LIBRE WIRELESS TECHNOLOGIES

LIBRE SYNC

User Guide

Model: LS5BVD-N11S

Rev: 2.9

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1. Introduction

Libre Wireless provides evaluation kits (EVK) for users to gain familiarity with our products and expedite their own design and development. User can connect to LS5B module through RS232 UART, SD card, USB, or wireless interface to configure the module, manage the on board device on the module, and perform functional test.

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
- Configuring NV-item
- Key Button Functionality
- Network Configuration
- Streaming Airplay® / DLNA® / DMR
- Libre APP
- DDMS
- Source Switching
- SD-Card Playback
- Aux-In Support
- Miracast
- TCP / IP Tunneling
- Device Name Configuration
- Music Services (Spotify Connect, QQ Music, Vtuner, TuneIn, Melon, Deezer)

2. Libre Wireless Technologies' EVK

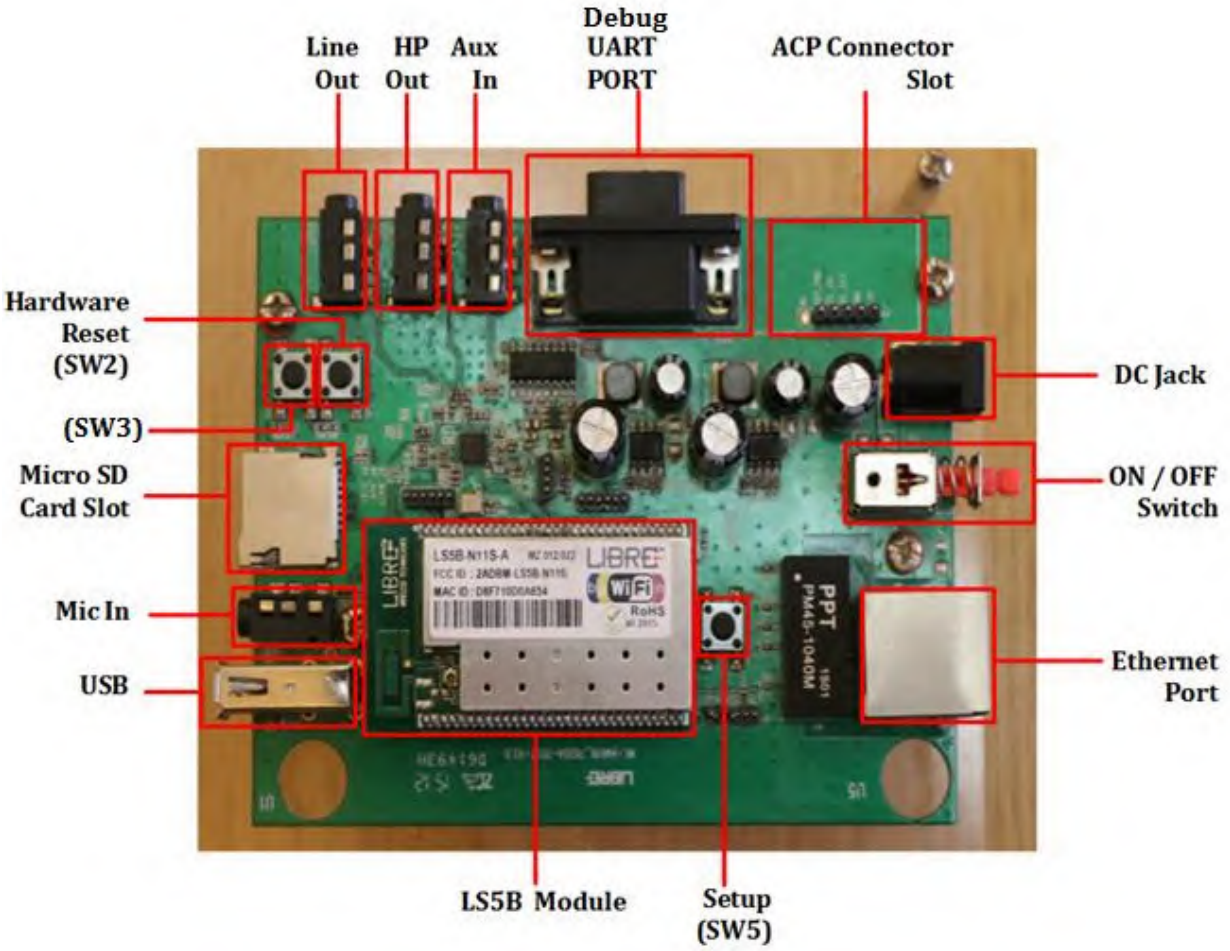


Figure 2-1: LS5B EVK (2.0) Peripherals

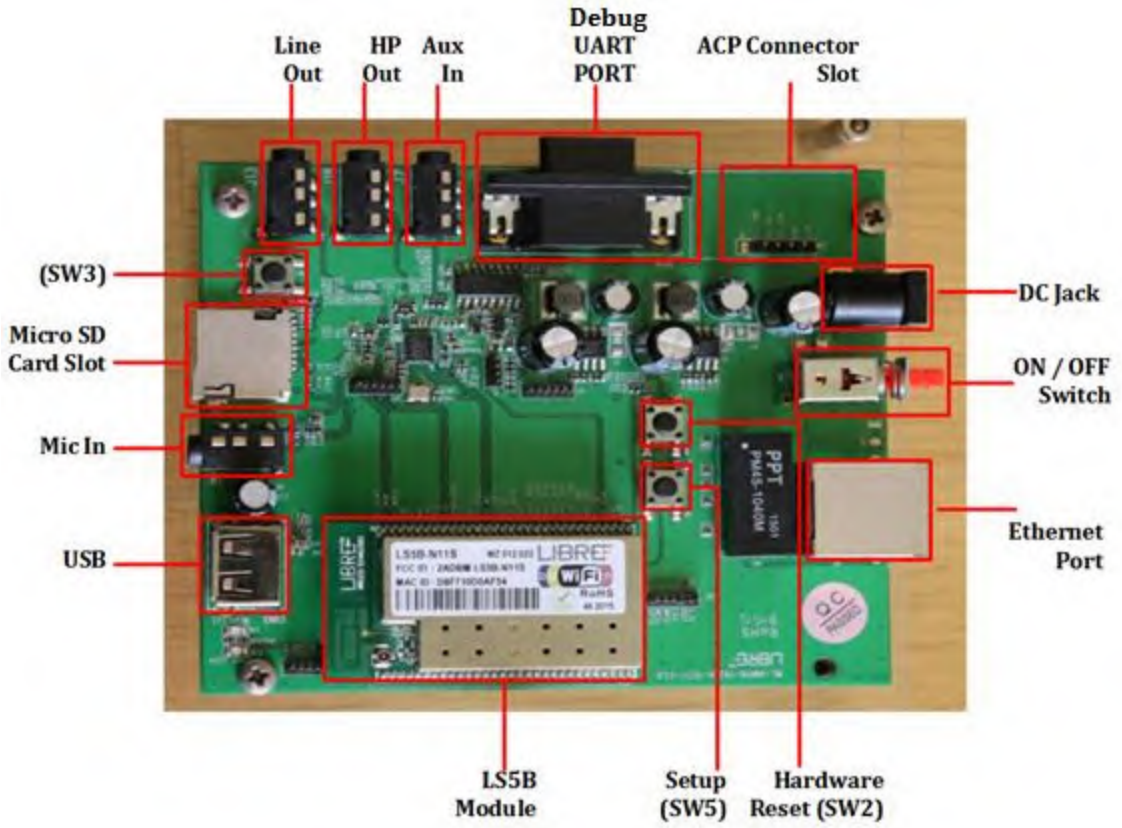


Figure 2-2: LS5B EVK (3.0) Peripherals

2.1. LS5B EVK Setup

To setup the LS5B EVK and get started proceed as below

Step 1. Ensure the LS5B module is inserted in the EVK

Step 2. Connect the USB-to-Serial Cable from Serial port of EVK to USB port of Laptop

Step 3. Connect the Power adaptor to DC Jack on EVK

Step 4. Power On the EVK, using ON/ OFF Switch

Step 5. Open the terminal tool (Hyper Terminal / Teraterm) on your laptop

Step 6. Configure the Serial settings, as below

- Baud Rate at 57600
- Data Bits at 8
- Parity at None
- Stop Bits at 1

3. Firmware Update

The Firmware Update process, facilitates update of U-Boot, BSL, and Application images individually, or all of them together (Single-Image) to the LS-Module.

LSx Platform supports following Sources of Firmware-Image and Interfaces to trigger the upgrade activity:

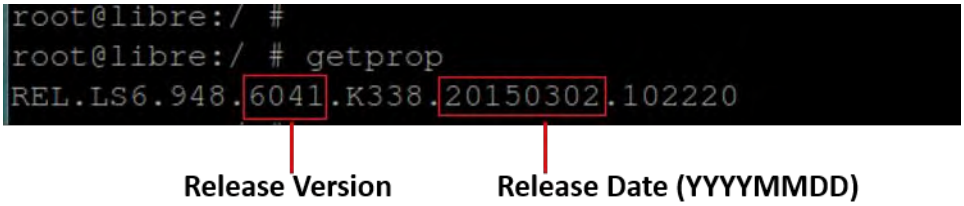
- **Image Source**: USB, SD-Card, Network or Internet
- **Trigger Interfaces**: Shell-Command/Host MCU (via LUCI), Libre App, or Webpage

> Note: For more details on How to trigger Firmware Upgrade via LUCI, refer to "***Light Weight Universal Control Interface Technical Note"***

The support for Shell-Command interface to initiate Firmware Upgrade is supported only from LS5B version vB5004 and onwards.

> Note:
> - For Customers using firmware version **vB5004 or before**, it is mandatory to **do factory reset** by issuing command ***#SetFacDefault*** in the terminal, after upgrading the firmware **vB5008 and later.**
> - Make sure devices with firmware version **vB5004** and before is not present in the same network as that of devices with Firmware version **vB5013** and later.
> - While using the latest Libre APP (Android v1p25, iOS v1p3 or later), released along with firmware version **vB5013**, Do not use Libre APP that supports firmware version **vB5004** or before.

To know the firmware version and Release date, execute the following command "#getprop" in the shell:



3.1. Single-Image Update and Application Update

Single-Image binary file named, **"lsimage"** is released to customers on Libre Portal. The "**lsimage"** contains U-Boot, Factory-ENV, BSL, and Application.

> Note: For detail on using the Single-Image tool refer to *LibreWireless-TechNote_Software_Customization_Kit* available on Libre Portal.

Application Update

The Application-Image used to update the firmware is a binary file.

Customers can update the Single-Image or Application Image via USB/SD-Card/Network/Internet method. USB Method of update is the fastest method and is recommended.

