LIBRE
WIRELESS TECHNOLOGIES

LIBRE SYNC

User Guide
Module : LS9 / LS9AD

Rev: 5.3

Libre Wireless Technologies Private Limited

librewireless.com

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Table of Contents

Table of Figures

Document Revision History

Revision	Date	Description of change
5.3	November 11, 2016	Incorporated updates
5.2	October 18, 2016	Updated section 6.19
5.1	October 17, 2016	Added Applicable for LS9AD modules and Roon Music Playback
5.0	August 24, 2016	Updated Section 3.2.1
4.9	August 10, 2016	Updated section 3.1 and 3.2
4.8	August 4, 2016	Updated section 3.2.4
4.7	August 3, 2016	Updated Section 4.12
4.6	July 28, 2016	Updated section 3
4.5	July 13, 2016	Updated section 4.2.2 “Webpage Method”
4.4	July 11, 2016	Added Section 6.17 “Telnet”
4.3	June 30, 2016	Added section 6.17 and Updated section 3.2
4.2	June 29, 2016	Updated section 3.2
4.1	June 21, 2016	Updated section 3.2
4.0	June 17, 2016	Updated Section 5

1. Introduction

Libre Wireless provides evaluation kit (EVK) for users to gain familiarity with our products and expedite their own design and development. User can connect to LS9 module through USB, or wireless interface to configure the module, manage the on board device on the module, and perform functional test.

Note: Libre had delivered few LS9 sample modules with OLD Market ID (MID #01). These modules should be returned back to Libre Sales team. Contact Libre Sale Team to know more and swap the existing LS9 Modules.

Libre has stopped making firmware release matching to OLD MID. Upgrading any LS9 firmware to modules with OLD MID shall result in LS9 modules non-functional.

The NEW Market ID (MID #03) should only be used going forward. To Know the MID # in the LS9-Module, check for the below log in the device terminal. On the device boot-up, in the device terminal the below MID is printed. Below screen-shot is of the NEW MID# 03.

1.1. User Guide Insight

This document provides information on the procedures to be followed while using LibreSync for various purpose such as,

- Firmware update
- Network Configuration
  - WAC / SAC Method
  - Webserver Method
    - Web page method
    - LS-Connect Method
    - Manual Configuration Method
- Configuring Non-Volatile Items

- Streaming Airplay / Cast For Audio / Spotify Connect
- Source Switching
- Software Security
- DDMS
- DLNA / DMR
- Wi-Fi Scan Results
- Music Services
- LUCI
- AUX Support
- Bluetooth Support
- TCP / IP Tunneling
- Device Name Configuration
- Roon Music

2. Libre Wireless Technologies' EVK

Figure 2-1 Marks different components of the LS9 Module

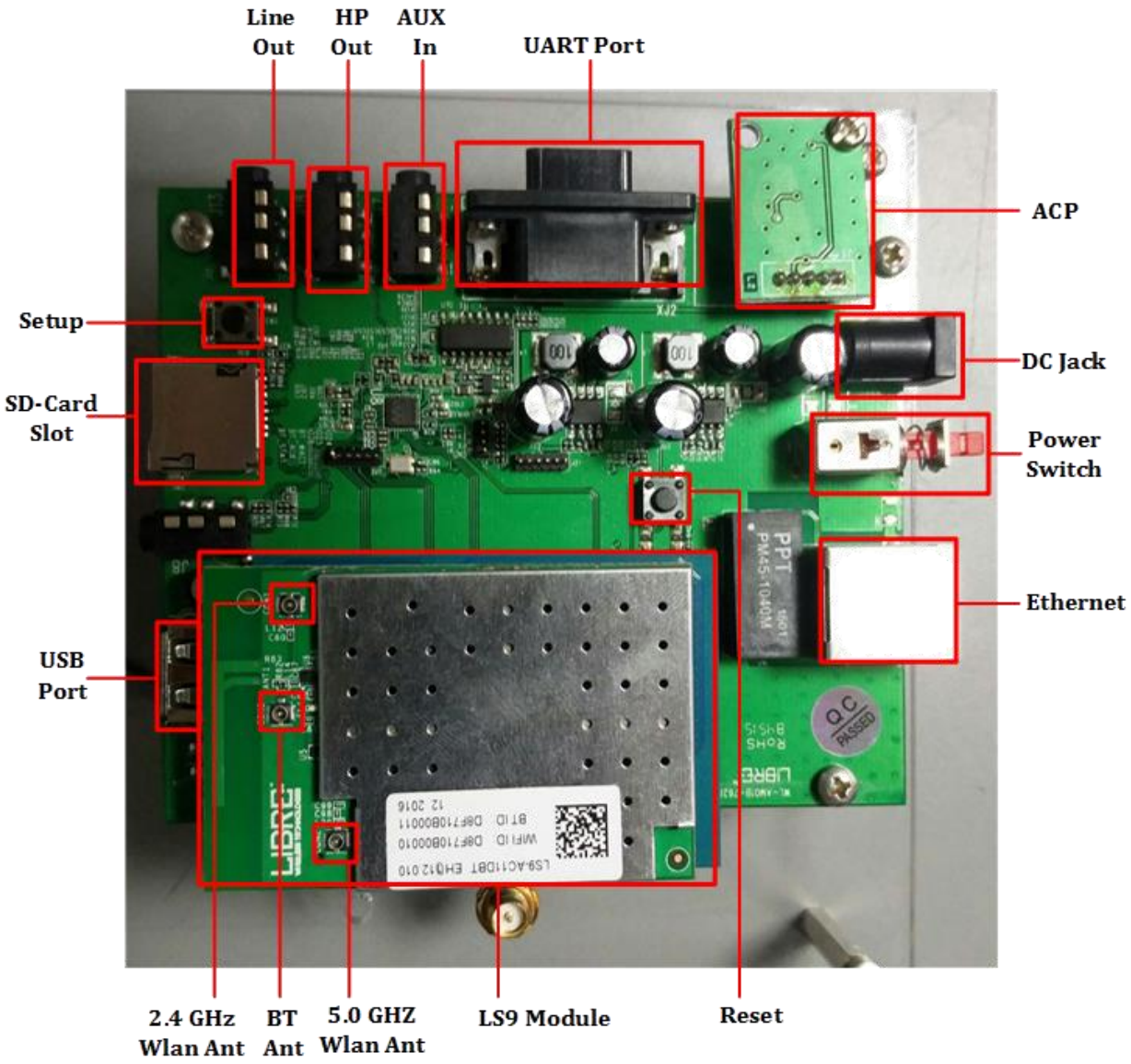


Figure 2-2: LS9 EVK

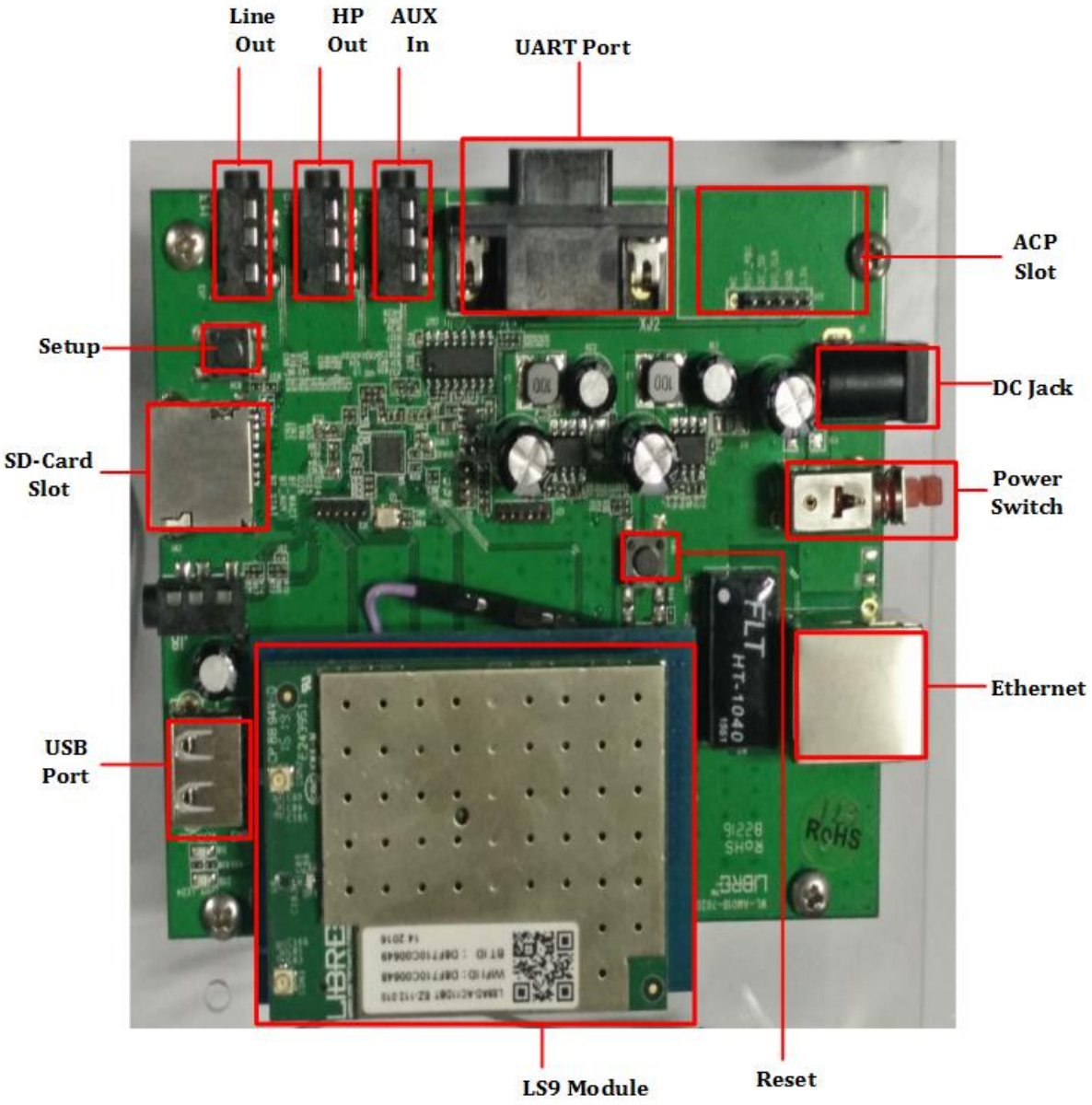


Figure 2-3: LS9AD EVK

2.1. LS9 EVK Setup

To setup the LS9 EVK and Get Started proceed as below.

Note:

- ACP is not provided along with Libre EVK. It is recommended to buy "**ACP-V2.0C"**. from Apple Inc.
- LS9 supports 4 or 8 port USB-Hub and using USB-Hub one can see debug log and also connect USB pen drive to update firmware.
- LS9 EVK supports 4 port USB-Hub by default. If you choose to use 8 port USB-hub then, the USB-Hub should be self powered.
- In LS9, USB Hub can be detected dynamically.
- Plug in and plug-out of each port in USB hub can also be detected dynamically.

Step 1. Connect the LS9 module to LS9 Bridge-Board.

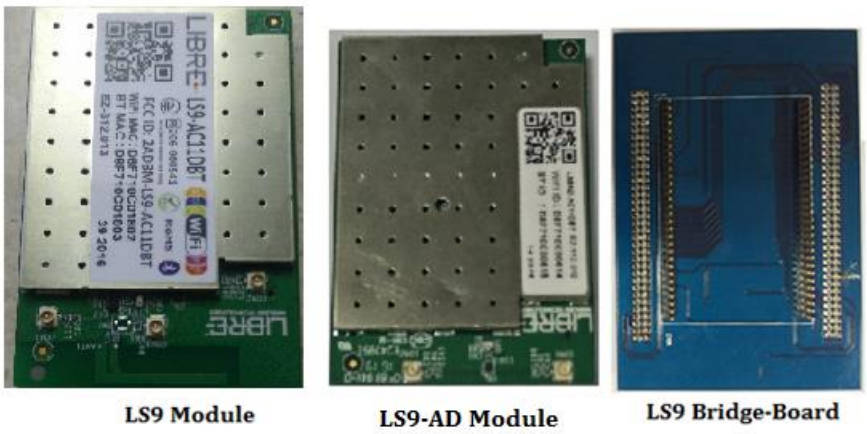


Figure 2.4: LS9 / LS9AD Module and LS9 Bridge-Board

Step 2. Insert LS9 Bridge-Board and LS9 module on LS9-EVK.

Step 3. Insert **ACP** on LS9 EVK.

See section 7.1 for more details on ACP Setup.

Step 4. Connect the **USB Null Modem cable** or **UART cable** to the Laptop / PC from EVK.

1 If the NV-Item **hostpresent** is "**0**", connect either of the cables to see debug logs.

2 If the NV-Item **hostpresent** is "**1**", connect only USB Null Modem cable.

Step 5. Connect the EVK Power adaptor to **DC Jack** on EVK

Step 6. Power On the EVK, using **ON/ OFF** Switch

Step 7. Open the device terminal such as, **Teraterm** (for windows) / **Zoc6** / **CoolTerm** (for Mac) and set the **Baud rate** to **115200**

End --

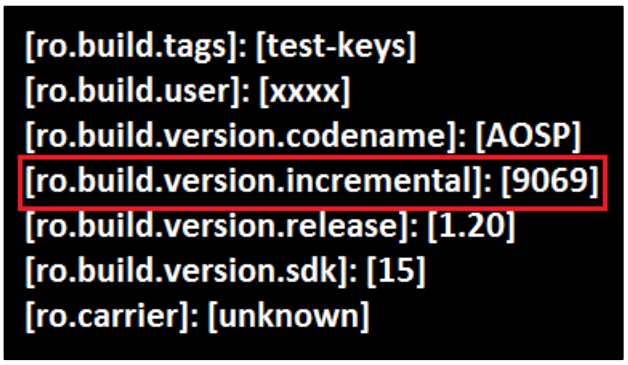
3. Firmware Upgrade

- If LS9 Modules are loaded with BIST image, then to load the LS Application image on the LS9 Modules, see document "*LibreWirelessTechNote - LibreSync_LS9_SoftwareProcess_Tool*" available in Libre Portal.
- If LS9 Modules are loaded with LS Application image, then follow the steps as explained in this chapter.

Firmware Application Upgrade on LS9 module can be done in one of the following ways.

- USB Method
- Network Method
- Internet Method
- PC / Laptop Method

To know the firmware version present in the LS9 module, execute the following command "`#getprop`" in the device terminal.



3.1. Preparing for Firmware Upgrade.

3.1.1 Upgrade Guidelines

Before updating the LS9 firmware onto the modules, see the table below to know the appropriate method of update to be used.

Firmware Version	Upgrade Options
Upgrading from v9023 (or previous) to v9024	Follow any one of the methods • USB Method, see *Section 3.2.1* • PC / Laptop method using "`l2nand`" command. See *Section 7.5*

<table>
<tr>
<td>Upgrading from v9024 to v9026 (or later)</td>
<td>

Ensure that the firmware version present in the module is v9024, before upgrading using the method mentioned below.
If the firmware version present in the module is older than v9024, then update the modules with v9024, and use one on the methods below.
If USB Method mentioned below is being used, then USB-Hub will be required to accommodate USB Stick which will have the single-image required for firmware upgrade as the USB port present in LS9 EVK will be already used to access device terminal to execute below shell commands.

Follow any one of the methods
• USB Method
1 Place the firmware image in the root directory of USB.
2 Ensure the binary filename is “83_IMAGE”
– The Firmware image should not contain any extensions.
3 Insert USB in LS9 EVK
4 Run <code>si_update</code> shell command and Reboot (Manual re-boot) the device.
5 Run <code>p_erase</code> shell command and device will re-boot.
6 After the device re-boots, execute the <code>usb_update</code> , to update the application image.
• PC / Laptop method using “l2nand” command. See Section 7.5

Custom ENVs will not be retained when firmware is upgraded using PC / Laptop method. Customers have to updated the firmware gain using either USB method (Section 3.2.1) or Network method (Section 3.2.2) of upgrade.
</td>
</tr>
<tr>
<td>Upgrading from v9026 to v9027 or later</td>
<td>
Follow any one of the methods
• USB Method, see Section 3.2.1
• Network Method, see Section 3.2.2
• Internet Method, see Section 3.2.3
</td>
</tr>
</table>

3.1.2 Creating Single-Image

Single-Image Update is used to update the HOST-MCU Firmware, FENV, Device-Webpage, and LS-Application Image simultaneously, by combining the Application Image, FENV, Device-Webpage files and HOST-MCU Firmware Image.

