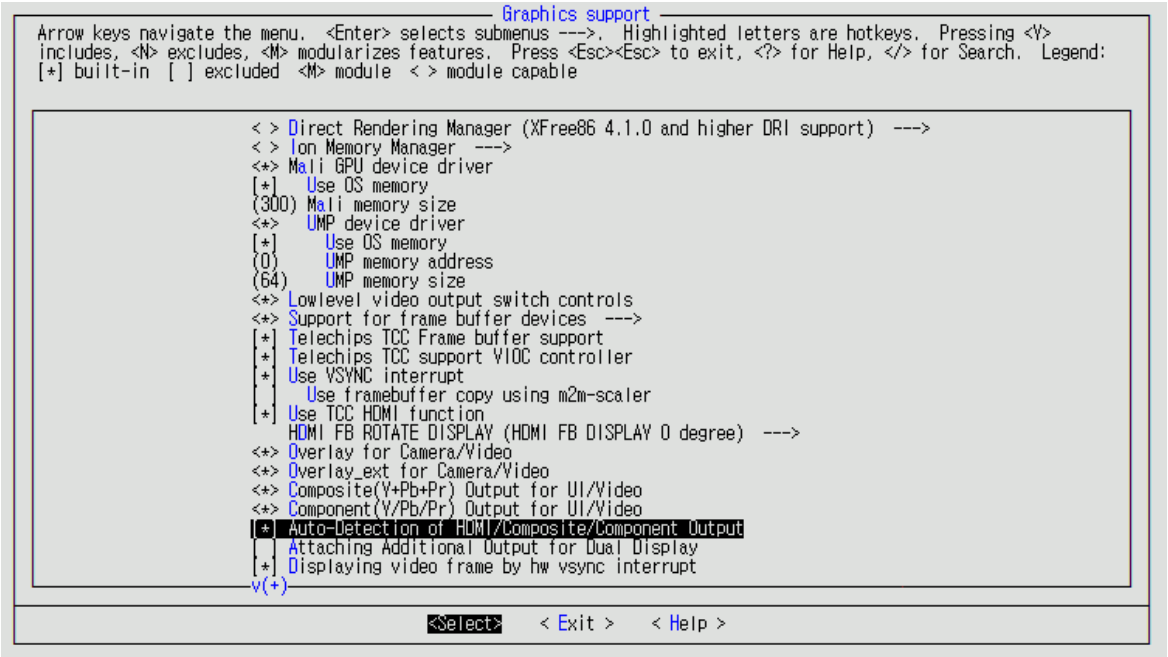


Figure 31. Configuration of Auto-detection

3) System

Change *"device/telechips/tcc8920st/device_base.mk"*.

```
PRODUCT_PROPERTY_OVERRIDES += \
       tcc.auto.detection.enable = 1
```

20 Application Rotation

If you want to change the display direction of application by force, it is possible to change below property.

`device/telechips/telechips/tcc8920st/device_base.mk`..

```
PRODUCT_PROPERTY_OVERRIDES += \
       persist.sys.app_rotation = 1
```

If “0”, display direction is decided by application.
If “1”, a application runs always on landscape mode but aspect ratio dose not change.
If “2”, a application runs always on landscape mode and screen size is full size.

21 How to change to the Gallery 2D or Gallery 3D.

If you want to change to the Gallery 2D or Gallery 3D, you have to modify the following two files.

21.1 Default settings - Gallery 2D

device/telechips/tcc8920st/device_base.mk..

```
PRODUCT_PACKAGES += \
       Gallery
```

device\telechips\tcc8920st\overlay\packages\apps\Launcher2\res\xml\default_workspace.xml

```
<favorite
       launcher:packageName="com.android.gallery"
       launcher:className="com.android.camera.ImageGallery"
       launcher:screen="2"
       launcher:x="2"
       launcher:y="4" />
```

21.2 Change to the Gallery 3D

device/telechips/tcc8920st/device_base.mk..

```
PRODUCT_PACKAGES += \
       Gallery2
```

device\telechips\tcc8920st\overlay\packages\apps\Launcher2\res\xml\default_workspace.xml

```
<favorite
       launcher:packageName="com.android.gallery3d"
       launcher:className="com.android.gallery3d.app.Gallery"
       launcher:screen="2"
       launcher:x="2"
       launcher:y="4" />
```

22 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 to the resolution that you want to set.

1) Bootloader

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

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

You can set initial resolution of variables below in *bootable/bootloader/lk/platform/tcc892x/lcdc.c* in case of composite and component output.

```
static char defalut_composite_resolution = LCDC_COMPOSITE_NTSC;
static char defalut_component_resolution = LCDC_COMPONENT_1080I;
```

2) Kernel

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

```
static char default_hdmi_resolution = STARTER_HDMI_640x480P_60Hz;
static char default_composite_resolution = STARTER_COMPOSITE_NTSC;
static char default_component_resolution = STARTER_COMPONENT_1080I;
```

3) System

You can set initial value of properties below in *device/telechips/tcc8920st/device_base.mk*.

```
[HDMI Output]
       persist.sys.hdmi_resolution = 125 \

[Composite Output]
       persist.sys.composite_mode = 0 \

[Component Output]
       persist.sys.component_mode = 1 \
```

Please refer to the following description about the value of each resolution or mode.

```
persist.sys.hdmi_resolution = 125       → Auto
persist.sys.hdmi_resolution = 0         → 1920x1080p 60Hz
persist.sys.hdmi_resolution = 1         → 1920x1080p 50Hz
persist.sys.hdmi_resolution = 2         → 1920x1080i 60Hz
persist.sys.hdmi_resolution = 3         → 1920x1080i 50Hz
persist.sys.hdmi_resolution = 4         → 1280x720p 60Hz
persist.sys.hdmi_resolution = 5         → 1280x720p 50Hz
persist.sys.hdmi_resolution = 6         → 720x576i 60Hz
```

```
persist.sys.hdmi_resolution = 7          → 720x480p 60Hz
persist.sys.hdmi_resolution = 8          → 640x480p 60Hz

persist.sys.composite_mode = 0           → NTSC
persist.sys.composite_mode = 1           → PAL

persist.sys.component_mode = 0           → 1280x720p 60Hz
persist.sys.component_mode = 1           → 1920x1080i 60Hz
```