3.1.1. Network Method

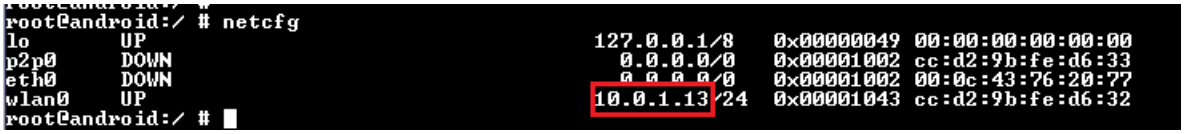
To update the binary file (Application-Image or Single-Image) on the LS5B module over network proceed as below

> Note: Make sure the LS5B EVK and your laptop / PC is connected to the same network.

Steps

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***

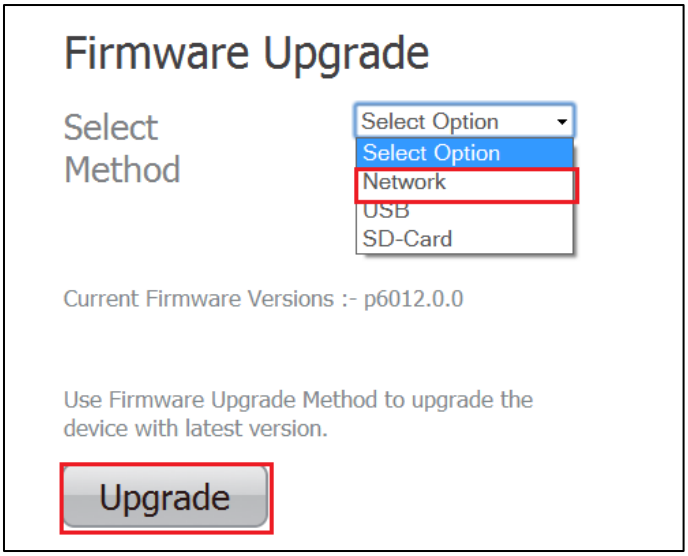


Figure 3.2.1-1: Firmware Upgrade Method Selection

Step 4. Click ***Choose File*** to select the **binary file** for upgradation and Click ***Update*** to upgrade the firmware.

- To refresh the binary file selected, Click ***Re-Select***

Figure 3.2.1-2: Firmware Update Webpage

Step 5. LS5B Shows below shown confirmation page. User has to click on **OK** button on the page.

Figure 3.2.1-3: Firmware Update Confirmation webpage

Step 6. LS5B-Module reboots to BSL, Firmware Update progress page is displayed.

Figure 3.2.1-4: Firmware Update Progress Page

On successful upload, web page displays the status of the update process

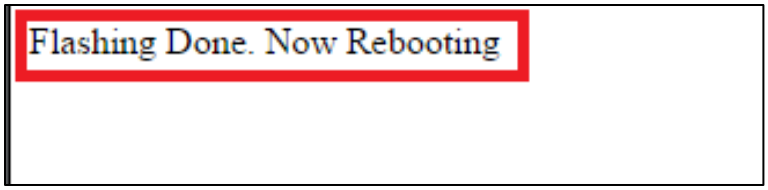


Figure 3.2.1-5: Firmware Update Status

End--

3.1.2. SD-Card / USB Method

To update the binary file (Application-Image or Single-Image) on the LS5B module from SD-Card / USB using the web server proceed as below

Steps

Step 1. Ensure the binary filename as "**lsimage"** and place the firmware image in root directory of SD-Card / USB.

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

Step 2. Insert the SD-Card / USB in the LS5B EVK

Step 3. 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 4. Enter the IP in the address bar of your browser

For Example, *10.0.1.13*

Step 5. In the Firmware upgrade section, Select Method as **SD-Card / USB** and Click **Upgrade**

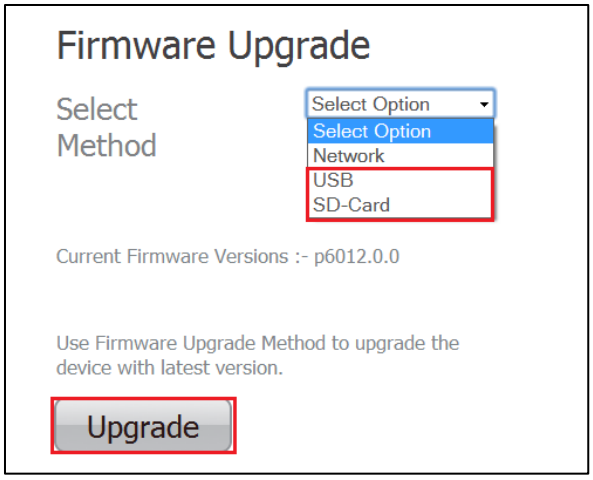


Figure 3.2.2-1: Firmware Upgrade Method Selection

Step 6. LS5B-Module reboots to BSL, and Firmware Upgrade from SD-Card / USB starts automatically.

On successful upgrade, LS5B-Module reboots, with the updated application.

End - -

3.1.3. Internet Method

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

Note:

- Make sure the LS5B module is in Home-Network mode, and is connected to the Home-AP with internet access.
- Also make sure your laptop / PC is connected to the same Home-AP.
- Each customer has to maintain their own server; in which they will place their own customized image. URL for the server location is customizable using the NV-Item **fwdownload_xml**.

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 http://10.0.1.14/share/firmware/LS5B/firmware_download.xml

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 'pB' followed by the actual version number.

For example, pB1000

- **mcu_version**: mcu_version tag is used to set the HOST-MCU version.
- **firmware**: firmware tag is used to give the URL of the firmware image, for upgrade.

```
<content>
<fw_version>pB5026</fw_version>
<mcu_version>000</mcu_version>
<firmware>http://10.0.1.14/share/firmware/ls5B/lsimage</firmware>
</content>
```

Figure 4.29-1: Sample XML Format

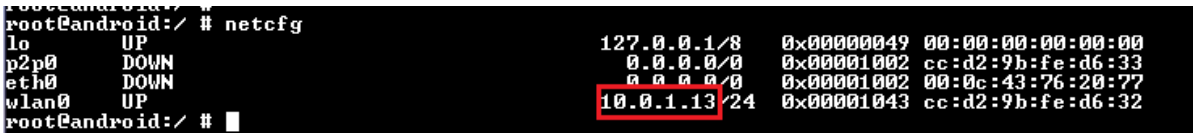
Application will parse the XML and verify the Firmware version of LS5B and host MCU version. If the given versions in the XML are greater than existing version in DUT, firmware upload process continues. Otherwise it aborts the upload mechanism. The URL from the ***<firmware>*** tag will be updated on ENV: ***fwupdate_link.***

Steps

Step 1. Place the Firmware (Combined image with LS-Image, and HOST-MCU Image) in the URL provided.

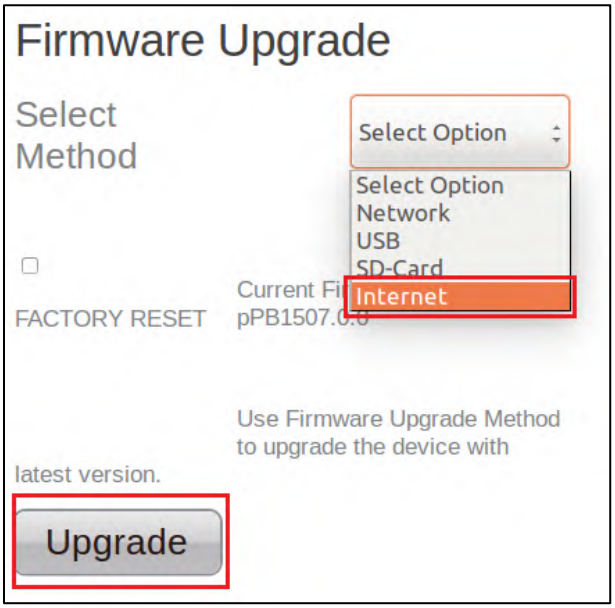
Step 2. Update the NV-Item ***fwdownload_xml*** with the URL of the XML file.

Step 3. Execute command **#netcfg** in the device terminal to know the device IP



Step 4. Enter the IP in the address bar of your browser

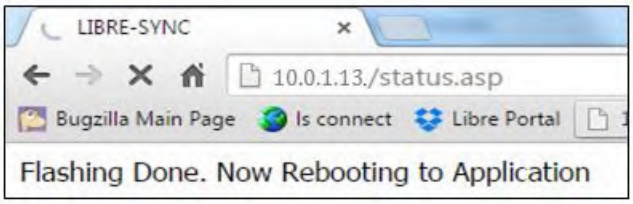
Step 5. In the Firmware upgrade section, Select Method as **Internet** and Click **Upgrade**



Step 6. LS5B-Module reboots to BSL. Once the DUT begins to download the Application-Image from URL provided in the **fwdownload_xml** NV-Item. Firmware Download progress is displayed.

Step 7. On Successful download, Firmware Upgrade starts and the progress status is displayed.

Step 8. Module reboots on successful completion of upgrade process.



3.2. BSL Update

The BSL is a one type of boot loader that facilitates upgrade of Application Image on to the LSx module. Below section describes procedure to program the BSL on to LSx Module.

3.2.1. TFTP Method

To update the BSL for LS5B module using TFTP proceed as below

Step 1. Install TFTP server in Win 7 laptop / PC

You can download the TFTP server from web

Step 2. **Store Image.bin file, in the same folder as TFTP is placed**

Disable the firewall in windows laptop / PC. Firewall will block the file from being loaded.