For upgrading HOST-MCU Firmware, combine the HOST-MCU Firmware-Image file with LS9 Application Image, using the Software Customization Kit (Software Customization Kit_LS9_vx.x).

To generate the customized Single-Image for LS9, see the document available in Libre Portal, "***LibreWireless-TechNote_LS9_Software_Customization_Kit***"

3.2. Firmware Upgrade Methods

Note:

- Before updating the LS9 firmware onto the modules, see *section 3.1*, to ensure the firmware upgrade guidelines are followed. If the guidelines are not followed, it shall result in LS9 modules non-functional.
- **For Modules with GCast Keys and Certificates programmed, only GC4A TZ firmware should be loaded.**
- **Libre support for GCast Non-TZ firmware is not available, from October 2016 and onwards.**
- **For development purpose, customers can get LS9 Modules with Libre GCast Keys and certificates programmed, from the Libre Sales team.**

3.2.1 Firmware Upgrade Using USB Method

For USB Method the name of the Firmware Image should be **83_IMAGE.**

- This image is a standard image file
- This image is used for USB update
- Size of this image is 140-150MB

LS9 Firmware image is a binary file **(File name: 83_IMAGE)**. The firmware image is upgraded by a trigger from Command-Shell or via Webpage.

To update the LS9 Firmware Application-Image using USB proceed as below.

Steps

Using Command Shell

Step 1. Place the firmware image in the root directory of USB.

Ensure the binary filename is "83_IMAGE"

> **Note:** The Firmware image should not contain any extensions.

Step 2. Insert the USB in LS9 EVK

Step 3. Execute the command #`usb_update`

End--

3.2.2 Firmware Upgrade Using Network Method

> **Note:**
> - Make sure the file name of the binary image to be upgrade is 83_IMAGE_network.
> - It takes about 2 to 5 minutes approximately to complete the upgrade progress.

For Network Method the name of the Firmware Image should be **83_IMAGE_network.**

- The size of this image is 40-45MB.
- This image can be used for **Network Update**.

LS9 module does not support Ethernet port on the module. Hence it is recommended to use External USB Network Adapter, to configure LS9 to Ethernet mode.

LS9 Supports below listed network adapters.

- XR22800 Hi-Speed USB to 10/100 Ethernet Bridge from EXAR
- RTL8150 USB 10/100 Fast Ethernet Adapter from REALTEK
- MAC book USB to Ethernet Adapter.
- LAN7500 driver from SMSC

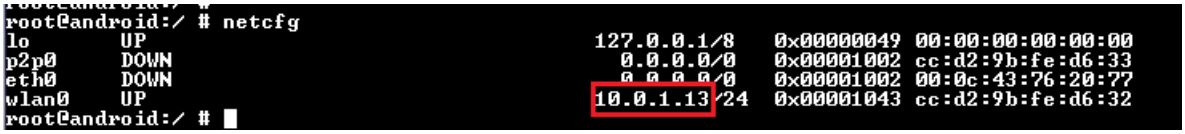
To update the binary file (Application-Image or Single-Image) on the LS9 module, over network proceed as below.

> **Note:** Make sure the LS9 EVK and your laptop / PC is connected to the same network.

LS9 Firmware image is a binary file (**File name**: 83_IMAGE_network)

Step 1. Execute command **#netcfg** in the device terminal to know the device IP

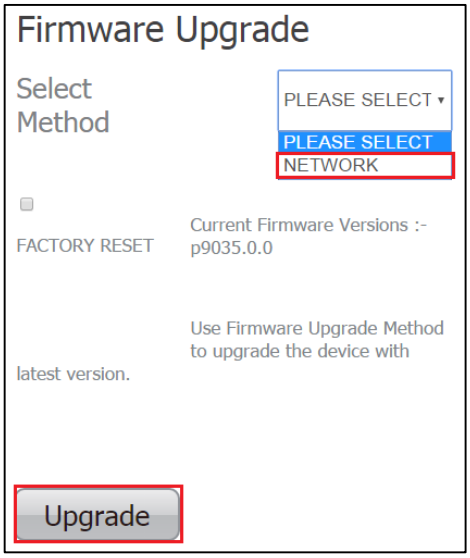
For Example, *10.0.1.13*



Step 2. Enter the IP in the address bar of your browser.

For Example, *10.0.1.13*

Step 3. In the Firmware upgrade section, Select Method as ***Network*** and Click ***Upgrade***.



Step 4. Browse through the folders and select the Binary file to be updated.

Make Sure the binary file is named as 83_IMAGE_network.

Step 5. Click Update

On successful upgrade, LS9-Module reboots, with the updated application.

End --

3.2.3 Internet Method

Points to be Considered

- Internet Method of Firmware Upgrade is applicable for release 9018 / 9019 and beyond.
- Internet Method of Firmware upgrade has two parts
  - Libre Application Firmware
  - GCAST Firmware
- Updating LS-Application Firmware (83_IMAGE_network) is mandatory in internet method of firmware upgrade process.
- HOST-MCU firmware can be updated only along with the LS-Application firmware. Independent update of HOST-MCU firmware is not allowed.
- GCast firmware update takes place automatically whenever there is any update from Google server. After successful update, LS module will send reboot command to Host-MCU. It's up to Host-MCU to reboot whenever required.

- For manual update of GCast firmware, customers should get in touch with Google to get the required OTA package (application.zip).
- Each customer has to maintain their own server; in which they will place their own customized image.

Server setup Requirements

- **Minimum Server System Requirements**: Intel i5 processor, HDD 80GB, RAM 8GB.
- **Operating System** : Ubuntu server 16.04
- Public IP from ISP providers**.**
- Down Time should be ZERO.

Customers can have server setup with above requirements or any cloud service provider with down time ZERO.

Use only 'http server'. 'https server' is not supported in LS9.

Firmware Download XML

NV-Item ***fwdownload_xml*** is used to provide the URL for the XML file that contains the information about Firmware version, HOST-MCU version and the link to download the firmware. Use the syntax below to provide the URL for firmware update.

To Provide the URL for Firmware Update over Internet

#setenv fwdownload_xml <<Link to firmware_download.xml file>>

Firmware Download XML Structure

Firmware Download XML file includes the following tags.

- **fw_version**: fw_version is tag used to set the firmware version. firmware version should start with 'p' followed by the actual version number.

For example, p0902

- **mcu_version**: mcu_version tag is used to set the HOST-MCU version.
- **firmware**: Firmware tag is used to give the URL of the system firmware image.

For example, http://192.168.1.143/83_IMAGE_network_9040

- **otapackage**: Ota package is used to give the link of the CAST OTA package. The CAST OTA package is downloaded, when LS-Firmware Upgrade is initiated. OTA file can be upgraded only when a higher Firmware version is available in the server.

For example, http://192.168.1.143/application.zip

Note:

If the module is a Non-TZ module, then the **otapackage** tag should not be included in the xml file.

Customers can obtain the CAST OTA from Google on signing of the appropriate agreement with Google.

- **crc32check**: CRC32 Check for firmware image which is mentioned in <firmware> field.
- CRC check is applicable for the Single-Image (LS-Application Image + HOST-MCU Image).
- CRC check is not applicable for GCast OTA Application Image.
- **ForceUpgrade**: Setting the tag ForceUpgrade as true, is to ensure the start of firmware upgrade on the device immediately.

Note:

Ensure to provide the direct URL link for the URLs of Firmware Download XML, Firmware, and Cast OTA package. Redirection methods are not supported.

```
<content>
  <fw_version>p9050</fw_version>
  <mcu_version>091</mcu_version>
  <firmware>http://192.168.1.143/83_IMAGE_network_9065</firmware>
  <otapackage>http://192.168.1.143/application.zip</otapackage>
  <crc32check>7f57ba88</crc32check>
  <ForceUpgrade>true</ForceUpgrade>
</content>
```

Application will parse the XML and verify the Firmware version of LS9 and host MCU version. If the given versions in the XML are greater than existing version in DUT, firmware upload process continues. Otherwise it aborts the upload mechanism. The URL from the <**firmware**> tag will be updated on ENV: **fwupdate_link.**

To update the Application Image on to the LS9 module proceed as below.

Step 1. Update the NV-Item ***fwdownload_xml*** with the URL of the XML file.

Step 2. Reboot the device,

internet method of firmware update is triggered, when the device successfully connects to the network.

Step 3. LS9 will compare the present build version (saved in "cast_version" env item) with <fw_version> of the XML file, and if the <fw_version> is more than that of present build version, then only Internet upgrade starts automatically.

Step 4. LS9 sends Message-Box 223 to HOST-MCU, indicating availability of firmware.

Step 5. Module reboots on successful completion of upgrade process.

End --

for more details on internet method of upgrade refer to the following document available in the portal *LibreWirelessTechNote_LS9_Failsafe-Firmware_Upgrade.*

4. Network Configuration

You can configure the network to LS9 module in the following ways.

- Wireless Network Setup Using WAC and SAC Method
- Wireless Network Setup Using Webserver Method

Speakers present in different Wi-Fi frequency bands cannot form a DDMS Group.

For example, If Speaker A is in Wi-Fi frequency band of 2.4GHz and Speaker B is in Wi-Fi frequency band of 5GHz, then you cannot form a DDMS Group of Speaker A and Speaker B.

Whereas, If Speaker A and Speaker B are in same frequency band (Speaker A and Speaker B are in 2.4GHZ or Speaker A and Speaker B are in 5GHZ), then they form a DDMS Group.

4.1. Wireless Network Setup Using WAC and SAC

4.1.1 Wireless Network Setup Using WAC

To setup a wireless network using Wireless Accessory Configuration (WAC) proceed as below:

Step 1. Short-Press the **Setup-Button** on LS9 EVK to trigger WAC mode.

Step 2. On an iOS device running iOS, go to ***Settings > Wi-Fi > SET UP NEW DEVICE***

The WAC speaker is listed. For example, Libre <MacID>.

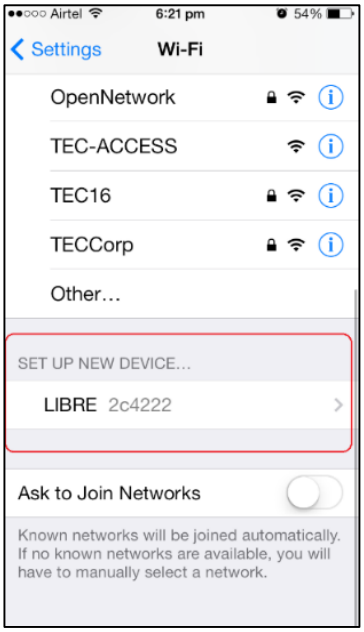


Figure 4.1.-1: WAC Speaker Listed

Step 3. Select the speaker / EVK and Tap NEXT

iOS device shares its Wi-Fi settings; that is SSID and Password with the WAC speaker and configures the device.

On successful configuration the device is configured to the Wi-Fi network to which the iOS device is connected.

End--

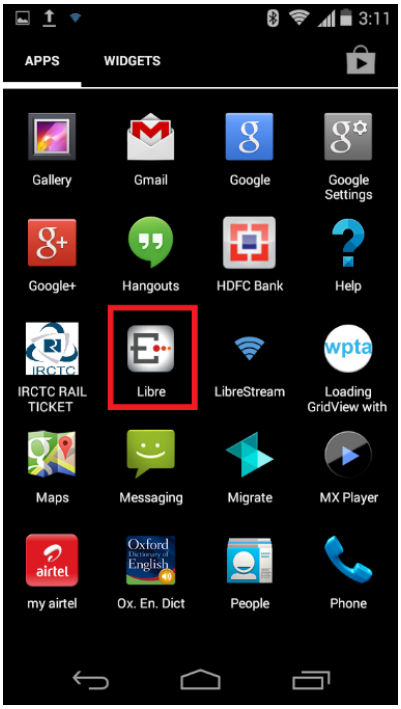
4.1.2 Wireless Network Setup Using SAC (Speaker Android Configuration) method

To setup a wireless network using Libre Android APP proceed as below

Step 1. Short-Press the **Setup button** on LS9 EVK to trigger SAC.

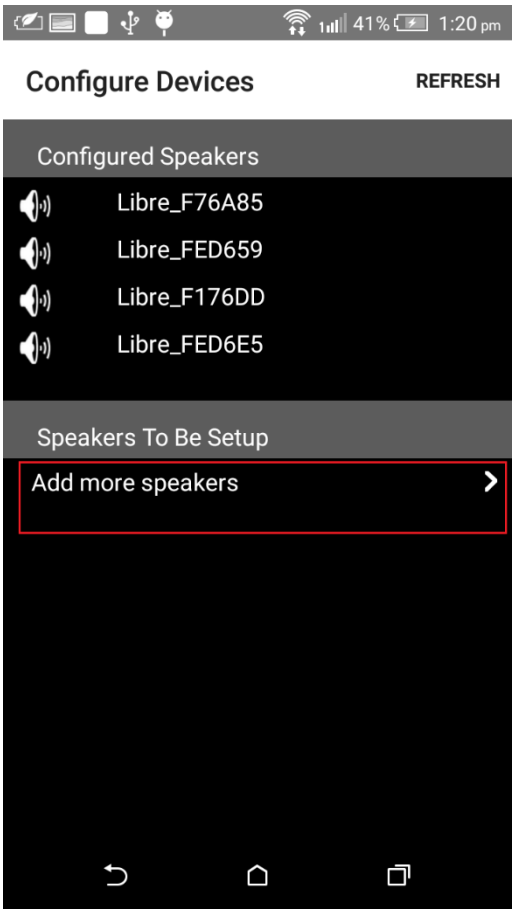
Speaker enters SAC mode

Step 2. Open the ***Libre App***

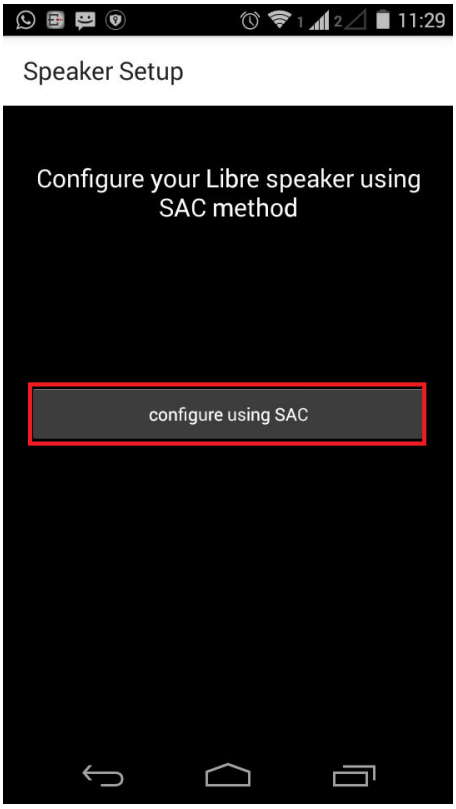


Step 3. Tap ***Configure*** in the menu 

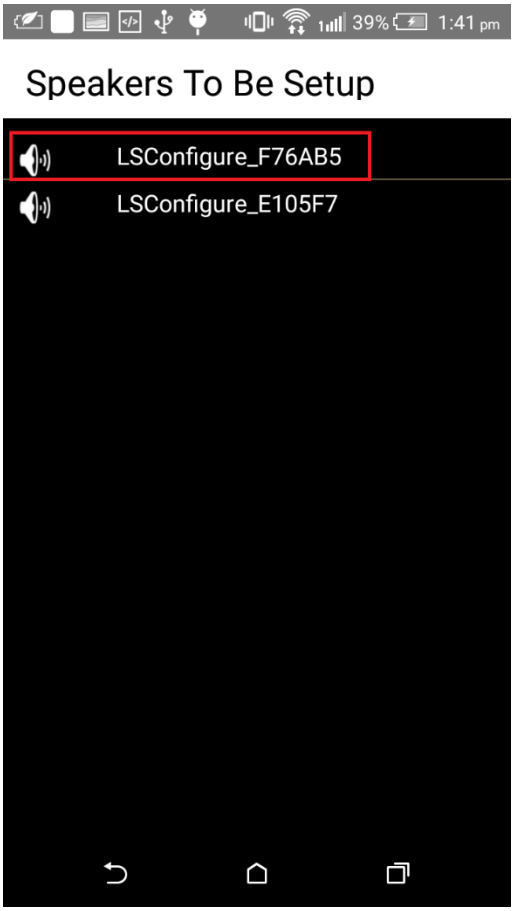
Step 4. In Speakers To be Setup section Tap Add more Speaker.