Step 3. Connect the PC and module with Ethernet cable

Step 4. Set Static IP 10.10.10.3 for the Laptop/PC

go to ***Control Panel > Network Configuration > Local Area Connection > Properties > TCP/IPv4 > Properties***

Step 5. Power on the board and connect serial cable from Serial port of EVK to the USB port of PC

Step 6. Open serial port terminal (57600-8-N-1) to access system Shell

Step 7. Start TFTP server in laptop / PC

Step 8. Restart the module by issuing the command **#reboot** in terminal

or

Restart the module using the **Reset** button in EVK

Step 9. In the U-Boot options, select ***Option a*** in the terminal within 1 second

Step 10. Answer 'Y' or 'N' for the warning message prompted to proceed with the update

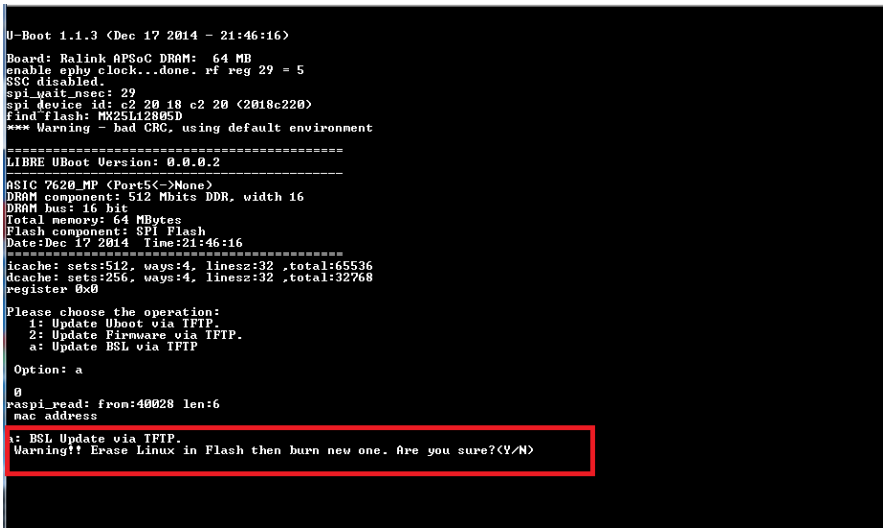


Figure 3.3.1-1: BSL Update Terminal Warning Message Prompt

Step 11. To set default Server and Device IP address, Press Enter key on Keyboard

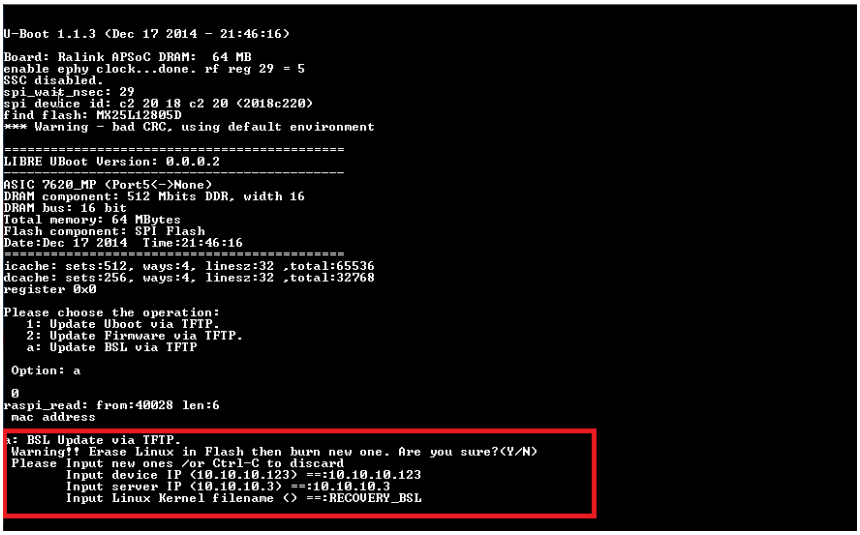


Figure 3.3.1-2: BSL Default IP Address

Step 12. Provide the name of the binary for BSL, to be flashed on the U-Boot prompt.

For Example, Image.bin

Make Sure the Binary name provided, is as in the repository. Wrong binary name might make the module unusable.

End--

3.3. U-Boot Update

3.3.1. TFTP Method

To update the U-Boot for LS5B module using TFTP proceed as below

Step 1. Install TFTP server in Win 7 laptop / PC

You can download the TFTP server from web

Step 2. Store **Image.bin** file, in the same folder as TFTP is placed

> Note: Disable the firewall in windows laptop / PC. Firewall will block the file from being loaded.

Step 3. Connect the PC and module with Ethernet cable

Step 4. Set Static IP 10.10.10.3 for the Laptop/PC

go to ***Control Panel > Network Configuration > Local Area Connection > Properties > TCP/IPv4 > Properties***

Step 5. Power on the board and connect the EVK to the USB port of PC

Step 6. Open serial port terminal (57600-8-N-1) to access system Shell

Step 7. Start TFTP server in laptop / PC

Step 8. Restart the module by issuing the command **#reboot** in terminal

or

Restart the module using the **Reset** button in EVK

Step 9. In the U-Boot options, select ***option 1*** in the terminal within 1 second

Step 10. Answer 'Y' or 'N' for the warning message prompted to proceed with the update

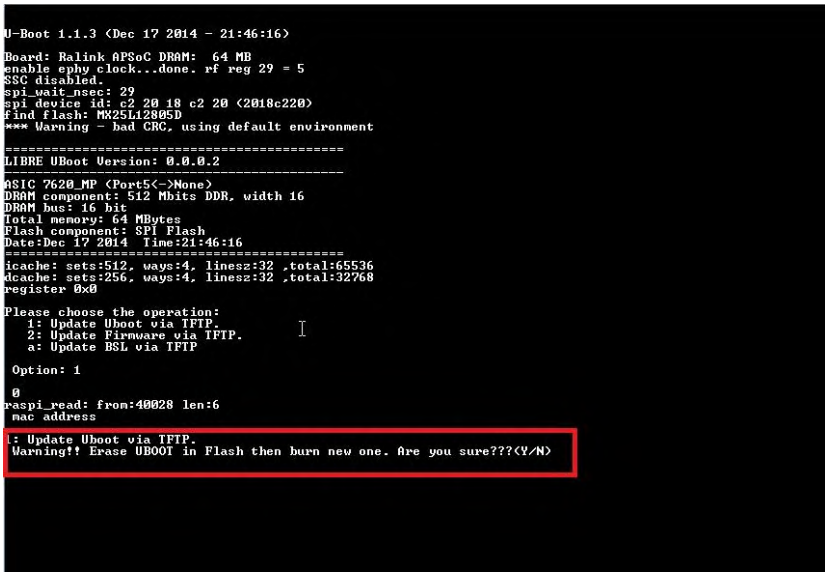


Figure 3.4.1-1: U-Boot Update Terminal Warning Message Prompt

Step 11. To set default Server and Device IP addres, Press Enter Key on Keyboard

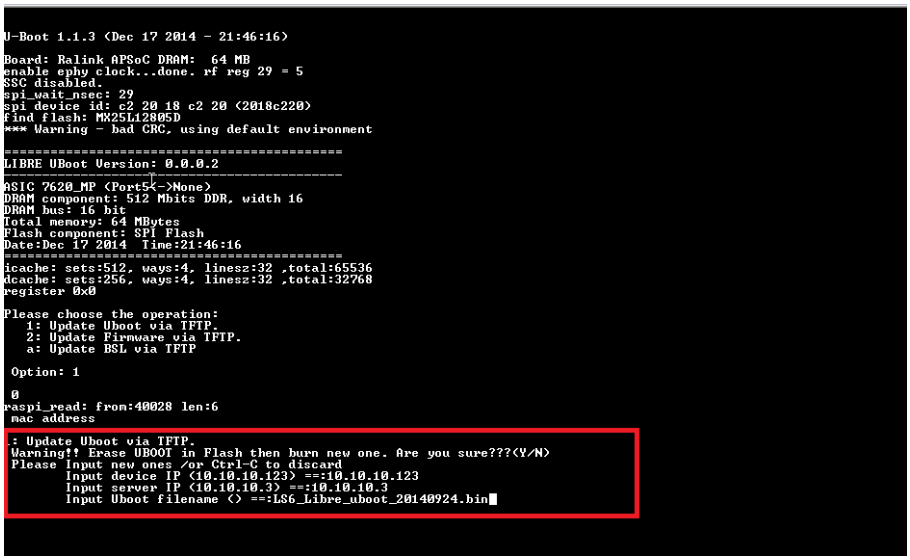


Figure 3.4.1-2: U-Boot Default IP address

Step 12. Provide the name of the binary for U-Boot, to be flashed on the U-boot prompt

For Example, Image.bin

Make Sure the Binary name provided, is as in the repository. Wrong binary name might make the module unusable.

End--

4. Configuring Non-Volatile-Item

- The latest LS-Images (vB5004 and onwards) supports NV-Item from application only and is accessible from **Application Shell prompt**. NV-item in U-Boot is not supported anymore.
- To configure all the NV-Item values at one shot as per customer choice, customers can use the **envitem.xml** file. This xml file is used to generate a final Golden-Image for production.

Non-Volatile (NV) item in LibreSync is 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.

5. Key Button Functionality

5.1. Setup Button (WAC / SAC / DDMS)

The Setup (SW5) button in LS-EVK is configured to trigger WAC / SAC after the LS module boots up as below.

- **Press and Hold** the setup button on the LS EVK **for 3 seconds**, to come out of the DDMS mode.
    - LS EVK connects to the AP or the SSID configured earlier.
    - To connect the LS EVK to different AP or SSID, **Press and Hold** the setup button on the LS EVK **for 3 seconds** again, to trigger SAC / WAC.
    - If the LS EVK was not configured to any AP, Press and Hold of setup button triggers SAC / WAC.
    - This state is stored in non-volatile memory and even after boot-up, the state is retained.

For more information on DDMS Stand-Alone mode and Home-Network mode refer to **DDMS Usability guide** (Android / iOS) available in LibreSync Document Portal.

5.2. LED Status

LED D18, in the LS5B EVK is used to identify the DDMS Connection Status.

- **Blinking LED** indicates LS5B EVK is in transition to DDMS and connection is not set.
- **Solid LED** indicates LS5B EVK is in DDMS mode and is configured as one of the DDMS-Node (Speaker-Master or Speaker-Station).

6. Network Configuration

The network configuration method supported in LS-Module is

- Wireless Network Setup Using WAC Method
- Wireless Network Setup Using SAC Method
- Wireless Network Setup Using Webserver Method
- Wireless Network Setup Using WPS Push Button Method

6.1. Wireless Network Setup Using WAC and SAC

6.1.1. Wireless Network Setup Using WAC

To setup a wireless network using Wireless Area Controller (WAC) proceed as below

Step 1. Press and hold the **Setup** button for 3 seconds on the EVK

Step 2. On an iOS device running iOS7, go to ***Settings > Wi-Fi > SET UP NEW DEVICE***

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

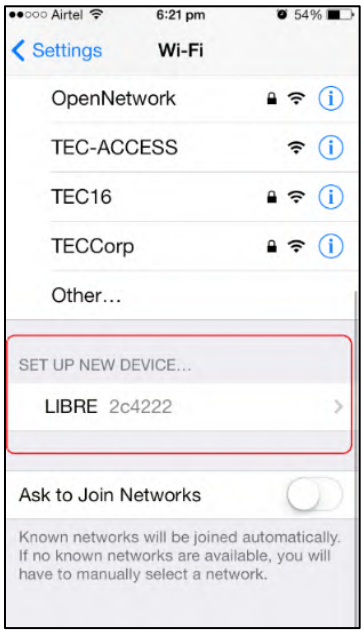


Figure 6.1.1-1: WAC Speaker Listed

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--

6.1.2. Wireless Network Setup Using SAC (Speaker Android Configuration) Method

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

Step 1. Power on the Speaker (DUT) and press and hold the **Setup button** on LS5B EVK for 3 seconds.

Speaker enters SAC mode

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

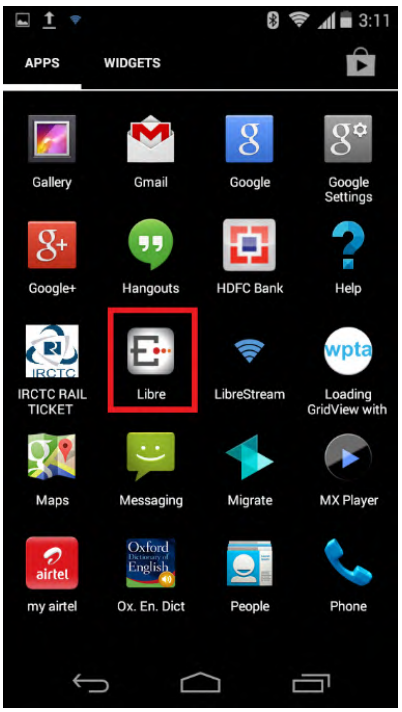
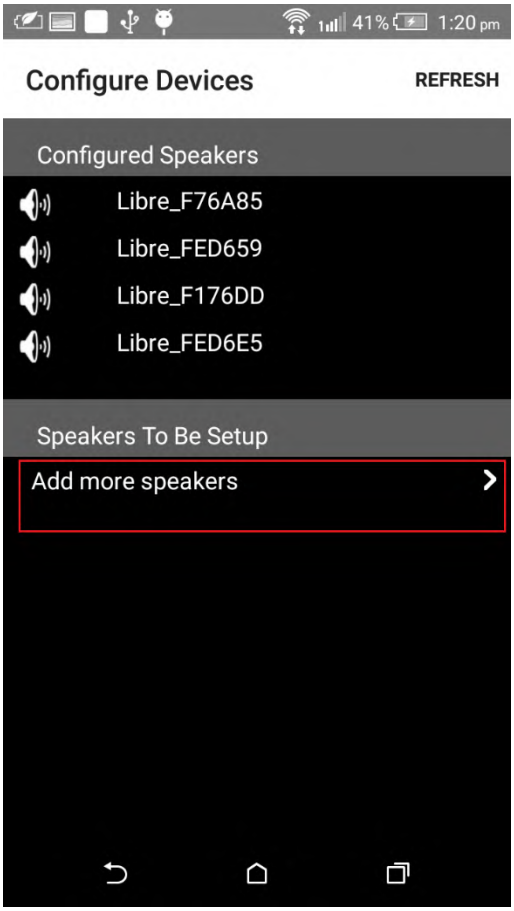


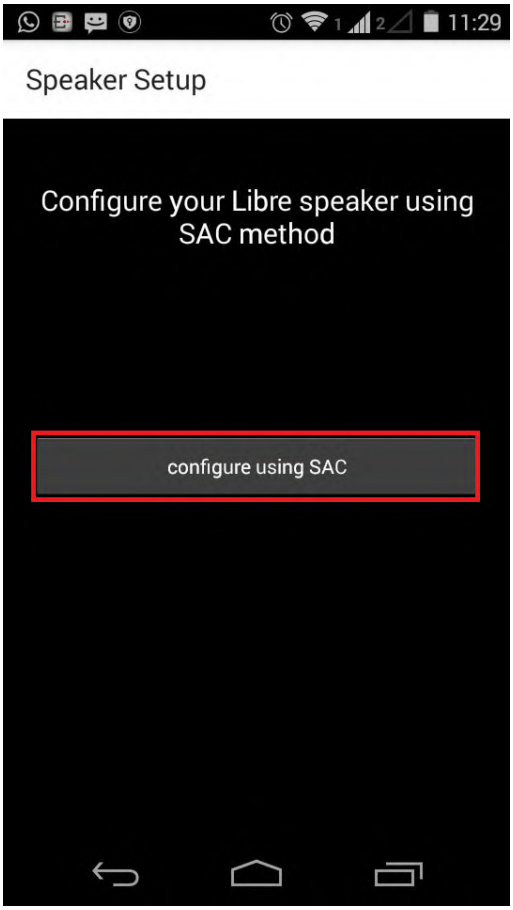
Figure 6.1.2-1: Libre App

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

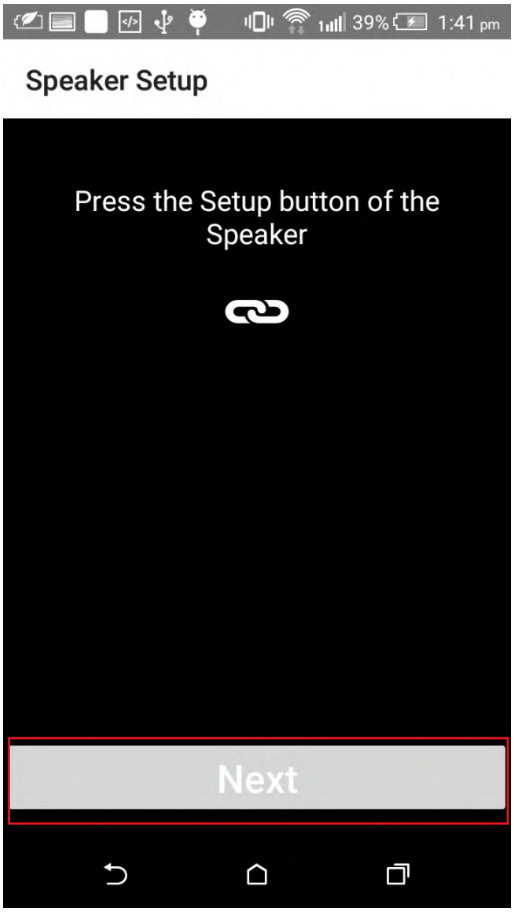
Step 4. In Speakers To be Setup section Tap Add more Speaker.



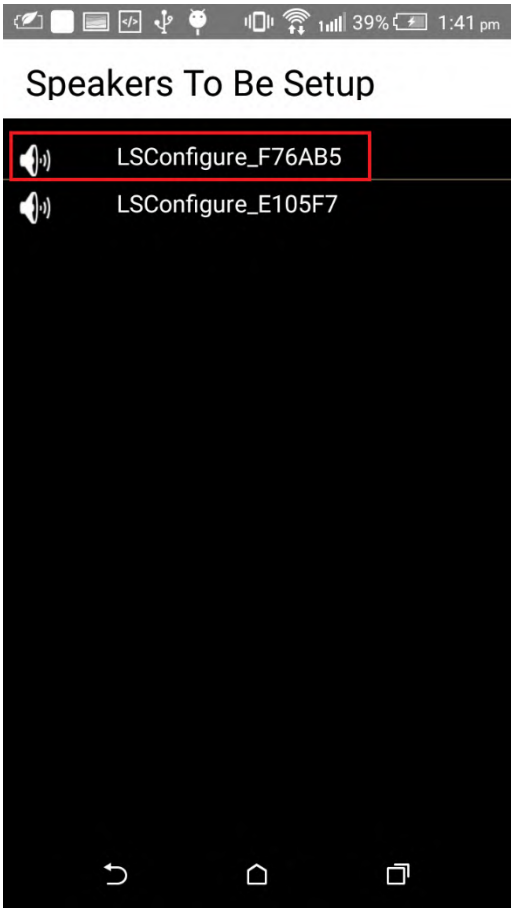
Step 5. In Speaker Setup page, Tap configure using SAC.



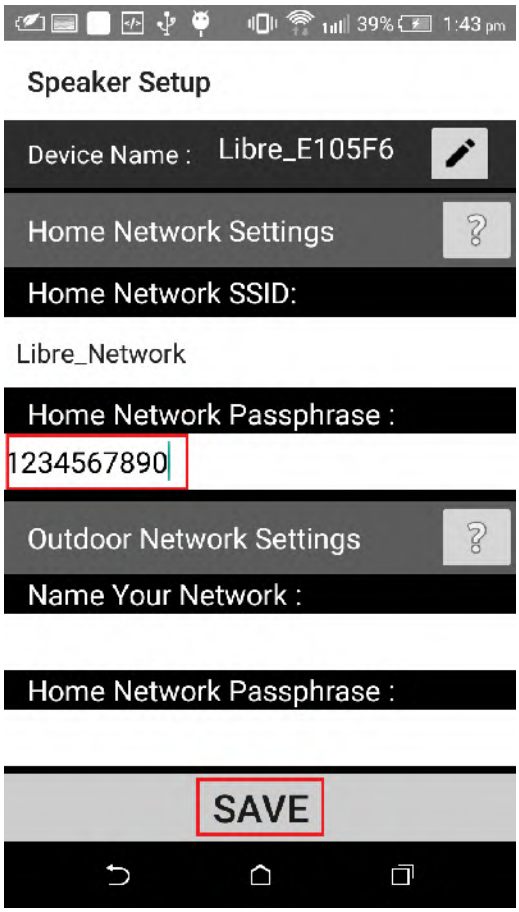
Step 6. On Speaker Setup page, Tap Next



Step 7. On **Speaker To Be Setup** page select the speaker to be configured.



Step 8. On **Speaker Setup page**, select the **Home-Network** and enter the password.



Step 9. Tap **SAVE**.

Step 10. Continue the configuration steps for all the speakers.

End--

6.1.3. WAC / SAC Trigger Behaviour in DDMS Mode and Non-DDMS Mode

This sections explains different behaviours of the speaker for network configuration when WAC / SAC is triggered.

For details on the network configuration using WAC / SAC refer Section 6.1 and Section 6.2.

Scenario 1

Precondition	LS-Enabled speaker is **not connected to AP**.
Action	WAC / SAC is triggered using the Setup Button (Press and Hold for three seconds) in LS EVK or through Message-Box 142.
Result	LS-Enabled Speaker enters WAC / SAC mode for Network Configuration.

Scenario 2

Precondition	LS-Enabled speaker is **connected to AP**.
Action	WAC / SAC is triggered using the Setup Button (Press and Hold for three seconds) in LS EVK or through Message-Box 142.
Result	LS-Enabled Speaker enters WAC / SAC mode for Network Configuration.

Scenario 3

Precondition	LS-Enabled speaker is **not connected to AP**.
Action	1. Reboot the Speaker. 2. Configure the speakers to **DDMS SA-Mode** (refer to DDMS usability guide). 3. Trigger WAC / SAC using the Setup Button (Press and Hold for three seconds) in LS EVK or through Message-Box 142.
Result	LS-Enabled Speaker switches from DDMS Mode to WAC / SAC mode for Network Configuration.

Scenario 4

Precondition	LS-Enabled speaker is **connected to AP**.
Action	1. Reboot the Speaker. 2. Configure the speakers to **DDMS SA-Mode** (refer to DDMS usability guide). 3. Trigger WAC / SAC using the Setup Button (Press and Hold for three seconds) in LS EVK or through Message-Box 142.
Result	LS-Enabled Speaker switches from DDMS Mode and connects to the AP configured earlier.