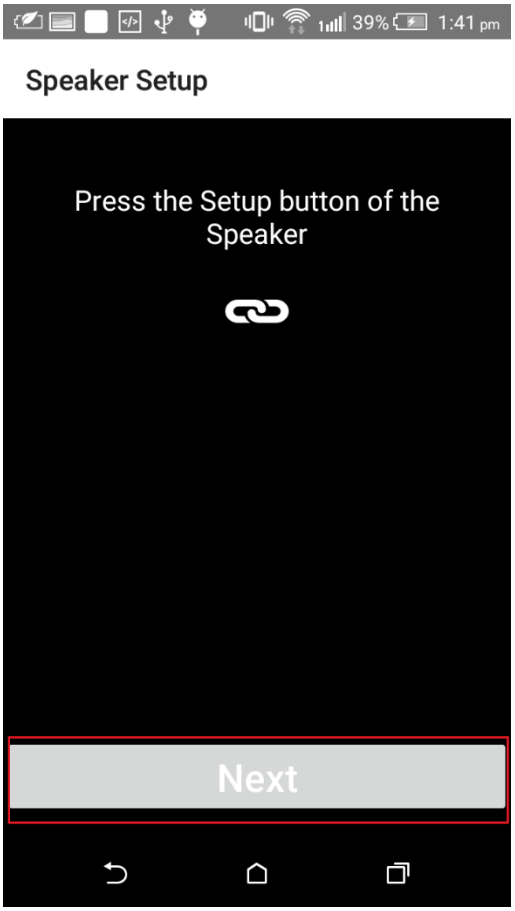
Step 5. In Speaker Setup page, Tap configure using SAC.



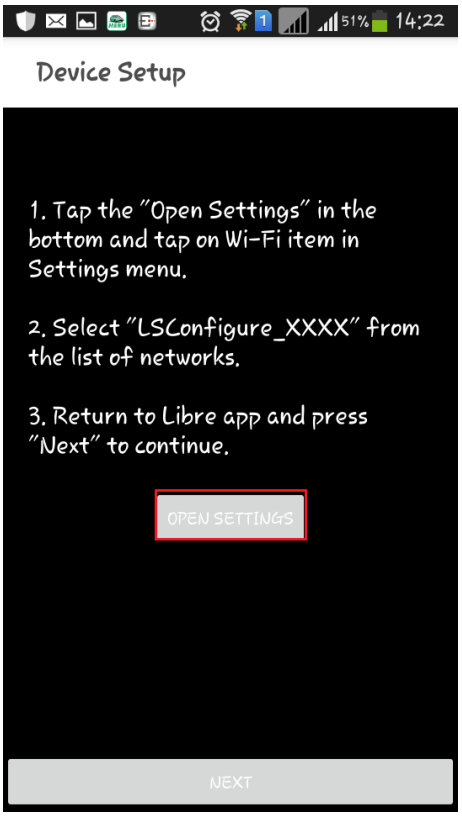
Step 6. On **Speaker To Be Setup** page select the speaker to be configured.



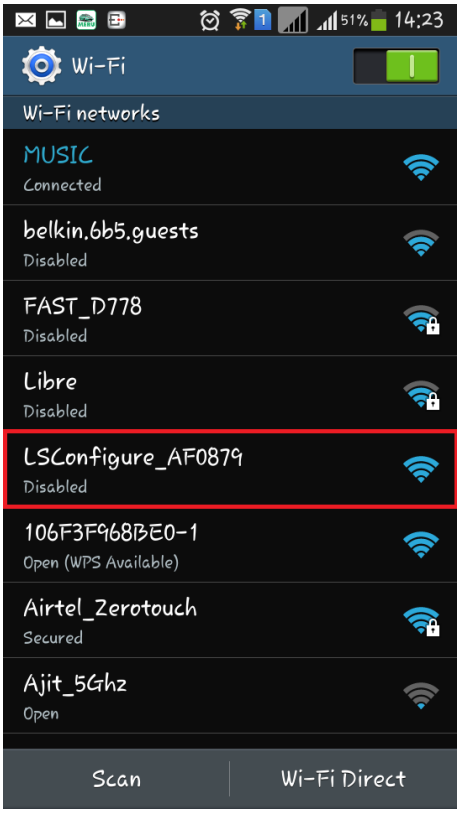
Step 7. On Speaker Setup page, Tap Next



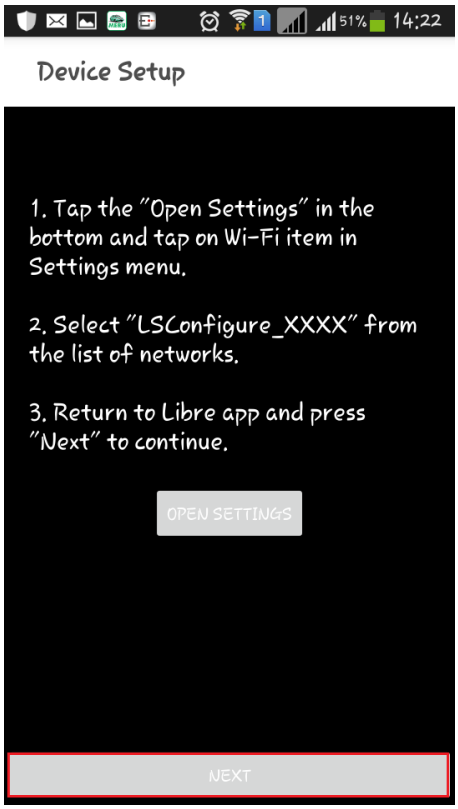
Step 8. In Device Setup Page, Tap Open Settings.



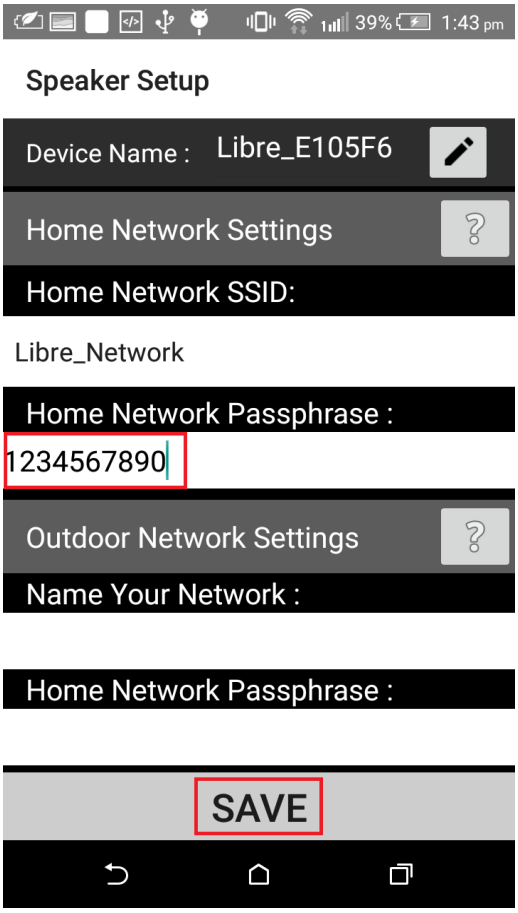
Step 9. Select the Module from the Wi-Fi list



Step 10. Go back to Libre APP and Tap ***Next***



Step 11. On **Speaker Setup page**, select the **Home-Network** and enter the password.



Step 12. Tap **SAVE**.

Step 13. Continue the configuration steps for all the speakers.

End--

4.2. Wireless Network Setup Using Webserver

4.2.1 LS-Configure Method

To setup wireless network using LS-Connect proceed as below

Step 1. Short-Press the **Setup-Button** on LS9 EVK to trigger LS-Connect
Device enters "AP" mode and is available in the Wi-Fi network list as **LSConfigure_xxxxxx**

Step 2. From the **network list** Select **LSConfigure_xxxxxx** and connect the laptop to the network.

Step 3. Enter the following URL in the address bar of your browser *192.168.43.1*

Step 4. Select the Access Point (AP) to be connected to, from Select Your Network drop-down list.

Step 5. Select Security Type from ***Security*** drop-down list, Enter the valid login credentials and Click ***OK***

Device disconnects from laptop and connects to the network selected

Step 6. To know the newly acquired IP execute command ***#netcfg*** in the device terminal

End--

4.2.2 Webpage Method

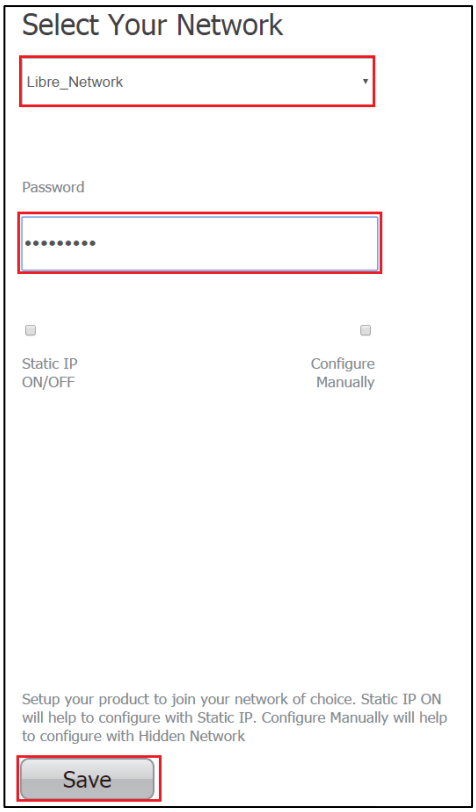
This method is used if the device is already connected to a network.

To setup wireless network via Webpage proceed as below

Step 1. Execute command **#netcfg** in the device terminal to know the device IP

Step 2. Enter the IP in the address bar of your browser.
For Example, *10.0.1.13*,
The webpage shows the Network status of the currently connected Access Point.

Step 3. In ***Select Your Network*** section, Select the Access Point (AP) to be connected, from Select your Network drop-down list and Click ***Save***



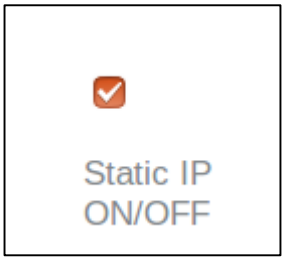
End --

You can also connect the device to the network of your choice by setting the Static IP for the device from the device web page.

Static IP address is a known IP address pre-allocated to the device. Static IP does not change and the device will have the same IP always.

Step 1. Select the Access Point from ***Select Your Network*** drop-down list.

Step 2. Enable ***Static IP*** ON / OFF settings.



Step 3. Enter **IP Address, Net Mask**, **Gateway, Primary DNS**, **Secondary DNS** details as shown in the below screenshot, and click **Save**

Use any IP address from the Access Point IP's address range which is not assigned to any client device already.

Device reboots and connects to the network and acquires the static IP as defined.

Step 4. To know the IP address of the device, execute command ***#netcfg*** in the device terminal

End--

4.3. WPS Trigger from Command Line

To setup a wireless network using WPS proceed as below

Step 1. On system boot, enter the command **#wpa_cli wps_pbc** in device terminal

Step 2. Trigger (Press Once) Setup button in the Access Point.

Device connects to the Network of the Access Point.

Step 3. To know the newly acquired IP execute command **#netcfg** in the device terminal

End--

4.4. WPS Trigger from LUCI

You can setup a wireless network for the LS-Enabled speaker, using the LUCI Message-Box #141. Message-Box #141 is used by Host to trigger WPS mode.

For more information see section 6 in LUCI Technical Note,

LibreWirelessTechNote - LS_Light_Weight_Universal_Control_Interface.

5. Configuring Non-Volatile-Item

Non-Volatile (NV) item in LibreSync can be configured through **command line** or by editing the **env-item.xml** file, shared by Libre.

To configure the NV-Item, type the below command **in the command line and Reboot the LS-Module to apply the changes.**

Command Syntax	#setenv <NV_item_name> <<value>> #reboot

There should be space between setenv and <NV_item_name> and between the <NV_item_name> and <<value>> .

To know the value of the NV-Item set, type the below command **in the command line.**

Command Syntax	#getenv <NV_item_name>

To reset all the NV-Items to factory default values, type the below command in the command line.

Command Syntax	#SetFacDefault

To know all the NV-items values, type the below command in the command line.

Command Syntax	#GetAllENV

Example	To configure NV-item hostpresent	#setenv hostpresent 1 #reboot
	To Know the value of the NV-Item hostpresent.	#getenv hostpresent

For detailed information on Configuring the NV-Items refer to

"***LibreWirelessTechNote – Non-Volatile_Items_in_LibreSync***" available in Libre Portal.

6. Features

6.1. Libre APP for Android

LUCI enables user to remotely, control the LibreSync LS9 enabled product using the Libre Application for android. The application can be used to browse DLNA-DMS in the network, USB connected to device and other online radio stations such as vTuner and TuneIn , and stream music using the DMP feature supported by LS9.

For more information on using Libre APP refer

LibreWireless-Usability_Guide_Dynamic_Direct_Multi-Node_Streaming

6.2. DDMS

A Wireless Dynamic Direct Multi-Node Streaming (DDMS) Zone is a group of nodes, (DDMS enabled speakers) chosen dynamically by an end user to synchronously play audio from a given content source.

This group of speakers can play music from any Audio Source synchronously without any delay between the nodes. Each group can consists of two or more nodes.

For information on setting up devices for DDMS, and Using Libre App refer to

LibreWireless-Usability_Guide_Dynamic_Direct_Multi-Node_Streaming

The device webpage provides interface to update DDMS SSID and password.

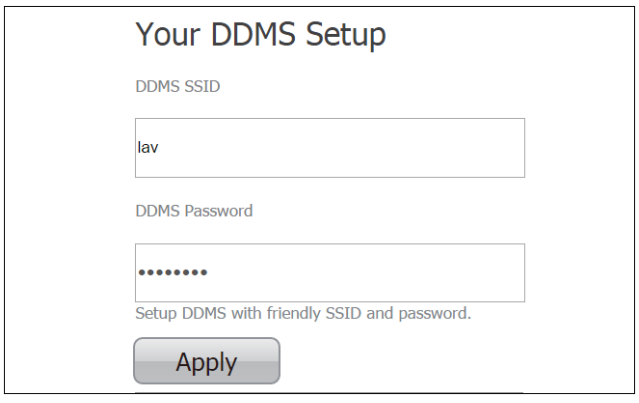


Figure 6.2-1: DDMS Setup in webpage

6.3. Source Switching

LibreSync enables user to switch the playback sources without any hitches. User can choose to stream music either from Cast-For-Audio (C4A) Spotify connect and the music streams on the selected device from the source.

For example, A LS Device streaming Cast-For-Audio (C4A) starts streaming music from Spotify connect when, the user selects music from Spotify APP to be played on the device.

6.4. Failsafe Mechanism

Failsafe Mechanism safeguards the modules from being corrupted or unusable, in case of power failure or reset during the firmware upgrade.

If there is a power failure during the firmware update process of the critical portions like kernel, firmware update process is re-tried automatically in the next boot up. There is no need to connect to the network, open device webpage or download the single image again from the server to complete the Firmware update process.

Failsafe Mechanism is applicable for network and internet update only.

For more information on Failsafe Mechanism see ***LibreWirelessTechNote_Failsafe-Firmware_Upgrade*** , available in Libre Portal.

6.5. Software Security

LibreSync software is secured using Crypto IC. Crypto IC is embedded either in the LS9 module or the ACP. Crypto IC authenticates and allows only the valid LS9 software to boot on the LS9 modules.

6.6. Airplay®

After the speaker or device is configured to the network, it is discovered by the iOS device and iTunes, and is available for AirPlay streaming.

To stream AirPlay proceed as below

Step 1. Open the Control Centre or Music APP on iOS device

Or

Open iTunes installed on any machine

Step 2. Tap the AirPlay icon

AirPlay enabled LibreSync device is listed

Step 3. Select the device and select Play

AirPlay starts streaming on the LibreSync enabled device.