Scenario 5

Precondition	LS-Enabled speaker is in **DDMS SA-Mode** and was **not connected to AP** earlier.
Action	1. Reboot the Speaker and 2. Trigger WAC / SAC using the Setup Button (Press and Hold for three seconds) in LS EVK or through Message-Box 142.
Result	LS-Enabled Speaker switches from DDMS Mode and enters WAC / SAC mode for Network Configuration.

Scenario 6

Precondition	LS-Enabled speaker is in **DDMS SA- Mode** and was **connected to AP** earlier.
Action	1. Reboot the Speaker and 2. Trigger WAC / SAC using the Setup Button (Press and Hold for three seconds) in LS EVK or through Message-Box 142.
Result	LS-Enabled Speaker switches from DDMS Mode and connects to the AP configured earlier.

Scenario 7

Precondition	LS-Enabled speaker is in **DDMS HN-Mode** and was **connected to AP** earlier.
Action	1. Reboot the Speaker and 2. Trigger WAC / SAC using the Setup Button (Press and Hold for three seconds) in LS EVK or through Message-Box 142.
Result	LS-Enabled Speaker switches from DDMS HN-Mode and enters WAC / SAC mode for Network Configuration.

6.2. Wireless Network Setup Using Webserver

6.2.1. 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

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*.

The webpage shows the Network status of the currently connected Access Point.

Figure 6.2.1-1: Network Status

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***

Device reboots and connects to the new network and acquires new IP

Figure 6.2.1-2: Network Configuration

End --

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

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, and enter the passphrase (if any).

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**

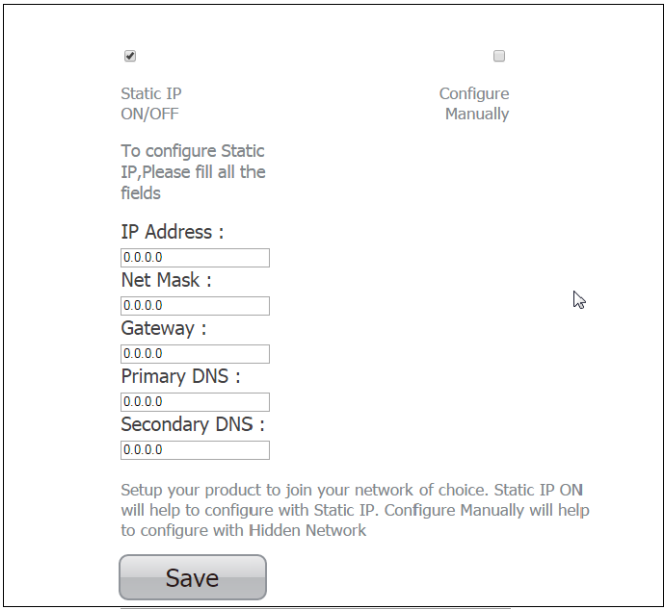


Figure 6.2.1-3: Network Configuration using Static IP

> **Note:** 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--

6.2.2. LS-Configure Method

To setup wireless network using LS-Connect proceed as below

Step 1. Press and hold the **Setup** button for 3 seconds on the EVK to trigger LS-Configure.

Device enters "AP" mode and is available in the Wi-Fi network list as **LS-Configure_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* webpage shows Network status as shown in Figure 6-4.

Figure 6.2.2-1: Network Status in Webpage

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--

6.2.3. Manual Configuration Method

To connect the device to the network manually proceed as below.

Optional: Device can be connected to the network using the hidden SSID.

Step 1. In Select Your Network section, enable Configure Manually

Step 2. Enter the Access Point ***SSID*** and Click ***Save***.

Device reboots and connects to the network.

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

Figure 6.2.3-1: Configure Network Manually

End--

6.3. Wireless Network Setup Using WPS Push-Button Method

6.3.1. 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--

6.3.2. 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.

6.3.3. WPS Trigger from Key Button

(TBG)

6.4. I-Device Wi-Fi Settings Sharing

Host-MCU requests the LS enabled device to share the Wi-Fi settings over Message-Box # 126. On request from HOST-MCU, iOS device shows a pop-up message to the user to "Ignore" or "Allow" the settings sharing.

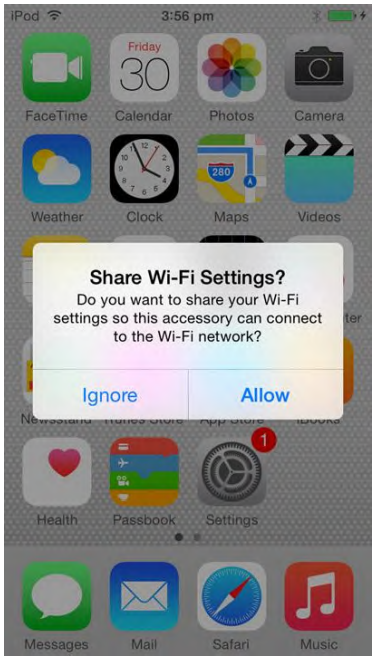


Figure 6.4.1-1: Wi-Fi settings sharing

- To share Wi-Fi setting tap ***Allow***
- To cancel sharing Wi-Fi settings tap ***Ignore***

6.5. Know the IP of LS-Modules

You can know the IP address of the LS-Modules in one of the two ways.

- Executing command ***#netcfg*** in the device terminal.

Or

- Check the IP address from the webpage of the Home-AP

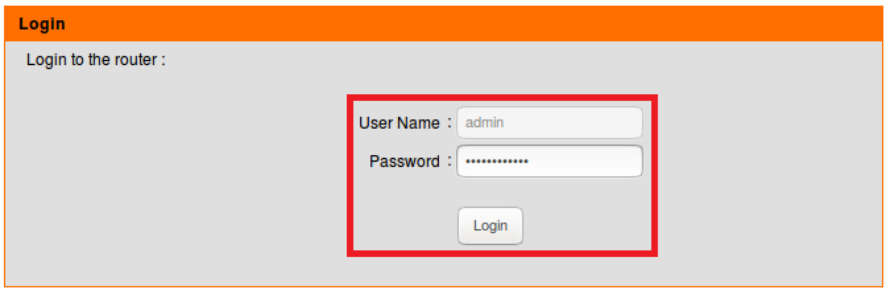
IP address from the Webpage of Home-AP

To know the IP address of the LS-Module from Home-AP webpage do as below.

Step 1. Enter the default IP address of your Home-AP in the address bar of your browser.

For example, if you use D-link router then the Default IP is ***192.168.0.1***

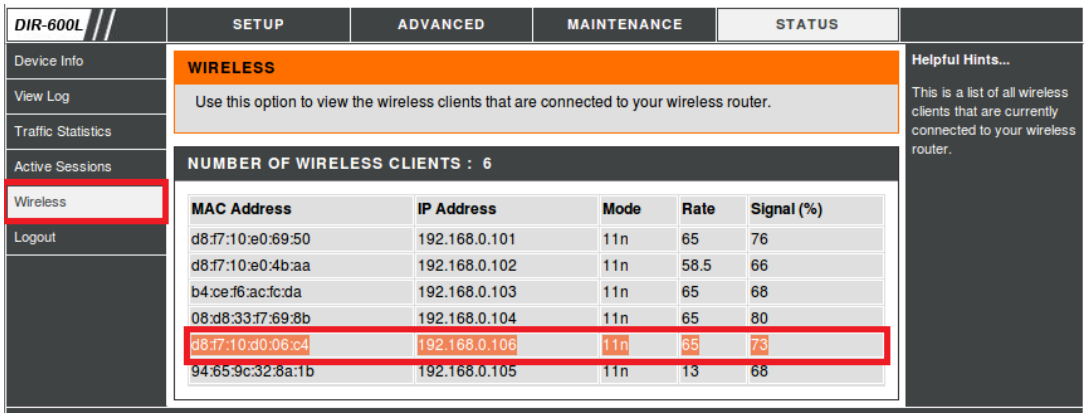
Step 2. Enter the Login Credentials and login to the webpage of Home-AP



Step 3. Go to Advanced Options and go to Wireless section

Step 4. In the connected device list select the MAC ID of the LS-Module.

Step 5. IP address of the module is known in the corresponding column.



End --

7. Features

7.1. Libre APP for Android

LUCI enables user to remotely, control the LibreSync LS5B enabled product using the Libre Application for android. The application can be used to browse DLNA-DMS in the network, SD Card connected to device and other online radio stations such as vTuner and TuneIn , and stream music using the DMP feature supported by LS5B.

For more information on using Libre APP refer

LibreWireless-Usability_Guide_Dynamic_Direct_Multi-Node_Streaming

7.2. 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.

DDMS Group is created in two mode

- Home-Network Mode – A state in which DDMS-Nodes creates a Sound-Scene, by connecting to the Access-Point (AP) in the Home-Network.
  The Audio Source (smartphone) streaming the audio should be connected to the same AP.
- Stand-Alone Mode - A state in which DDMS-Nodes creates a Sound-Scene, by connecting to the Master using the SSID of Sound-Scene in SA-Mode. In this state there is no Access-Point (AP) or home infrastructure present.
  The Audio Source (smartphone) streaming the audio should be connected to the same SSID of the Sound-Scene in SA-Mode.

Note: Ls-Enabled device reboots, every time when it is switched from HN-Mode to SA-Mode and vice-versa

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.

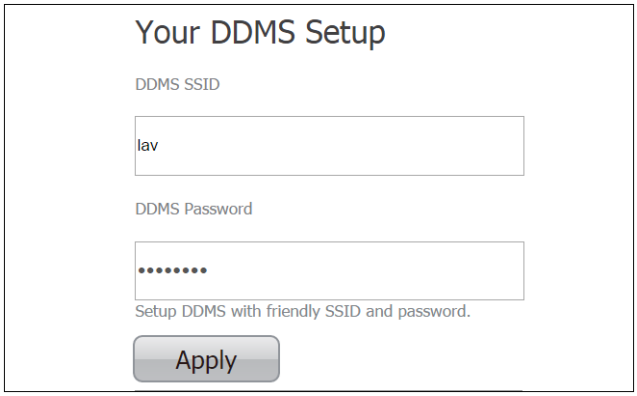


Figure 7.2-1: DDMS Setup in webpage

7.3. Software Security

LibreSync software is secured using Crypto IC. Crypto IC is embedded either in the LS5B module or the ACP. Crypto IC authenticates and allows only the valid LS5B software to boot on the LS5B modules.

7.4. Source Switching

LibreSync enables user to switch the playback sources without any hitches. User can choose to stream music either from AirPlay or UPnP server and the music streams on the selected device from the source.

For example, A LS Device streaming AirPlay, starts streaming music from DLNA / DMR when, the user selects music from Win 7 -Media Player to be played on the device.

7.5. Failsafe Mechanism

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

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

7.6. Autosense of Audio CODEC

The new LS Firmware will automatically detect the presence of Audio CODEC in the firmware.

If LS-SoC detects Wolfson CODEC (WN8904) on LS-I2C bus, then LS-Module takes care of controlling the Audio CODEC and is applicable to LS5B EVK.

If Wolfson CODEC is not detected, LS-SoC does not control the Audio CODEC. Host MCU must take care of handling AUDIO DAC / CODEC.

7.7. AUX-In Support

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

7.8. 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

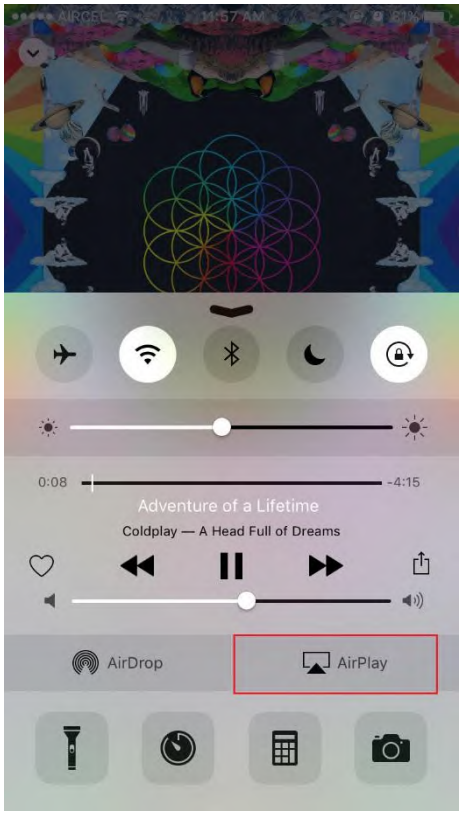
Open iTunes installed on any machine

Step 2. Tap the AirPlay icon

AirPlay enabled LibreSync device is listed

Step 3. Select the device and select Play

AirPlay starts streaming



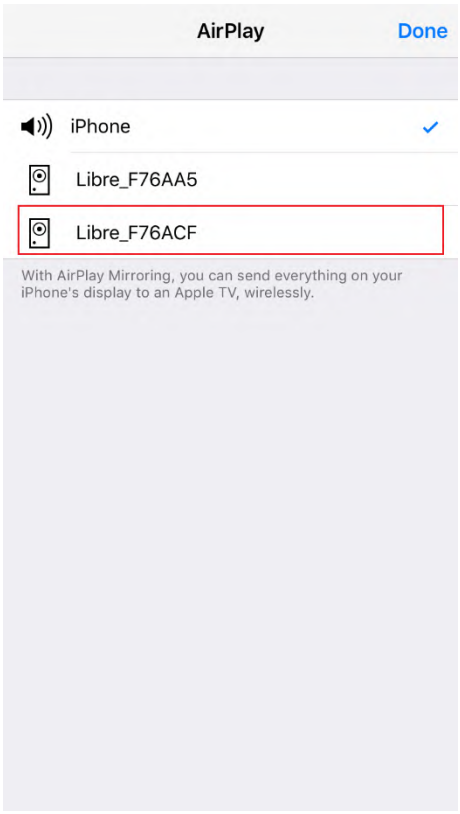


Figure 7.7-1: AirPlay Stream

End--

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

Device reboots automatically.

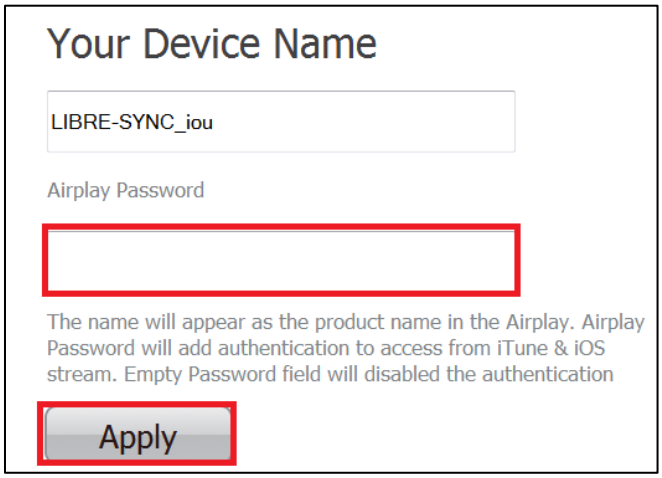


Figure 7.7.1-1: Password for Airplay

Step 2. Open the Control Centre or Music App on iOS device

Or

Use iTunes installed on any machine

Step 3. Tap the AirPlay icon

AirPlay enabled LibreSync device is listed

Step 4. Select the device and Select Play

Step 5. In the pop screen enter the password entered in the webpage

AirPlay starts streaming.

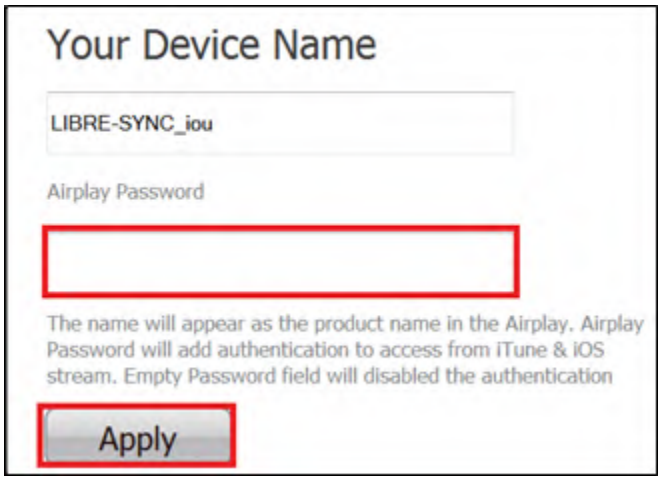


Figure 7.7.1-2: Enter Password for Streaming

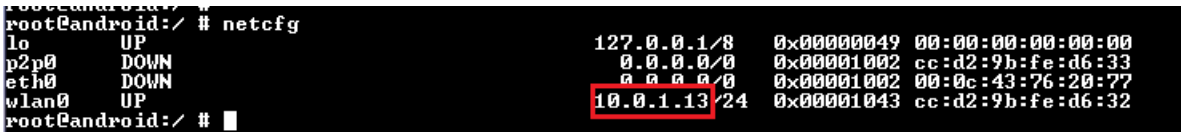
End--

Disable

To disable a password for Airplay Playback proceed as below.

Step 6. Execute command **#netcfg** in the device terminal to know the device IP

For Example, *10.0.1.13*



Step 7. Enter the IP in the address bar of your browser with port number

For Example, *10.0.1.13*

Step 8. In ***Your Device Name*** section, Clear the previous Password and leave the white space blank and Click ***Apply***

Step 9. A pop-up message appears Click ***OK*** Click ***Apply***

Figure 7.7.1-3: Disable Airplay Password

Device reboots automatically.

End --

7.9. 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.

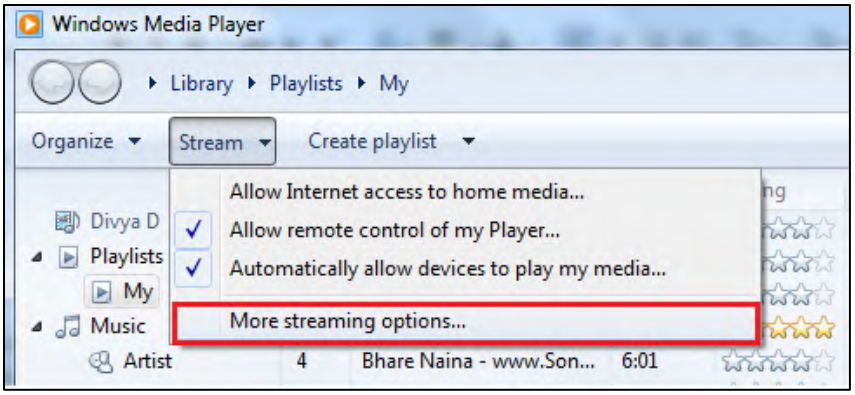


Figure 7.8-1: Media Player Stream Menu

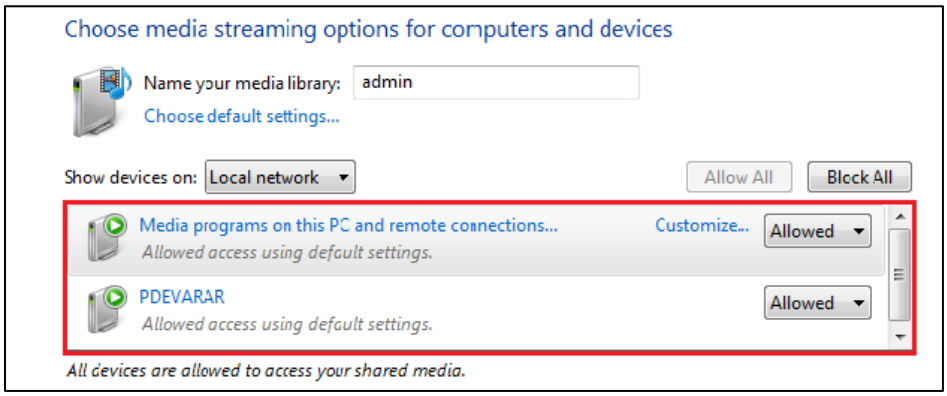


Figure 7.8-2: Media Streaming Options

Note: 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--

7.10. Miracast

Miracast also known as Wi-Fi display, is the feature used to mirror the mobile (video and audio) to the Miracast sink device. It uses wifi-P2P technology for communication.

Miracast on Libre platform doesn't support Video, but Miracast devices (source) by design streams both Video and audio to the Libre speaker.

To start Miracast on an android phone, that supports Miracast proceed as below.