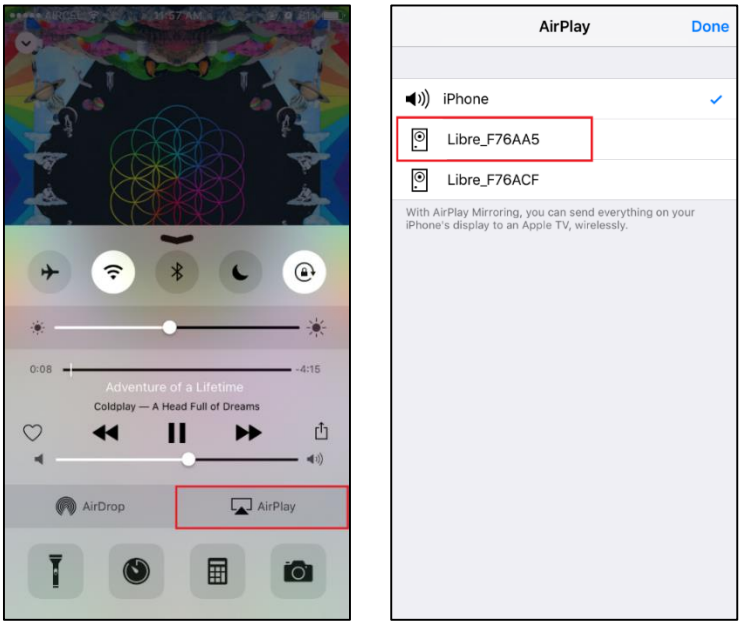


Figure 6.5-1 AirPlay Stream

End --

Password for Airplay Playback

You can either enable or disable a password, to start Airplay playback on the LS enabled device through a webpage.

Enable

To enable a password for Airplay Playback proceed as below.

Step 1. Execute command **#netcfg** in the device terminal to know the device IP

For Example, *10.0.1.13*

```
root@android:/ # netcfg
lo       UP                                   127.0.0.1/8       0x00000049 00:00:00:00:00:00
p2p0     DOWN                                   0.0.0.0/0       0x00001002 cc:d2:9b:fe:d6:33
eth0     DOWN                                   0.0.0.0/0       0x00001002 00:0c:43:76:20:77
wlan0    UP                                  10.0.1.13/24       0x00001043 cc:d2:9b:fe:d6:32
root@android:/ #
```

Step 2. Enter the IP in the address bar of your browser with port number

For Example, *10.0.1.13*

Step 3. In ***Your Device Name*** section, Enter the ***Airplay Password*** in the white box below and Click ***Apply***

Device reboots automatically.

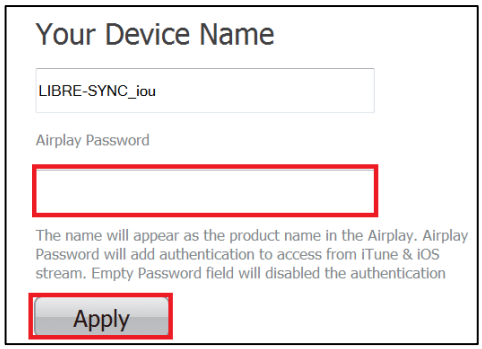


Figure 6.5-2: Password for Airplay

Step 4. Open the Control Centre or Music App on iOS device

Or

Use iTunes installed on any machine

Step 5. Tap the AirPlay icon

AirPlay enabled LibreSync device is listed

Step 6. Select the device and Select Play

Step 7. In the pop screen enter the password entered in the webpage

AirPlay starts streaming.

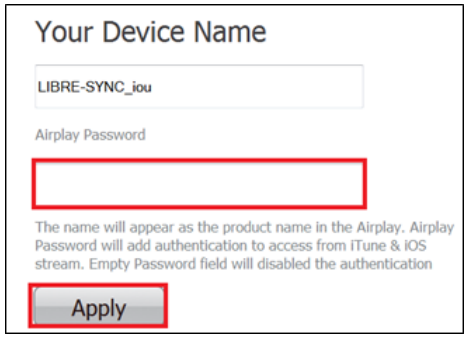


Figure 6.5-3: Enter Password for Streaming

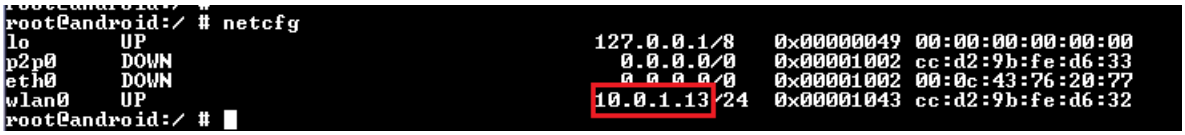
End--

Disable

To disable a password for Airplay Playback proceed as below.

Step 1. Execute command **#netcfg** in the device terminal to know the device IP

For Example, *10.0.1.13*



Step 2. Enter the IP in the address bar of your browser with port number

For Example, *10.0.1.13*

Step 3. In ***Your Device Name*** section, Clear the previous Password and leave the white space blank and Click ***Apply***

Step 4. A pop-up message appears Click ***OK*** Click ***Apply***

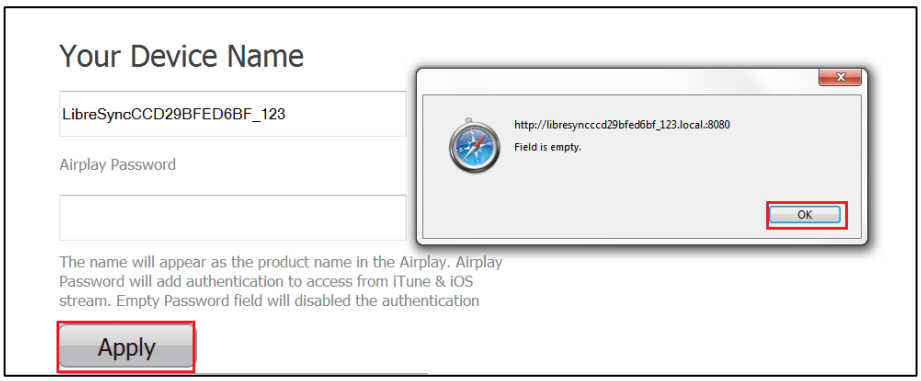


Figure 6.6-1: Disable Airplay Password

Device reboots automatically.

End --

6.7. Cast For Audio

Once the speaker or device is configured to the network, it is discovered by *Cast For Audio* supported iOS / Android Application (i.e. Cast for Audio Application), and is available for *Cast For Audio* streaming.

To stream *Cast For Audio* proceed as below

Step 1. Connect the iOS / Android device in same network as your LS-Device.

Step 2. Open the ***Cast for Audio Application*** on iOS / Android device

Step 3. Tap the **Cast** icon on Cast for Audio Application

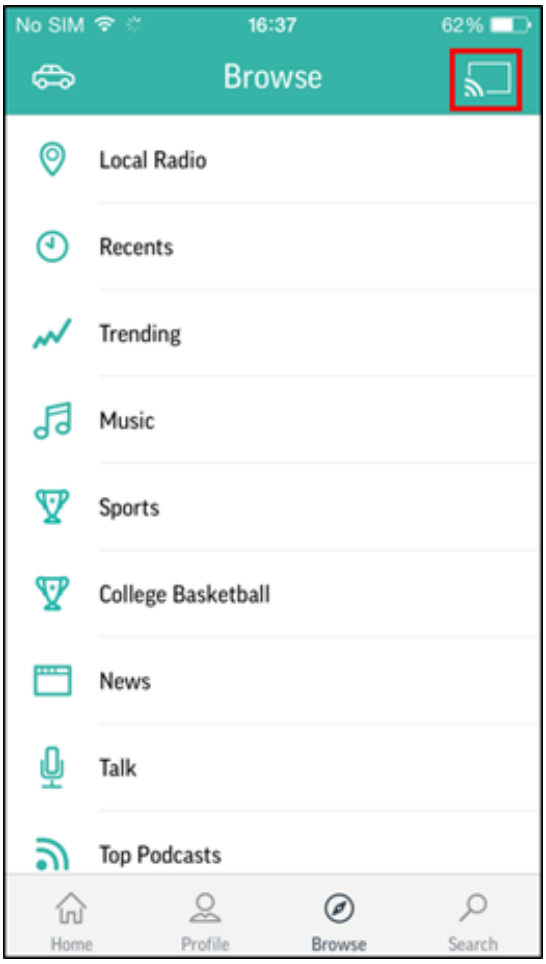


Figure 6.6-1: Cast for Audio Application Menu

Step 4. Cast For Audio enabled LS-Device is listed

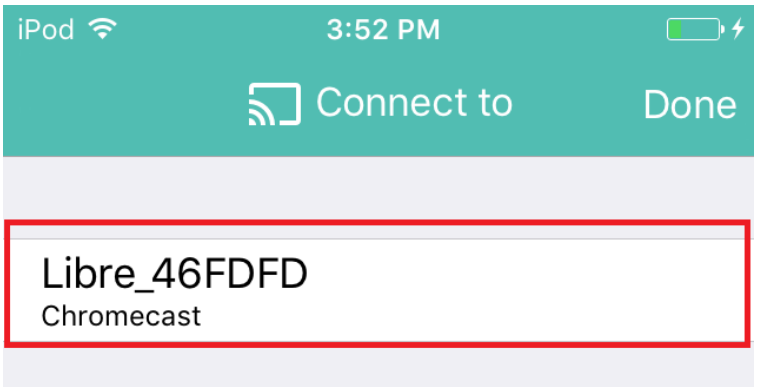


Figure 6.6-2: Device list

Step 5. Select the device and start Cast For Audio streaming

Figure 6.6-3: Cast for Audio Enabled Device Selected

End --

6.8. Spotify Connect

LibreSync enables you to stream music via Spotify connect.

To use the Spotify connect APP proceed as below.

Step 1. Register for Spotify premium account and get the Username and Password for the account

Step 2. Download the Spotify app from the APP store/Play Store.

To stream music from Spotify connect proceed as below.

Step 3. Reboot the LS enabled device and connect to the network.

Step 4. Connect iOS device/Android phone to the same network.

Step 5. Open the Spotify APP

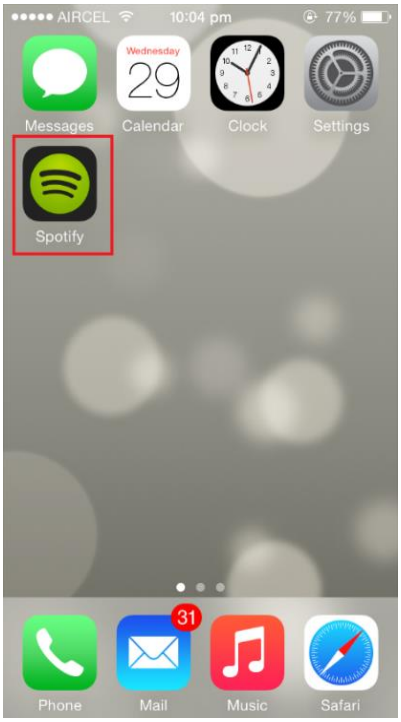


Figure 6.7-1: Spotify APP

Step 6. Login to Spotify, using the Username and Password received, during registration.

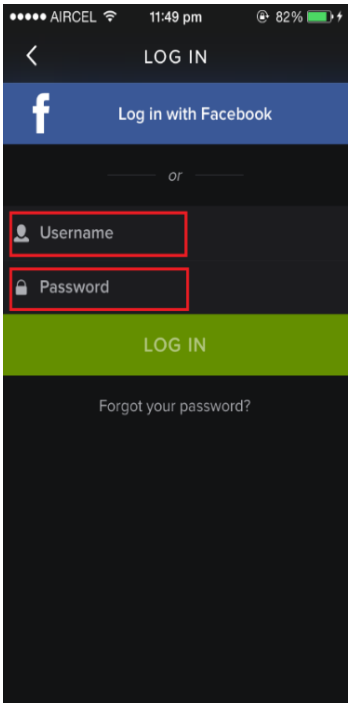


Figure 6.7-2: Spotify Login Screen

Step 7. Browse for songs in the Spotify Server

Step 8. In Now playing screen, select Speaker in right bottom

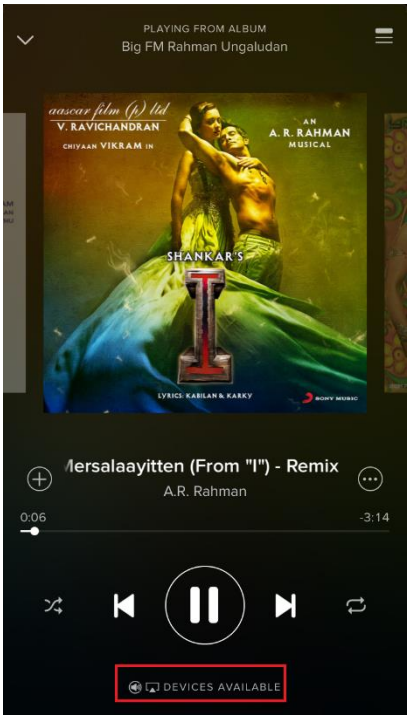


Figure 6.7-3: Device Selection

Step 9. Select the LS enabled device

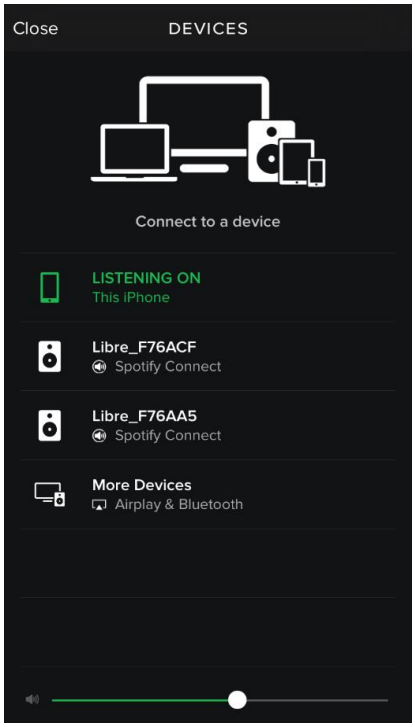


Figure 6.7-4: Device List

LS enabled device starts streaming music from Spotify Connect

End --

6.9. AUX-In Support

Users can connect Audio Source to AUX-In jack of EVK and select the source from Libre-APP.

6.10.USB Playback

LS supports audio playback from USB. User can select the content source from an USB drive to stream music on LS-Enabled speaker.

6.11.DLNA ® / DMR

After the device is configured to the network, device is discoverable over UPnP®. Any Universal Plug and Play (UPnP) / Digital Living Network Alliance (DLNA) certified controller can be used to stream music to the device.

To test ***Play To*** functionality proceed as below

Step 1. Open Media Player on Windows 7

Step 2. In the play list, Click ***Play To*** and select the LS enabled speaker or device

Or

Right click on the song and Click ***Play To***

Music starts streaming.

If the speaker / device is not visible on the Windows 7 Media Player, go to ***Stream > More streaming options***, ensure speaker is in Allowed state.