Step 1. Send the type 2 Command in Message-Box 113 over LUCI

For more information see Message 113 in file ***LibreWirelessTechNote - LS_Light_Weight_Universal_Control_Interface***

Step 2. Start the local audio playback on an Miracast enabled Android Phone

For Example, Nexus 5

Step 3. Go to the Miracast screen, on the Android Phone

For Example, In Nexus 5 phone go to ***Settings > Display > Cast screen***

Miracast enabled speaker is listed. For example, LibreCast

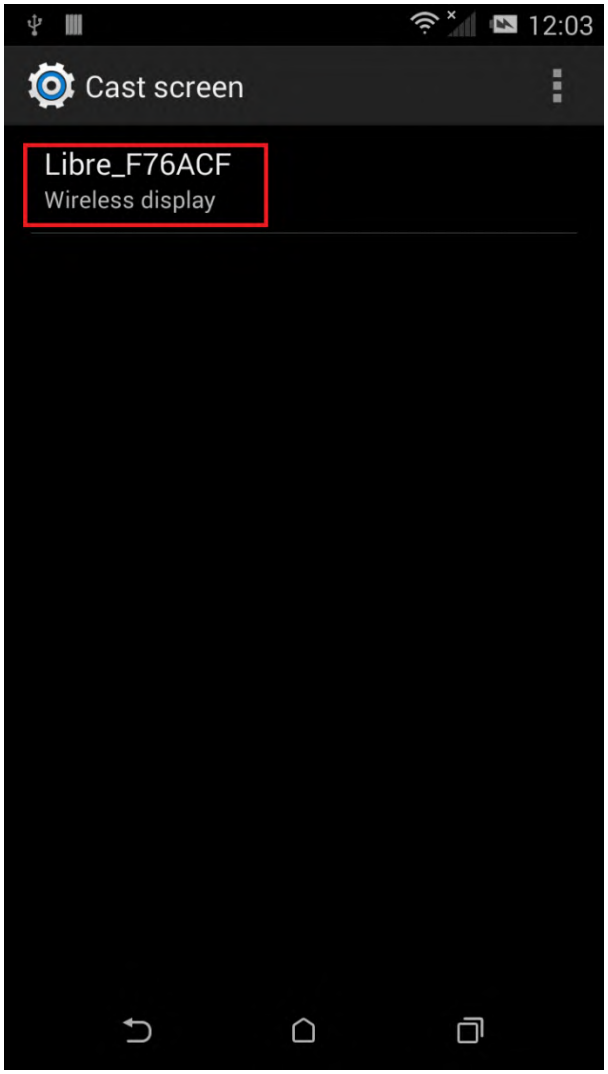


Figure 7.9-1: Miracast Enabled Speaker

Step 4. Tap the Speaker from the list

Speaker connects to the Miracast and streams the music from the current playlist

Step 5. Close the Miracast Screen

End--

For details on scenarios of **Miracast Mode Switching with other Different Modes (WAC/DDMS),** and Miracast Source Switching with other Different Sources, refer to "***LibreWirelessTechNote-Miracast_Mode_and_Source_Conversion***" document available in Libre Portal.

7.11. SD-Card Playback

LS supports Audio Playback from SD-Card. User can select the content source from SD-Card to stream music on a LS-Enabled speaker.

The seek operation support for SD-Card Playback is available from Mid-January, 2015 Release (LS5B-vB5004) and Onwards.

7.12. i-Device playback over USB

LS supports audio playback from i-Devices over USB. User can select the content source from an iOS device to stream music on LS-Enabled speaker.

Apple devices which support iAP2 protocol (Apple devices with lightning connector except iPod nano 7g) can be connected to LS device and playback can be done.

When Host-MCU is Not-Present (in LS-EVK)

If the NV-Item **hostpresent** is set to '0' , connect the apple device and press PLAY icon on the UI of the apple device to start the playback.

To Disable NV-Item hostpresent

#setenv hostpresent 0

When Host-MCU is Present (in Customer Product)

If the NV-Item **hostpresent** is set to '1' ,

To Enable NV-Item hostpresent
#setenv hostpresent 1

To start playback from Apple Device following sequence is to be followed.

Step 1. LS sends the new source to the Host MCU over Message-Box# 10

Step 2. Host MCU may send a command to LS (Command Type: GET) over Message-Box#50 (Current Source – with value 16 that is Apple Device) to get to know the current playback source, if any.

Step 3. Host MCU takes a decision whether it has to allow/disallow the new Audio Source.

Step 4. Send a confirmation on Message-Box#11 with data field set to 1/0 for Allowed/Not-allowed respectively.

Apple Device Connection Status

- When Apple device is connected Message-Box # 38 is updated with the value '2'
- When it is disconnected Message-Box # 39 is updated with the value '2'.

For more information refer to LUCI document

LibreWirelessTechNote - LS_Light_Weight_Universal_Control_Interface

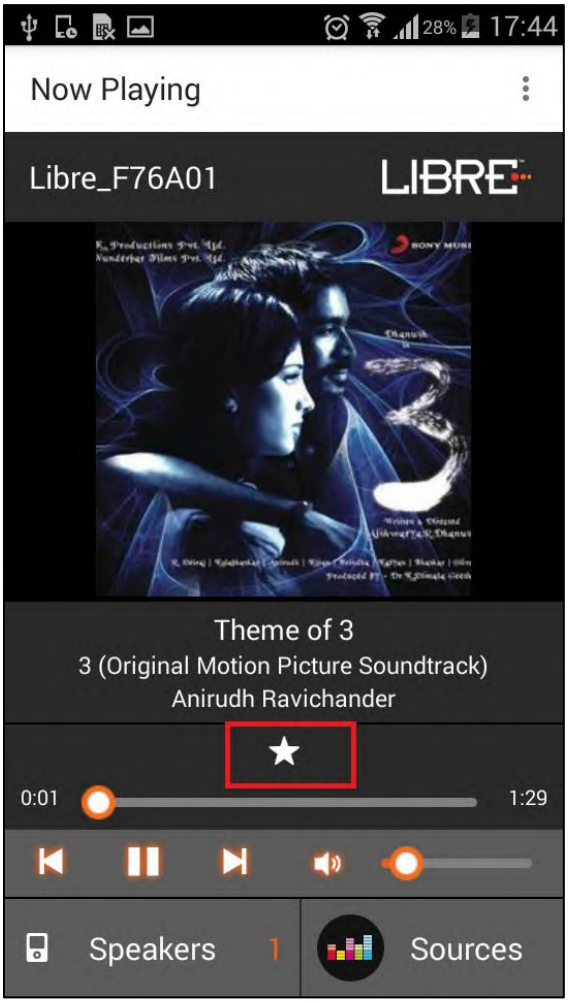
7.13. Favourites

Favourites in LibreSync allows you to save your favourite songs and radio stations in Music-Services (Listed below) for easy access.

You can save up-to 10 songs (URLs) of your choice as favourites in LibreSync platform. When you save the 11th favourite Song (11th URL), the oldest song saved (1st URL) is erased and replaced with the song saved earlier (2nd URL).

You can save and play favourites using the Libre Reference APP (Android / iOS).

- To Save the current song as Favourite, Tap the Star icon in Now Playing Screen.



- To Play the Song from Favourites List,
  - Go to Sources and Select Favourites ★ Favourites
  - Browse the list and play your favourite song.

Toggle Between Favourites

Use the Previous, and Next keys to toggle between favourites. You can also send the Play Control commands Over LUCI via Message-Box 40.

7.14. 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.

7.15. 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

7.16. 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.

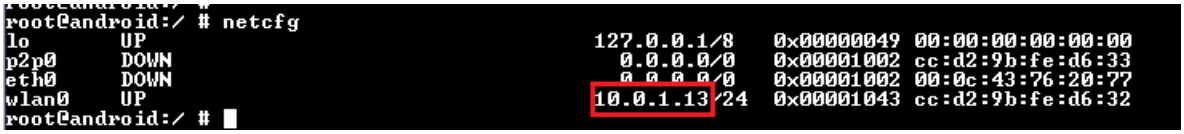
To use the feature, in the address bar of your browser enter the IP address followed by */scanresult.asp.*

7.17. Device Name Configuration

You can define a friendly name to LS-Platform 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***

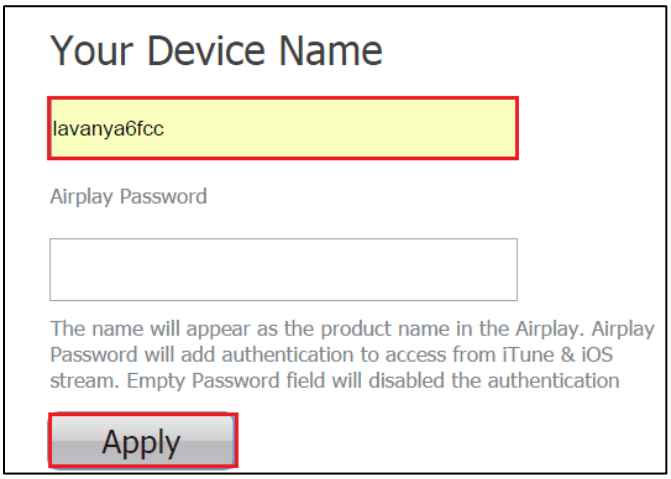


Figure 7.16-1: Device Name Section

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
- Device will not reboot when Device Name is changed.

End--

7.18. Switch between Wired and wireless modes

You can switch between wired and wireless mode using the Webserver

7.18.1. 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 with port number

For Example, *10.0.1.13*

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

Figure 7.17.1-1: Switch to Wired Mode

Step 4. Connect the device with an Ethernet cable

Step 5. Click Save

LS module reboots automatically

End--

7.18.2. Switching to Wireless Mode

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

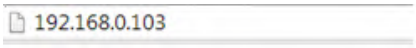
Step 1. Execute command **#netcfg** in the device terminal to know the device IP

For Example, *192.168.0.103*

```
127|root@android:/ #
127|root@android:/ # netcfg
lo       UP                                   127.0.0.1/8       0x00000049 00:00:00:00:00:00
eth0     UP                                   192.168.0.103/24  0x00001043 00:0c:43:76:20:77
wlan0    DOWN                                 0.0.0.0/0         0x00001002 00:00:00:00:00:00
root@android:/ #
```

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***

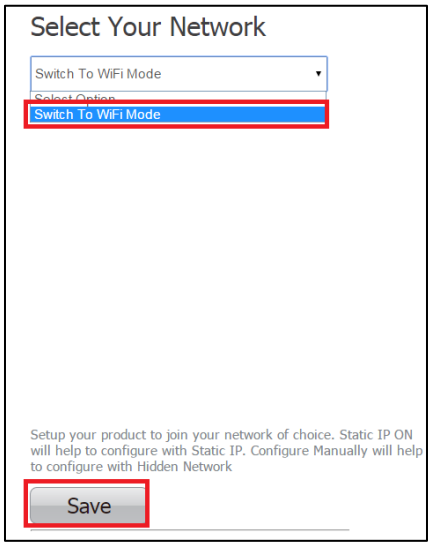


Figure 7.17.2-1: Switch to Wi-Fi Mode

LS module reboots automatically.

End--

7.19. Pair / Share credentials

Pair functionality enables LS-Enabled speaker in SA-Mode to pair (join) with other LS-Enabled speaker.

Share functionality allows the LS-Enabled speaker to share its Wi-Fi credentials with other LS-enabled speakers.

For Example: If there are two LS-Enabled speakers, called LS-Speaker A and LS-Speaker B, then LS-Speaker A with pair enabled, can join LS-Speaker B only when LS-Speaker B is enabled with share.