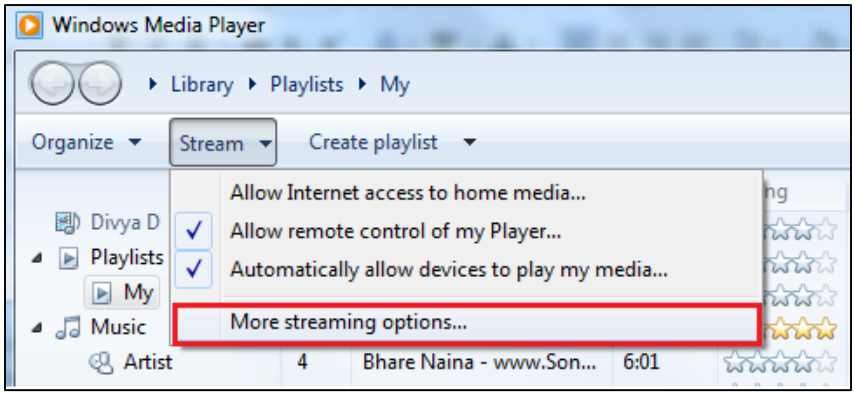


Figure 6.9-1: Media Player Stream Menu

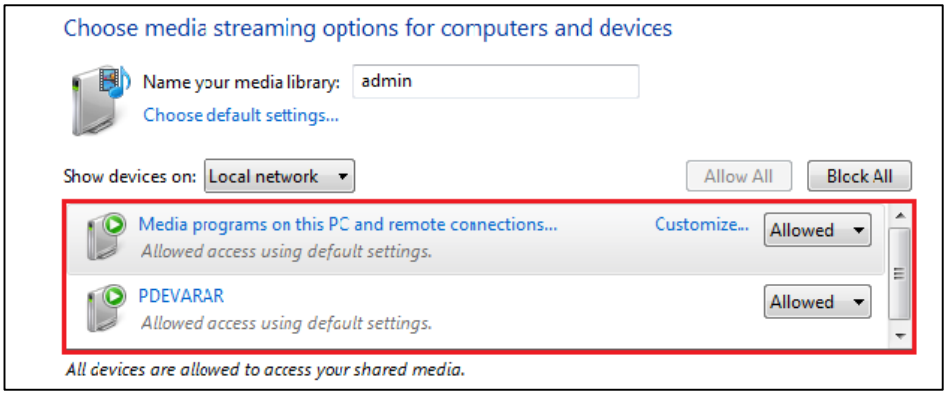


Figure 6.9-2: Media Streaming Options

Digital Media Renderer (DMR) functionality can be verified using any app on the Android / iOS devices as well. For example, the native audio player on Samsung Galaxy devices can be used.

End--

6.12.LUCI Over UART

LibreSync enabled devices provides a set of Message-Boxes for Control and Status Indications to, remote control itself. LUCI Architecture is designed to enable developers to remote control LibreSync products using a common light weight protocol.

LUCI provides control for status indications such as

- Play Control
- Browse Control
- Device Attachment / Detachment Status (USB)
- User Interface, Time Stamp, Volume Control
- Firmware Upgrade Process
- Multi-Room Audio Status, Multi-Room Audio Modes
- Network Configuration Status
- Bluetooth Control

For more information on LUCI and Message-Box used refer to LUCI Tech-Note available in Libre Portal.

6.13.Switch between Wired and wireless modes

You can switch between wired and wireless mode using the Webserver

Switching to Wired Mode

To switch to wired mode from Wi-Fi mode proceed as below

> **Note:** Make Sure device is connected to an Wi-Fi Network

Step 1. Execute command **#netcfg** in the device terminal to know the device IP

For Example, *10.0.1.13*

```
root@android:/ # netcfg
lo       UP                                127.0.0.1/8   0x00000049 00:00:00:00:00:00
p2p0     DOWN                                0.0.0.0/0   0x00001002 cc:d2:9b:fe:d6:33
eth0     DOWN                                0.0.0.0/0   0x00001002 00:0c:43:76:20:77
wlan0    UP                                10.0.1.13/24  0x00001043 cc:d2:9b:fe:d6:32
root@android:/ #
```

Step 2. Enter the IP in the address bar of your browser.

For Example, *10.0.1.13*

Step 3. In Select Your Network drop-down list, select ***Switch to Wired mode***

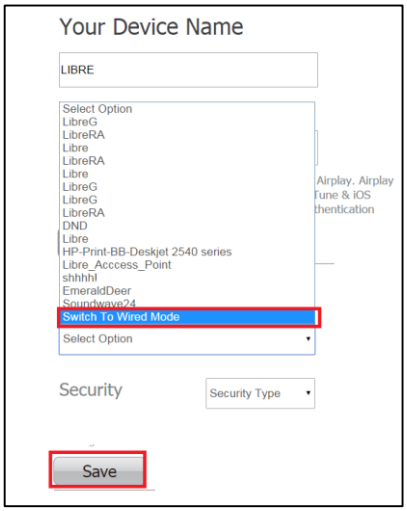


Figure 6.11-1: Switch to Wired Mode

Step 4. Connect the device with an Ethernet cable

Step 5. Click Save

LS module reboots automatically

End--

Switching to Wireless Mode

To switch to wireless mode from wired mode proceed as below

Step 1. Execute command **#netcfg** in the device terminal to know the device IP

For Example, *192.168.0.103*

Step 2. Enter the IP in the address bar of your browser with port number

For Example, *192.168.0.103*

Step 3. In Select Your Network drop-down list, select ***Switch to Wi-Fi mode*** and Click ***Save***

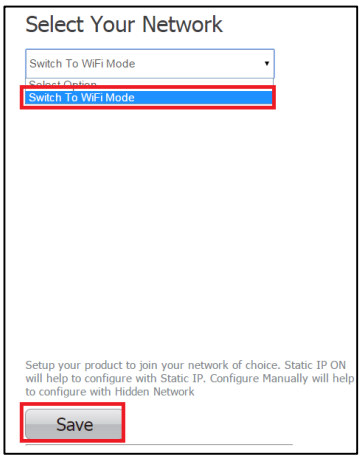


Figure 6.11-2: Switch to Wi-Fi Mode

LS module reboots automatically.

End--

6.14.TCP / IP Tunneling

TCP/IP Tunnelling is a unique feature supported by LS modules. Tunneling enables a Host MCU to communicate with other network devices over UART. The Host MCU can build their own proprietary protocol using LUCI tunneling.

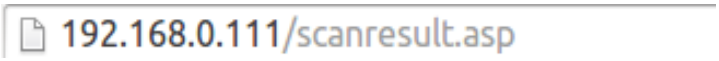
For more information on TCP / IP tunneling refer LUCI document

LibreWirelessTechNote - LS_Light_Weight_Universal_Control_Interface

6.15.Wi-Fi Scan Result

Wi-Fi Scan result enables you to list the available access point. This feature is intended to be used by the APP developers to list the available networks in the APP for configuration.

To use the feature, in the address bar of your browser enter the IP address followed by */scanresult.asp.*

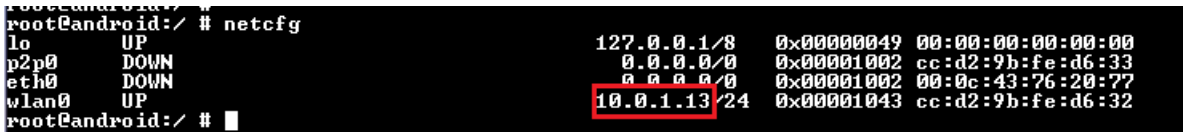


6.16.Device Name Configuration

You can define a friendly name to LS-Enabled device. To define the friendly name proceed as below.

Step 1. Execute command **#netcfg** in the device terminal to know the device IP

For Example, *10.0.1.13*



Step 2. Enter the IP in the address bar of your browser with port number

For Example, *10.0.1.13*

Step 3. In ***Your* Device Name** section, Enter the Device Name in the white box and Click ***Apply***

Device reboots automatically.

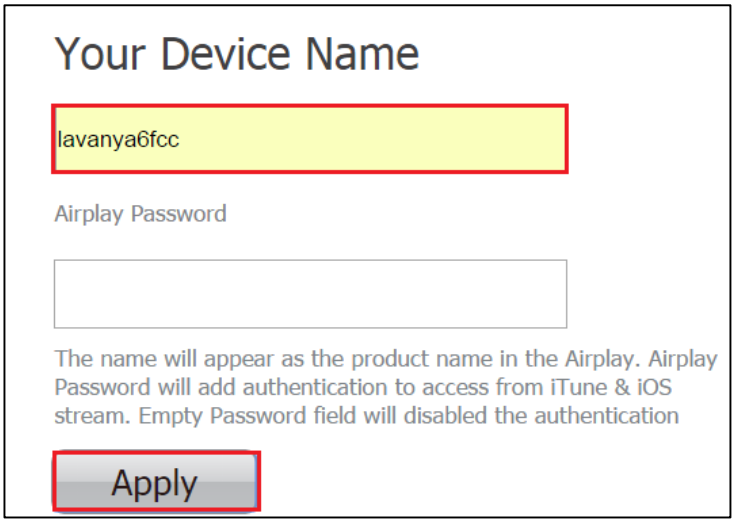


Figure 6.14-1: Device Name Section

Note:

- The device name length can be up-to maximum of 50 characters.
- After the Firmware upgrade, if the device friendly name is not set, the device name is listed as below
  - iTunes server and DMR Speakers lists the device as LibreSync_xxxxxx

End--

6.17.Music Services

Note:

This section is applicable for Non-TZ modules, without GCast enabled in it.

vTuner

vTuner is an internet radio device that receives and plays streamed media, either from Internet radio or Home network.

vTuner on Libre platform can be used to stream music using the Libre APP.

To stream music from vTuner proceed as below.

Step 4. In the Now Playing screen of Libre APP, Tap ***Sources*** 

Step 5. Tap ***vTuner*** from the source List 

Step 6. Browse through the list and select the song of your choice.

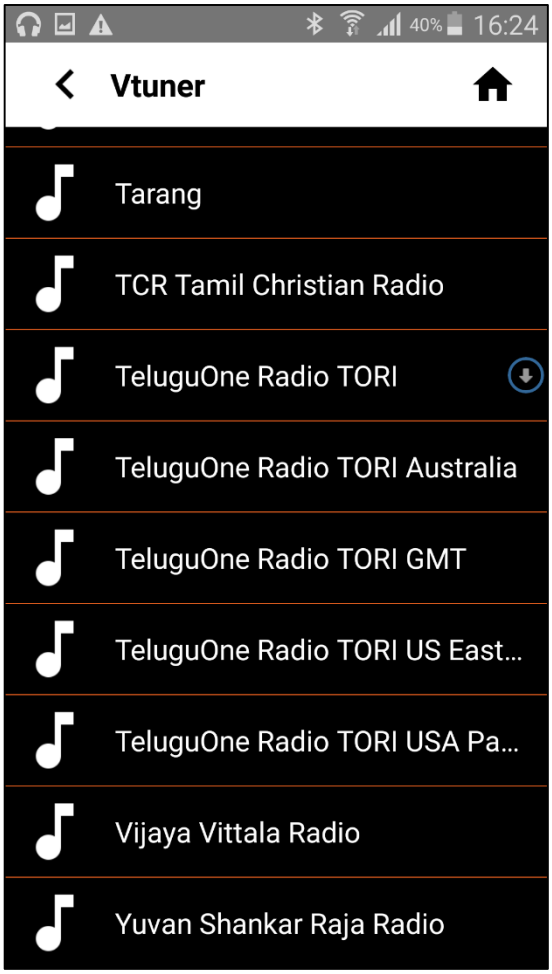


Figure 6.16.1-1: vTuner Browse Screen

Step 7. LS enabled speaker starts streaming the song from vTuner.

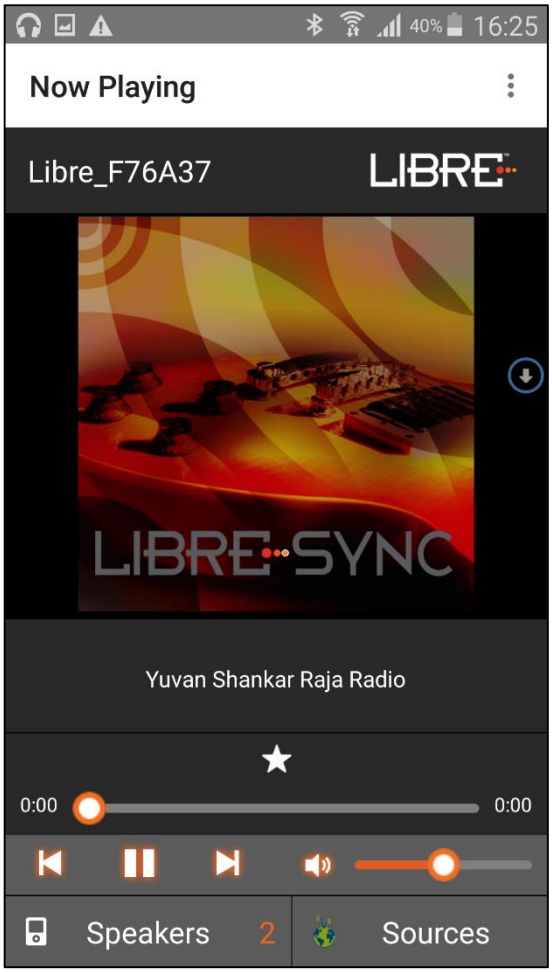


Figure 6.16.1-2: Now Playing Screen for vTuner

End --

QQ Music

LibreSync enable you to stream music via QQ music service.

To use the QQ music service

Step 1. Register for QQ Music account and get the Username and Password for the account

Step 2. Download the QQ Music app from the Play Store.

To stream music from QQ Music proceed as below.

Step 3. Reboot the LS enabled device and connect to the network.

Step 4. Connect Smartphone to the same network.

Step 5. Open the QQ Music APP

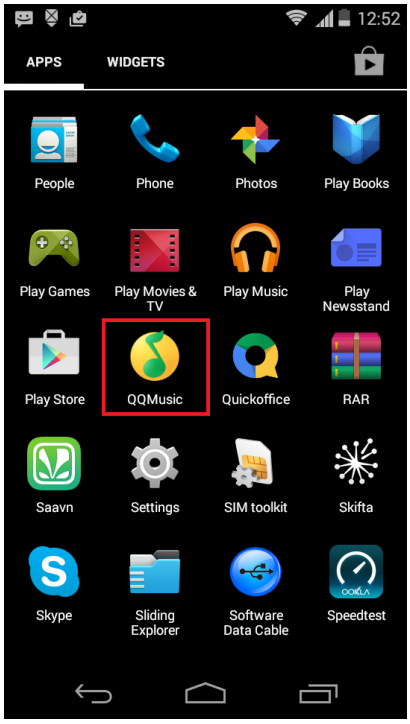


Figure 6.16.3-1: QQ Music APP

Step 6. Login to QQ Music, using the Username and Password received, during registration.

Figure 6.16.3-2: Login Screen

Step 7. Browse for songs in the QQ Music Server

Step 8. In Now playing screen, select 'Q' symbol

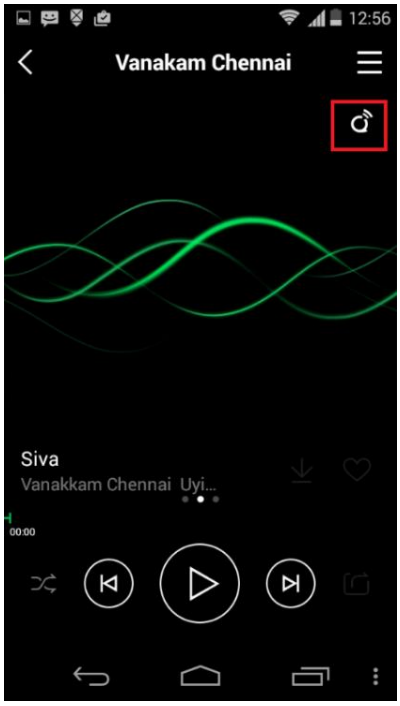


Figure 6.16.3-3: Device Selection Option

Step 9. Select the LS enabled device

Figure 6.16.3-4: Device List

Playback from QQ music on the LS enabled device starts.

End - -

Spotify

LibreSync enables you to stream music via Spotify connect.

Spotify on LS-Enabled speakers supports to Save / Play/ Delete presets, for more information on Spotify Preset Actions refer to Message-Box # 75 in LUCI Document

(LibreWirelessTechNote-LS_Light_Weight_Universal_Control_Interface) available in LibreSync Document Portal.

To use the Spotify connect APP proceed as below.

Step 1. Register for Spotify premium account and get the Username and Password for the account

Step 2. Download the Spotify app from the App store/Play Store.

> **Note:**
>
> - The device name is listed as, LibreSync_xxxxxx
> - In Spotify free account, LS Device will not be listed in the Spotify speaker list.

To stream music from Spotify connect proceed as below.

Step 3. Reboot the LS enabled device and connect to the network.

Step 4. Connect iOS device/Android phone to the same network.

Step 5. Open the Spotify APP

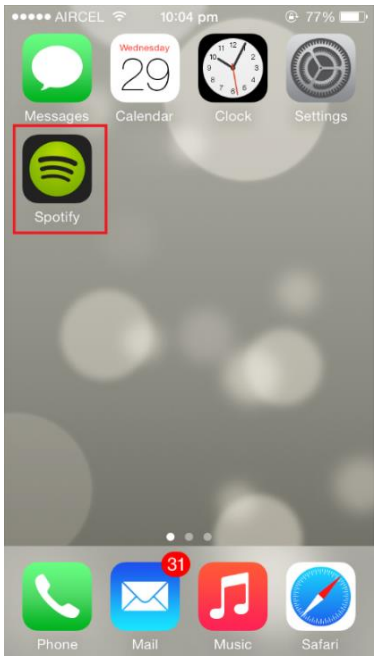


Figure 6.16.4-1: Spotify APP

Step 6. Login to Spotify, using the Username and Password received, during registration.

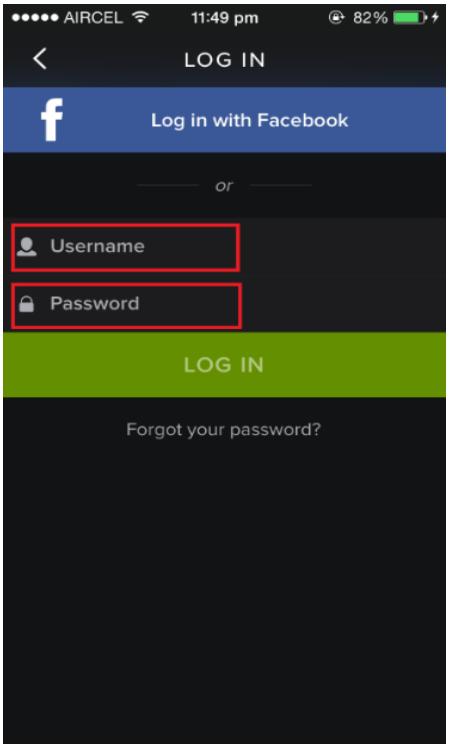


Figure 6.16.4-2: Spotify Login Screen

Step 7. Browse for songs in the Spotify Server

Step 8. In Now playing screen, select Speaker symbol in right bottom

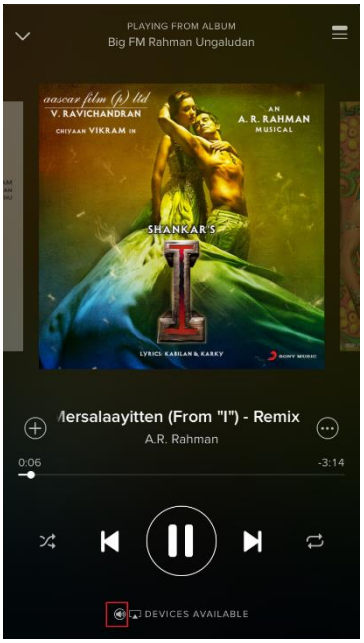


Figure 6.16.4-3: Device Selection

Step 9. Select the LS enabled device

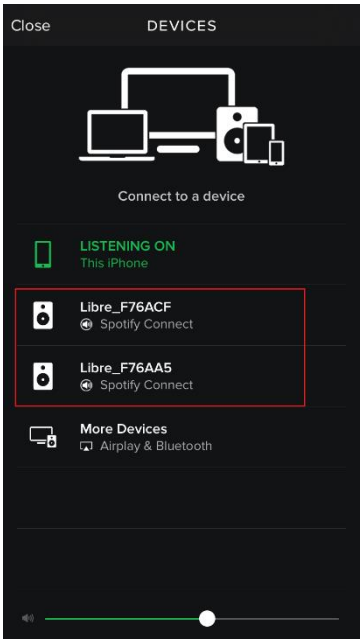


Figure 6.16.4-4: Device List

LS enabled device starts streaming music from Spotify Connect

End --

Tidal

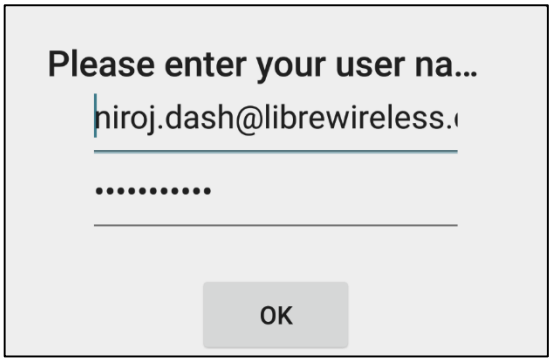
Tidal, also known as TIDALHiFi is a subscription-based music streaming service that offers lossless audio and high definition music. The service has over 30 million tracks and 75,000 music videos. Tidal on Libre platform is used to stream music using the Libre APP.

To stream music from Tidal proceed as below.

Step 1. In the Now Playing screen of Libre APP, Tap ***Sources*** 

Step 2. Tap ***Tidal*** from the source List 

Step 3. Enter the User Name and Password to login to the music service.



Step 4. Browse through the list and select the song of your choice.

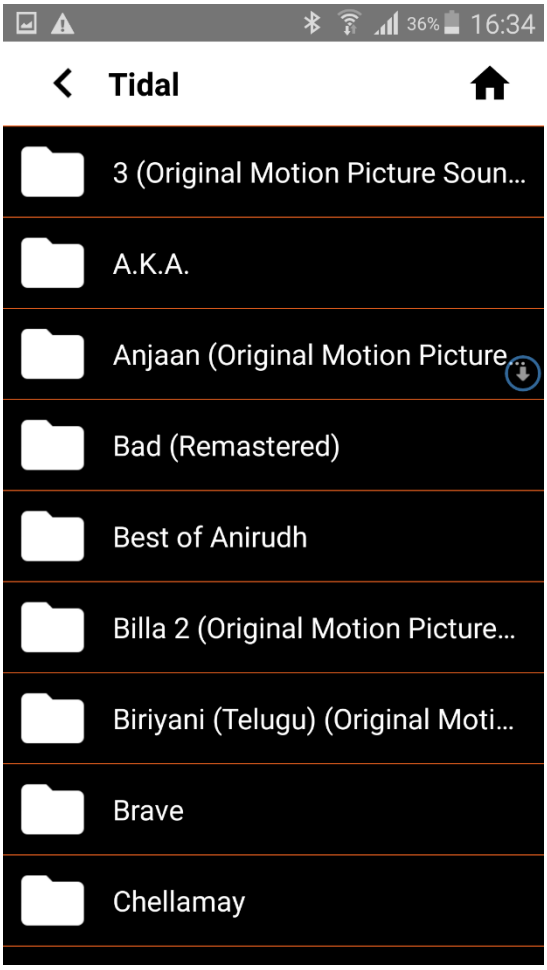


Figure 6.16.6-1: Tidal Browse Screen

Step 5. LS enabled speaker starts streaming the song from Tidal.

Figure 6.16.6-2: Now Playing Screen for Tidal

End --

6.18. Telnet

Telnet provides access to the command line interface of the LS-Enabled device over Ethernet / Wi-Fi.

To enable or disable Telnet in the device LibreSync provides a configurable Non-Volatile Item "**telnet**". Setting this NV-Item as **1** enables Telnet in the device.

For more information on configuring NV-item refer to ***LibreWirelessTechNote Non-Volatile_Items_in_LibreSync*** available in Libre Portal.

6.19. Roon Music

Roon is a music player service which looks at your music and finds photos, bios, reviews, lyrics, and concert dates, and makes connections between artists, composers, performers, conductors, and producers.

LS9-module supports playback from Roon player in its platform. To enable Roon Music proceed as below.

Step 1. Get Membership account or Free trail account from Roon
https://roonlabs.com/pricing.html

Step 2. Download applications, which support Roon music playback
https://roonlabs.com/downloads.html

Step 3. Launch the Roon server, and add your music content.
Music can be added from local content of PC, network folder, USB.

Step 4. Added Music content will be indexed and it can be played from Roon control.

Step 5. Select LS9 as audio output device ("Select Audio Zone")
LS9 will be one of Roon audio out endpoint.

End--

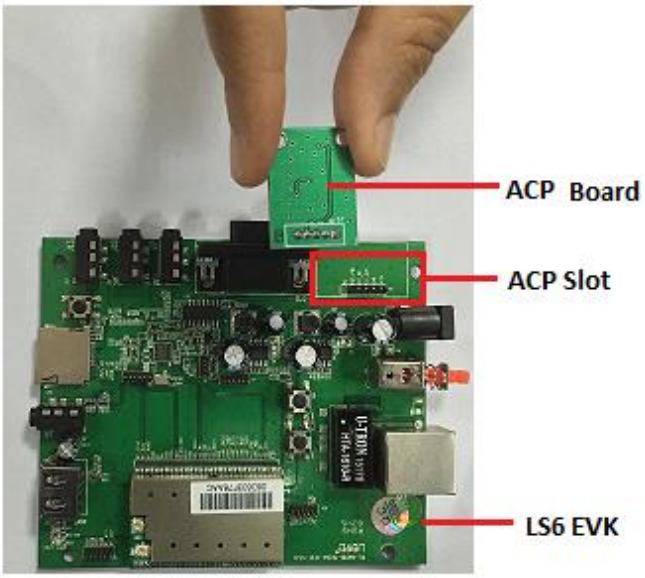
7. Appendix

7.1. ACP Setup

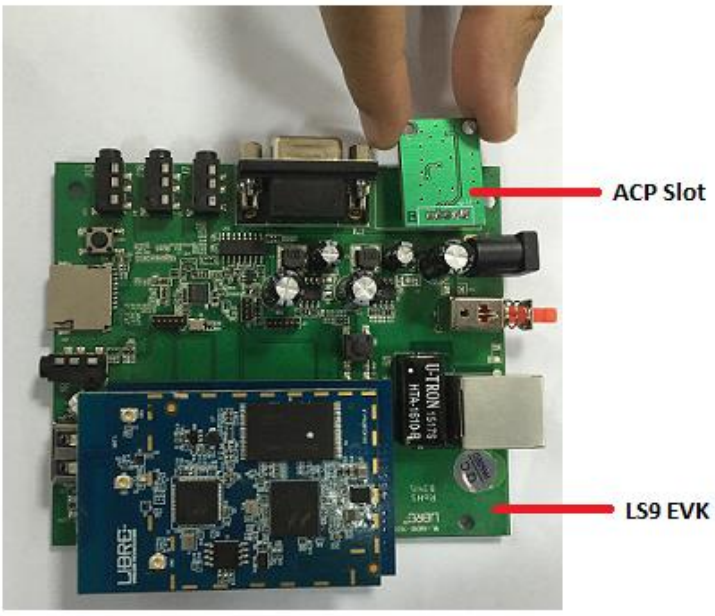
It is recommended to Use "**ACP 2.0C**".

To insert ACP on LS9 EVK proceed as below.

Step 1. To use the ACP board in LS6 EVK, remove the ACP board from the ACP slot as shown below.



Step 2. Insert the ACP board onto the ACP slot in the LS9 EVK as shown below.



End--

7.2. Rework on LS6 EVK to evaluate LS9 Module.

If you are using LS6 EVK for LS9 module evolution then

Step 1. Remove electrolytic capacitor C15, C22, USB connector and Re-mount and soldier electrolytic capacitor on the back side of the LS6 EVK.

Step 2. Connect 5v from LS6 EVK to LS9 module USB_VBUS J1-pin 17

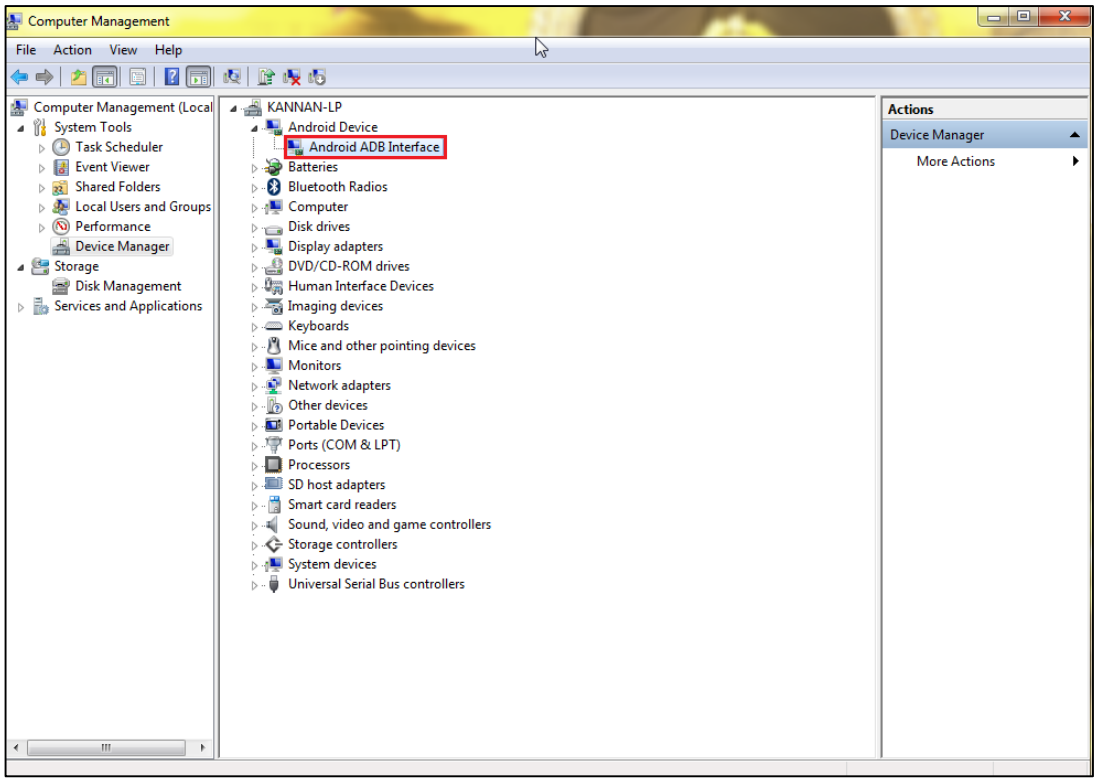
7.3. Install USB Composite Drive

To Install USB Composite Drive proceed as below

Step 1. Download Marvell Windows USB Driver available in Libre Portal https://librewireless.sharefile.com/share#/view/s465a9d86cfb4fc4b/fi43add6-6929-324d-14ea-debffef787bf

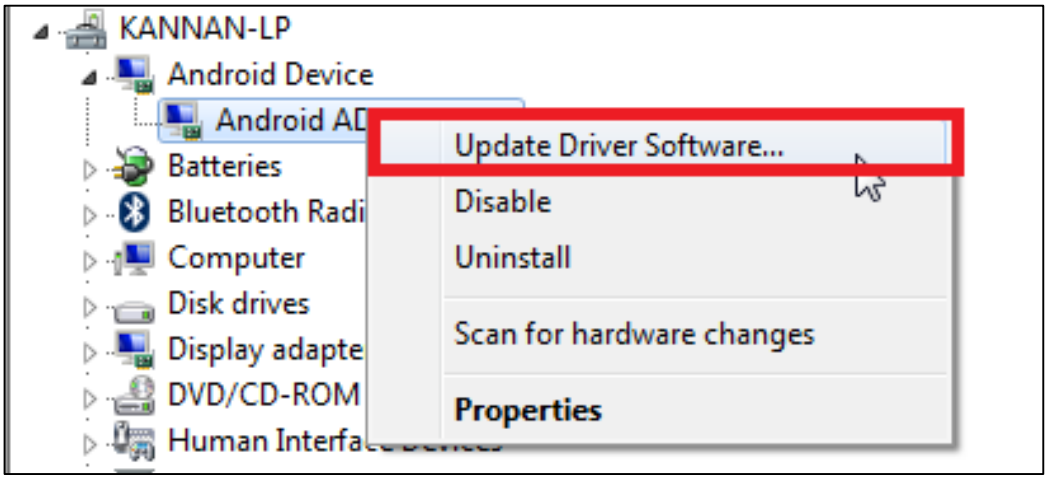
Step 2. Connect the power adaptor, press and hold the **USB-Boot button,** and simultaneously connect the USB cable and power on the EVK**.**

Step 3. Open Device Manager.

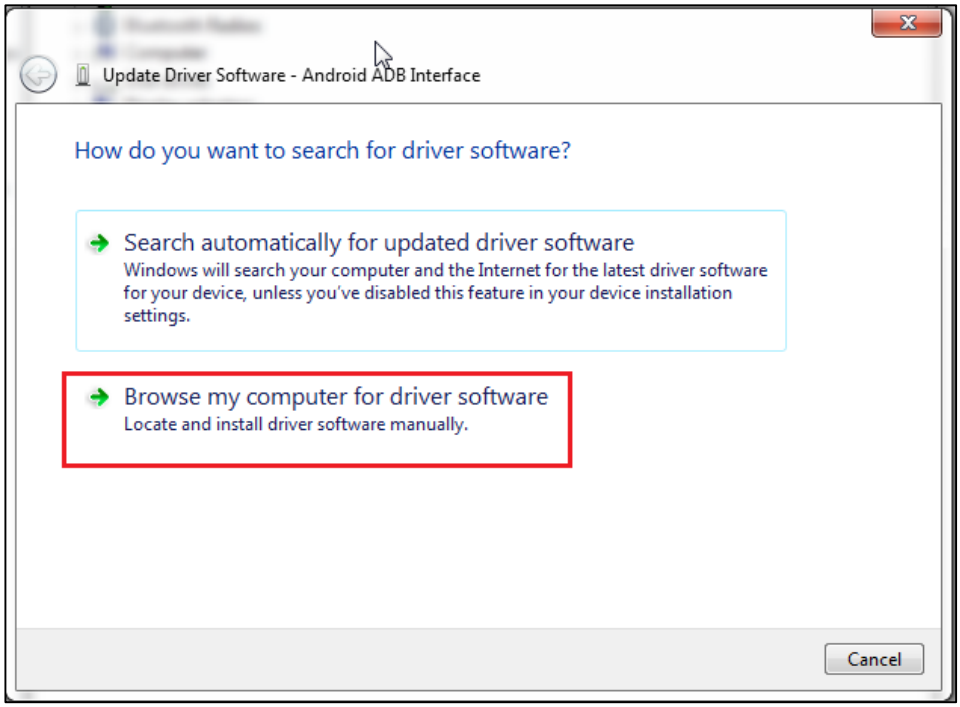


Note: After boot up, if there is only one "Android ADB Interface" device as shown in the above screenshot, then follow, section 2.1.1 to install USB Composite Drive. Otherwise skip section 2.1.1 and go to section 2.1.2 directly.

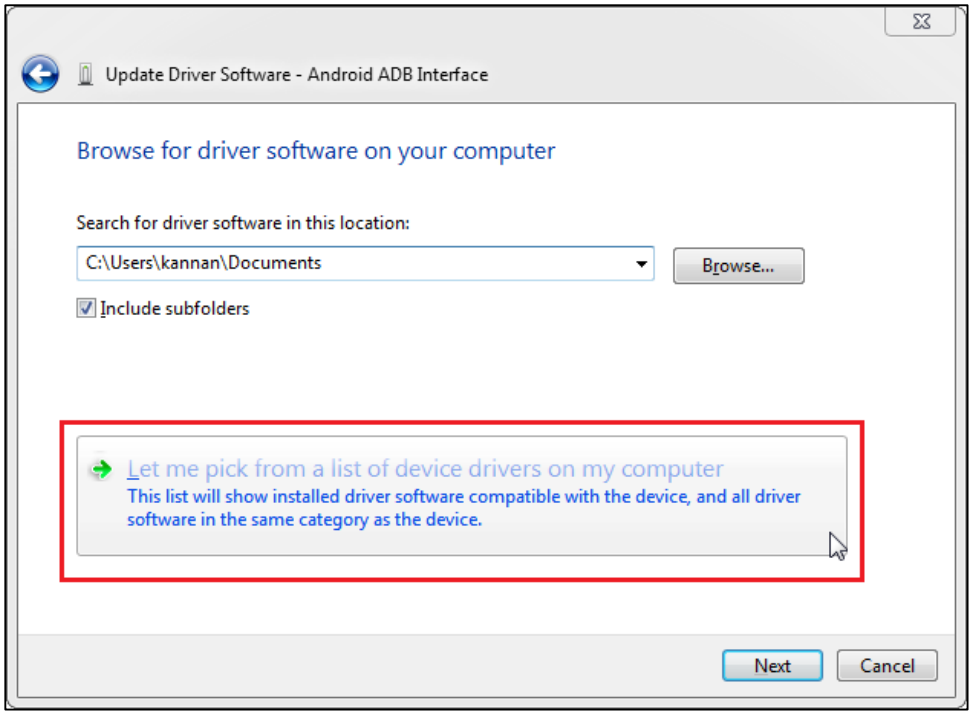
Step 4. Right click "Android ADB Interface", and select "Update Driver Software".



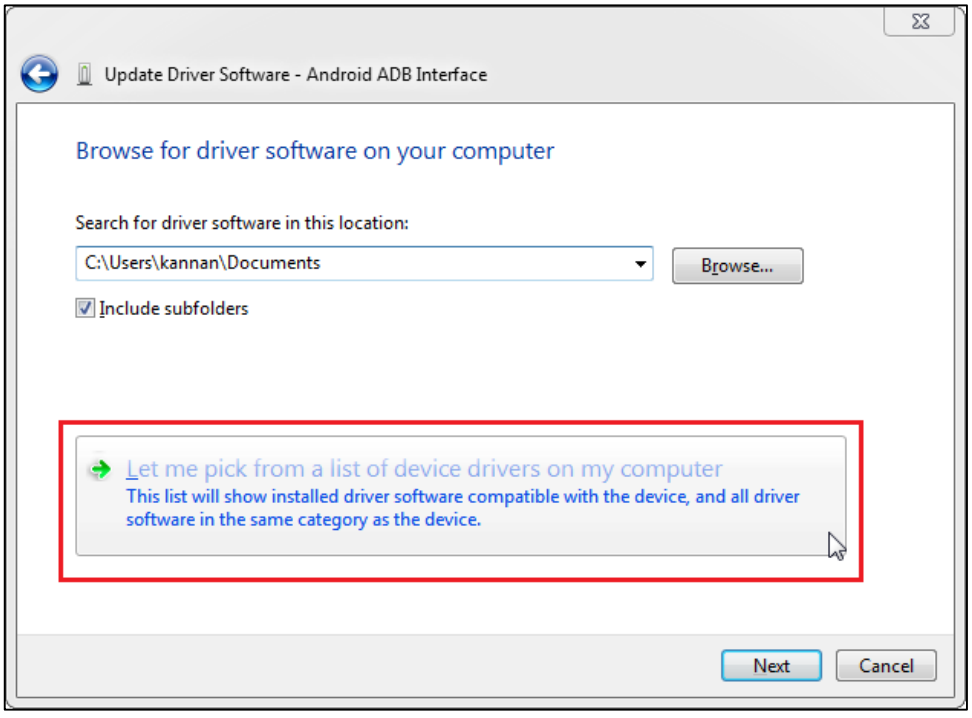
Step 5. Select "Browse my computer for driver software".



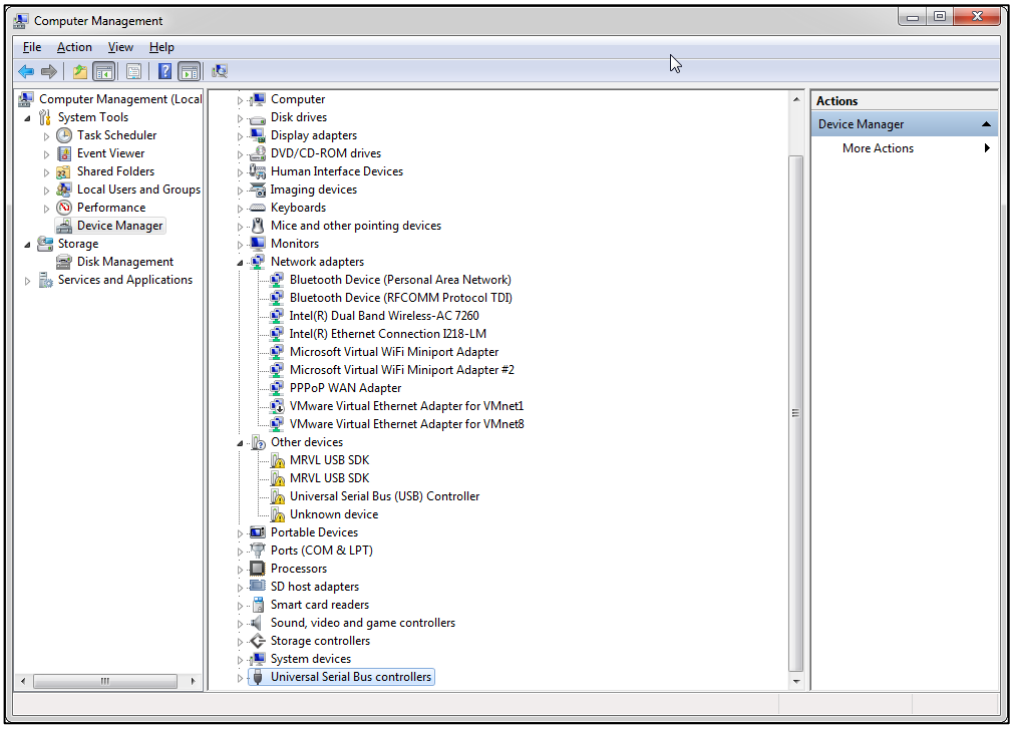
Step 6. Select "let me pick from a list device driver on my computer"



Step 7. Select "**USB Composite Device**", then click "**Next**".



After installation, two unknown devices will be seen as shown in the below screenshot.



End--

7.4. Install Android Composite ADB Driver

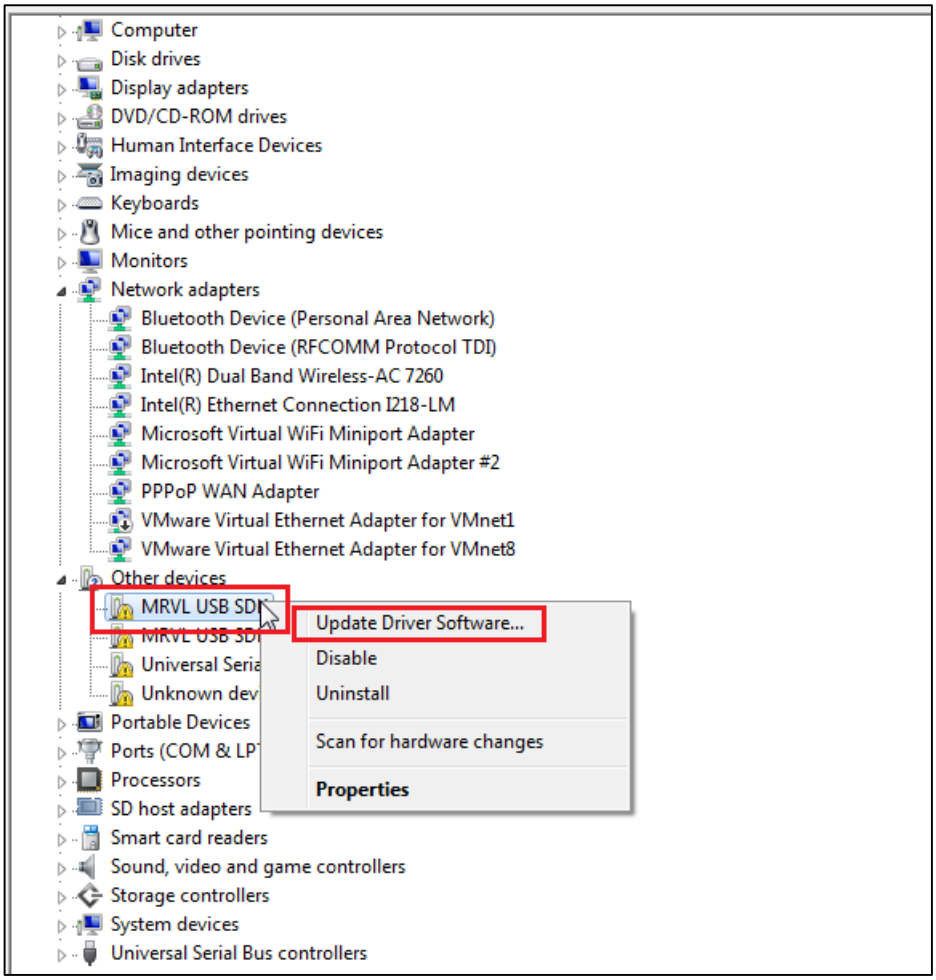
To install Android Composite ADB Driver (ADBD) proceed as below.

Step 1. Download ADB Composite Driver from
http://developer.android.com/sdk/win-usb.html

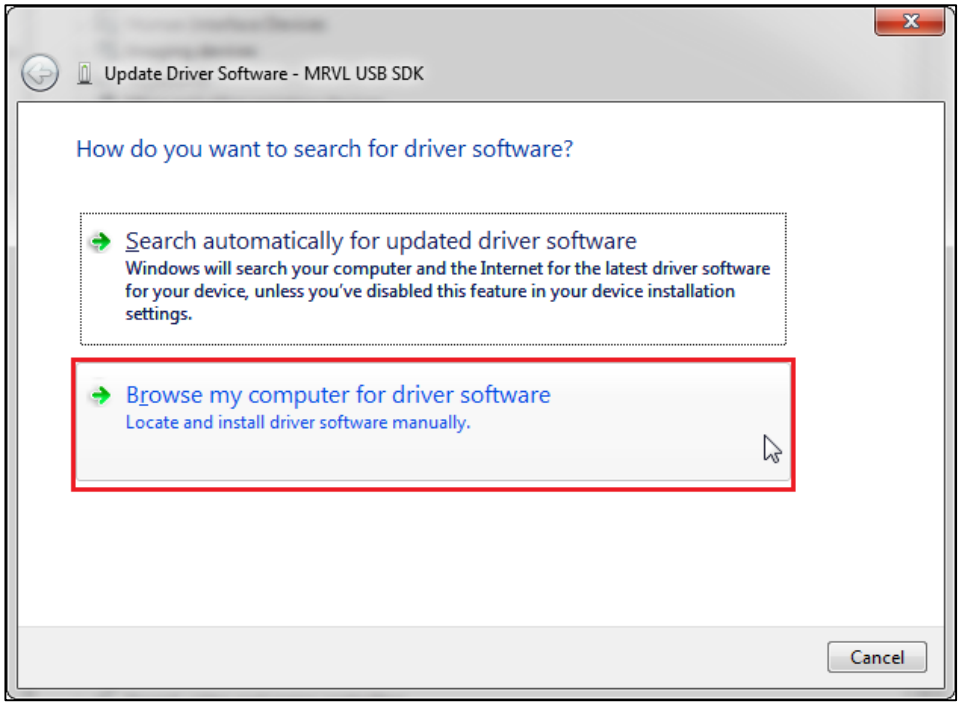
Step 2. Power on LS EVK

> **Note:** ADBD starts on LS-EVK Boot-Up. Two unknown devices will show up in Device Manager as seen in the below screenshot.

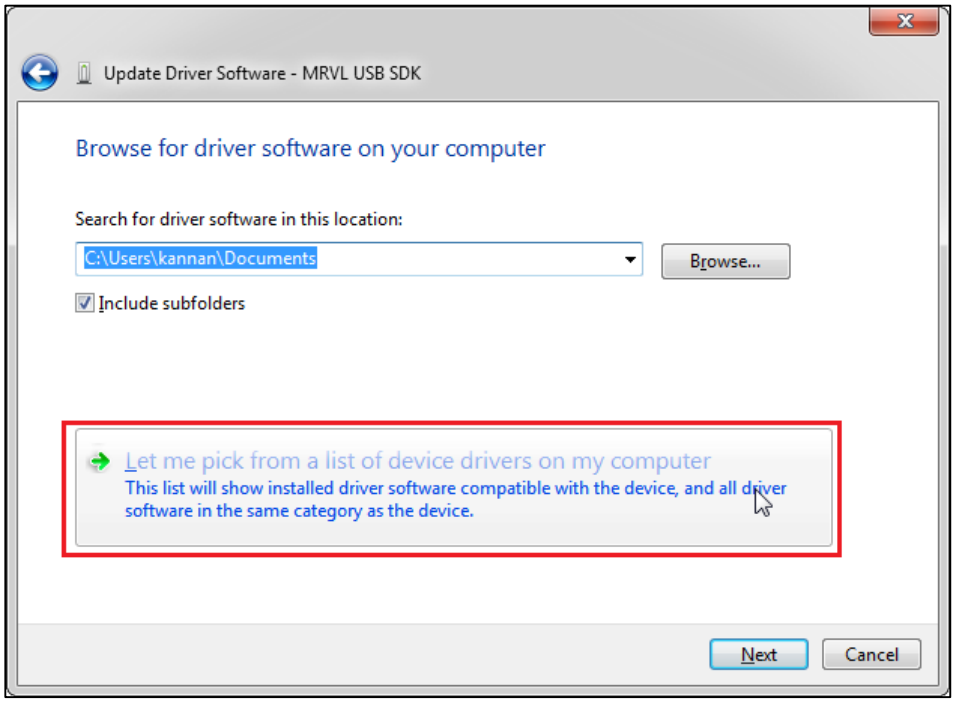
Step 3. Right click the 2nd device, and select "**Update Driver Software**."



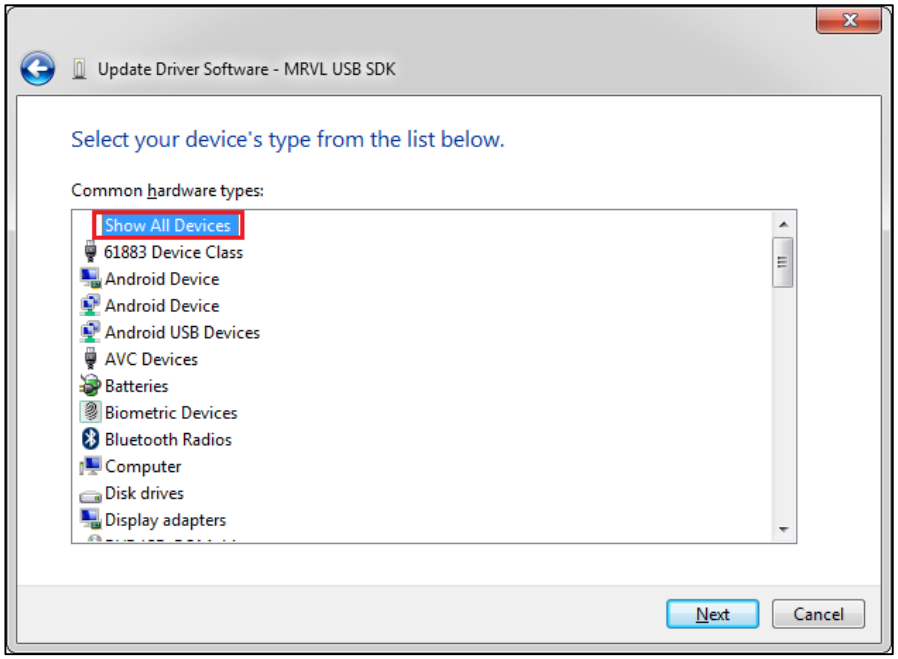
Step 4. Select “Browse my computer for driver software”



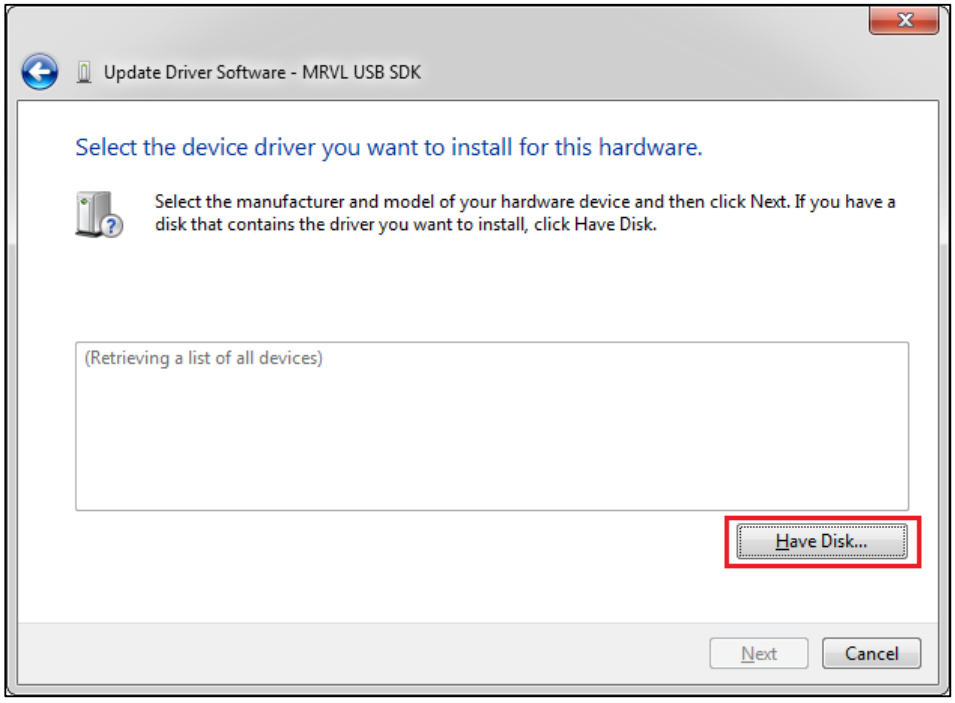
Step 5. Select "let me pick from a list device drivers on my computer"



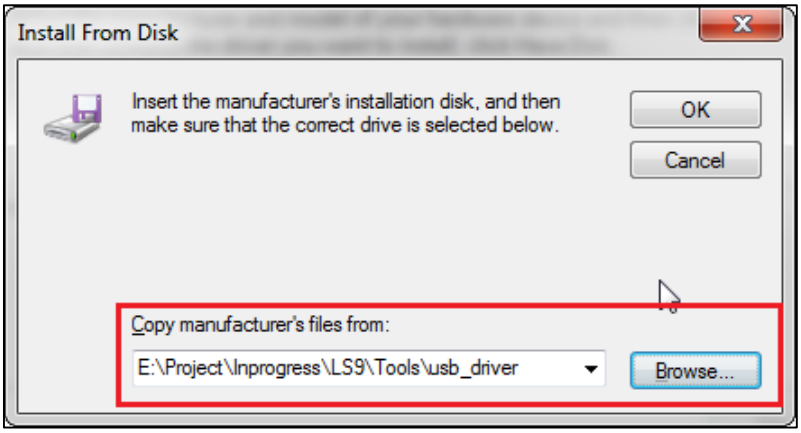
Step 6. Select "**Show all Device**", then click "**Next**"



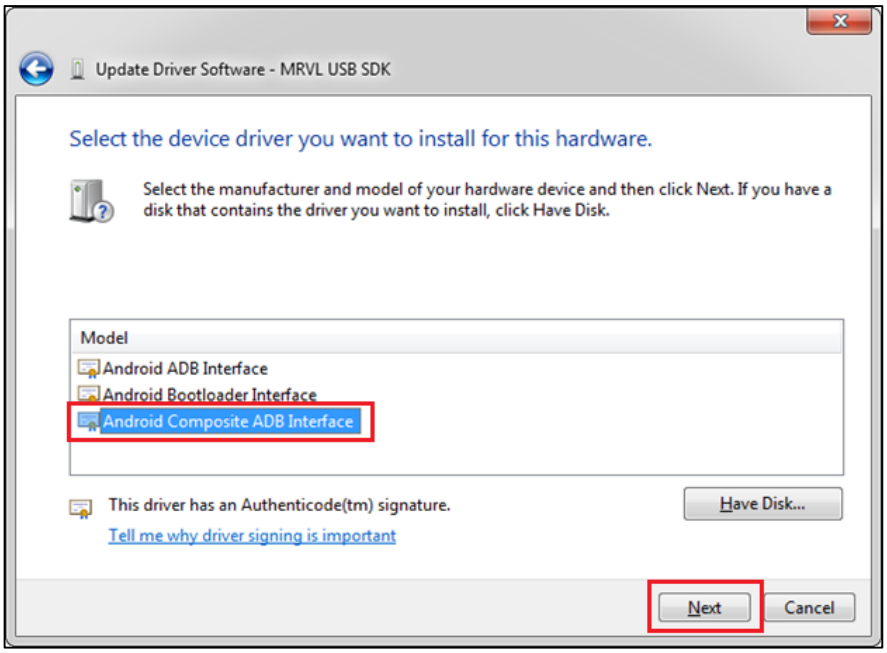
Step 7. Select "Have Disk…"



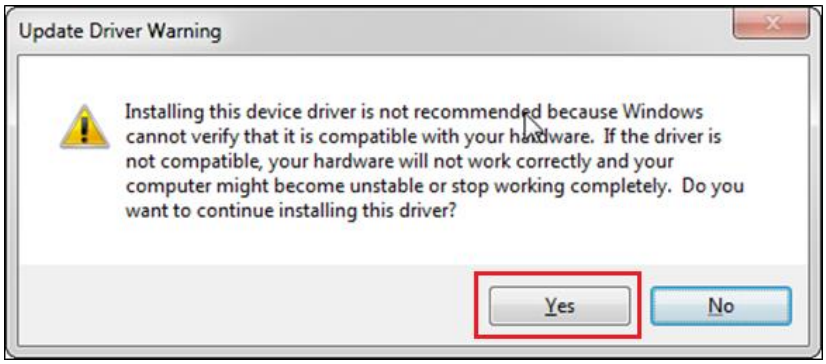
Step 8. Go to Google USB driver file location and then select "**OK**"



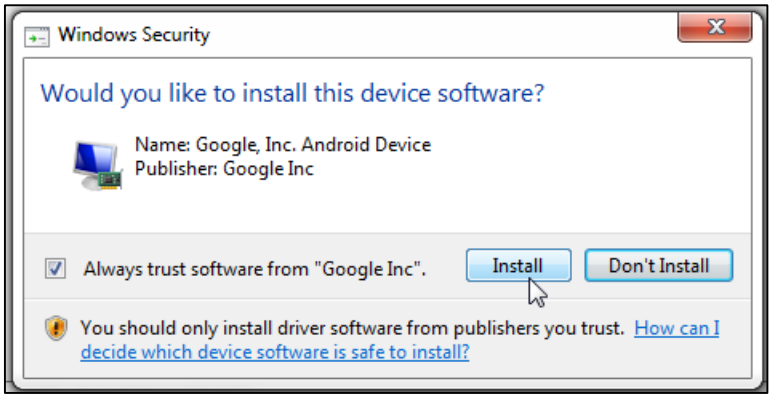
Step 9. Select "Android Composite ADB Interface", then click "Next".



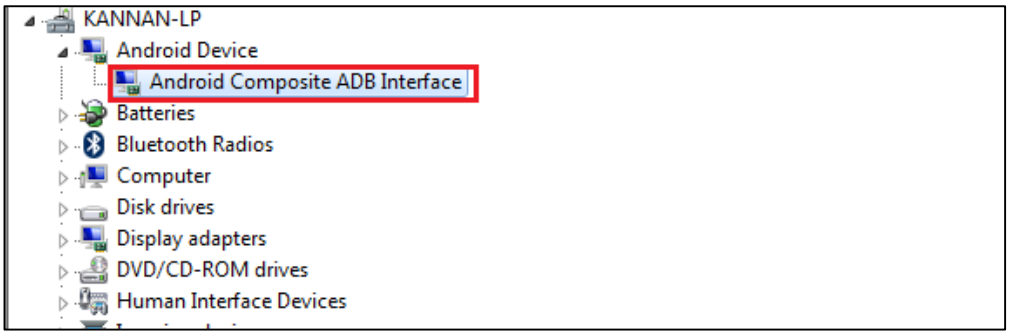
Step 10. Click **"Yes"** on Update Driver Warning message then



Step 11. Click **"Install"** on Windows Security message



Step 12. After installation is complete, "Android Composite ADB Interface" device is displayed as shown in the screenshot.



End --

7.5. Firmware Upgrade Using PC / Laptop Method

For PC / Laptop Method the name of the Firmware Image should be **83_IMAGE.**

- This image is a standard image file
- This image is used for l2nand update (PC / Laptop)
- Size of this image is 140-150MB

To update the firmware Application Image on to the LS9 module using your PC / Laptop, proceed as below.

Step 1. Setup the LS9 EVK system, as explained in section 2.1

1. Instead of USB Null Modem cable, Connect **USB-Type-A** to **USB-Type-A** cable to the Laptop USB port.
2. Download and install the US_BOOT tool from
   Libre Portal → LibreSync → LS_tools → LS9USB_BOOT for NEW MID

Note:	This step is applicable for LS9 modules with new MID only.

3 Install **Marvell Windows USB Driver** in your PC / Laptop.

See section 7.3 for procedure on installing Marvell Windows USB Driver

4 Install **Android Composite ADB Driver**.

See section 7.4 for procedure on installing **Android Composite ADB Driver**

Step 2. Download LS9 **Basic Release Package** from Libre Portal

Path: LibreSync →LS_Firmwares → LS9 → LS9_Release_9004 → Firmwares

If you have already downloaded the 9004 release package ignore this step.

Step 3. Download the latest firmware image (83_IMAGE) from Libre Portal.

Path: LibreSync → LS_Firmwares → LS9

Step 4. Copy the latest firmware image (83_IMAGE) into the Basic Release Package folder

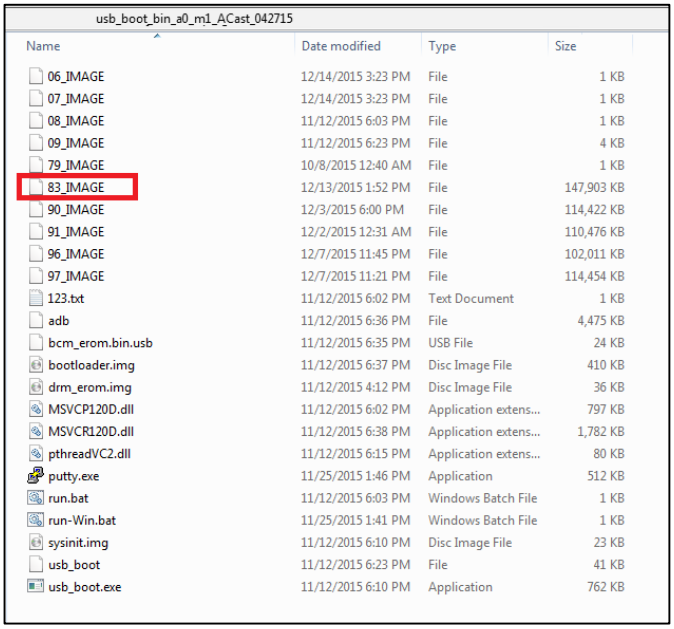


Figure 3.1-1: LS9 Firmware Folder Structure

Step 5. Connect the Laptop to LS9 EVK with the **USB type A to Type A** connector

Step 6. Download and install **PuTTY Application**

http://www.putty.org/

Step 7. Connect the power adapter to power source but do not switch ON the power yet

Step 8. Press and hold the USB-Boot button, and simultaneously connect the USB cable and Power ON the EVK.

Step 9. Execute the script ***run.bat***

LS9 boots to bootloader.

Step 10. Execute the command ***#l2nand –m <image_number>*** on debug shell.

Syntax
#l2nand –m <image_number>
Example
l2nand -m 83

LS flashes the image onto LS9.

Step 11. On Successful Completion Reboot the Module.

End - -

7.6. FCC Information

Federal Communication Commission Interference Statement

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

FCC Caution:

Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

(1) This device may not cause harmful interference, and

(2) This device must accept any interference received, including interference that may cause undesired operation.

FCC Radiation Exposure Statement:

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This transmitter module must not be co-located or operating in conjunction with any other antenna or transmitter.

This End equipment should be installed and operated with a minimum distance of 20 centimetres between the radiator and your body.

IMPORTANT NOTE:

In the event that these conditions cannot be met (for example certain laptop configurations or co-location with another transmitter), then the FCC authorization is no longer considered valid and the FCC ID cannot be used on the final product. In these circumstances, the OEM integrator will be responsible for re-evaluating the end product (including the transmitter) and obtaining a separate FCC authorization.

End Product Labelling

The final end product must be labelled in a visible area with the following:

- **LS9** - “Contains FCC ID: 2ADBM-LS9-AC11DBT”.
- **LS9AD** - “Contains FCC ID: 2ADBM-LS9AD-AC11DBT”.

Manual Information to the End User

The OEM integrator has to be aware not to provide information to the end user regarding how to install or remove this RF module in the user's manual of the end product which integrates this module.