Pair / Share functionality is possible, only when both the LS-Enabled speakers are in the same DDMS-Mode (Home-Network / Stand-Alone).

Example: Two LS-Enabled speakers in HN-Mode can use Pair / Share functionality.

For information on using PAIR / SHARE commands see "*LibreWirelessTechNote - LS_Light_Weight_Universal_Control_Interface*" available in Libre Portal.

7.20. Multiple SSID

LibreSync allows LS-Enabled devices to store **Eight** different network's information in Home Network mode.

If the device lose network, it would scan for earlier connected networks and then connects to the network with highest signal strength.

The details of each network's SSID and Passphrase are stored in **HN_SSID_x** and **HN_PASSPHRASE_x** respectively. The device starts storing the information from HN_SSID_7 till HN_SSID_0 and then erases the oldest i.e., HN_SSID_7 to write the new network details.

7.21. Zone Volume.

Zone Volume uses scaling ratios to provide a good user experience and intuitive system response based on controlling volume levels for dynamic groups of speakers - called "Sound Scenes".

Zone volume manages an overall Sound Scene's Volume. Once speakers are adjusted, the Sound Scene Volume will raise and lower each speaker's volume in a relative way keeping the relationship of volume level between speakers. However as you lower the Sound Scene's Volume level to zero, every speaker in the Scene will converge to zero at the same time.

For more details see LUCI Tech Note.

7.22. Music Services

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

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

Step 3. Browse through the list and select the song of your choice.

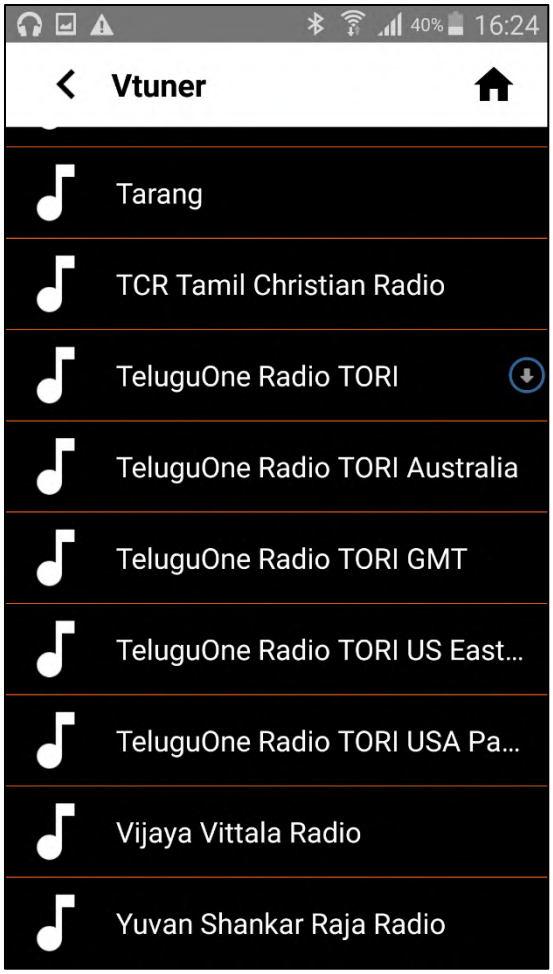


Figure 7.18.1-1: vTuner Browse Screen

Step 4. LS enabled speaker starts streaming the song from vTuner.

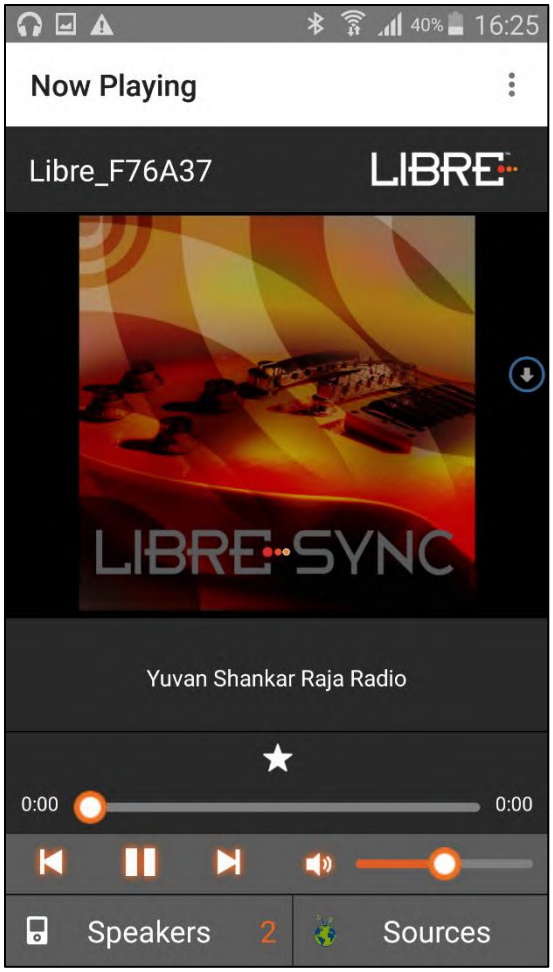


Figure 7.18.1-2: Now Playing Screen for vTuner

End --

7.22.2. TuneIn

TuneIn is an internet radio station that enables streaming of music.

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

To stream music from TuneIn proceed as below.

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

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

Step 3. Browse through the list and select the song of your choice.

Figure 7.18.2-1: TuneIn Browse Screen

Step 4. LS enabled speaker starts streaming the song from TuneIn.

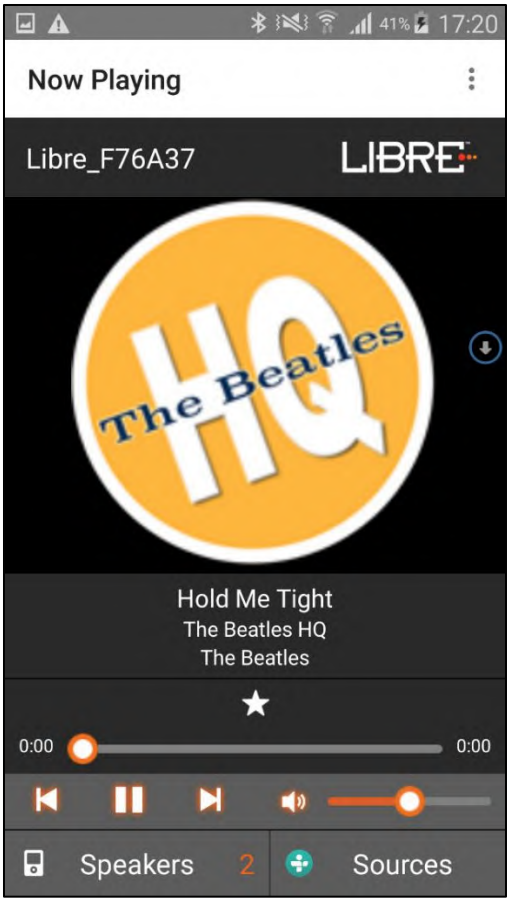


Figure 7.18.2-2: Now Playing Screen for TuneIn

Sync Your TuneIn Account

Step 5. In Tunein Home-Page, Tap **Settings**.

Step 6. Follow the steps as listed below.

1 From www.tunein.com logon with your account.

2 Go to My Info, and select Devices or tunein.com/mydevice.

Step 7. Tap Registration Code

Step 8. Confirm if the Registration Code information is correct.

End --

7.22.3. Melon

Melon is an online music service, User should use the melon Player to browse through the music of choice.

Melon Application generates the URL for the song selected and sends it to the LS-Speaker using LUCI over Message-Box # 41 and Command '2' to SET. LS-Speaker downloads the song and renders the audio output.

Melon Music service Application should Append the song URL with "**MELON:**" while sending the command over LUCI.

For Example,

Message-Box #41, 2, PLAYITEM:MELON:(HTTP URL of the Melon Song).

7.22.4. 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 1. Reboot the LS enabled device and connect to the network.

Step 2. Connect Smartphone to the same network.

Step 3. Open the QQ Music APP

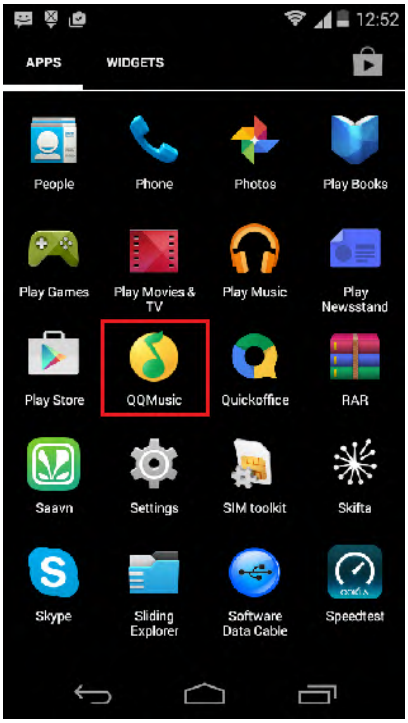


Figure 7.18.4-1: QQ Music APP

Step 4. Login to QQ Music, using the Username and Password received, during registration.

Figure 7.18.4-1: Login Screen

Step 5. Browse for songs in the QQ Music Server

Step 6. In Now playing screen, select 'Q' symbol

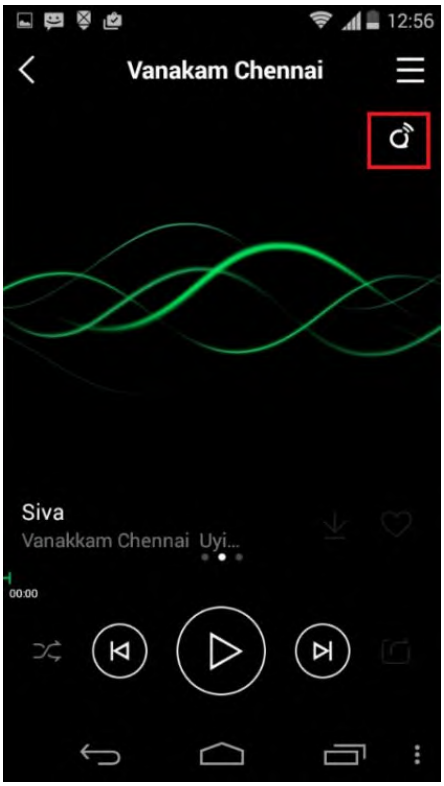


Figure 7.18.4-2: Device Selection Option

Step 7. Select the LS enabled device

Figure 7.18.4-3: Device List

Playback from QQ music on the LS enabled device starts.

End - -

7.22.5. 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.

- 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 1. Reboot the LS enabled device and connect to the network.

Step 2. Connect iOS device/Android phone to the same network.

Step 3. Open the Spotify APP

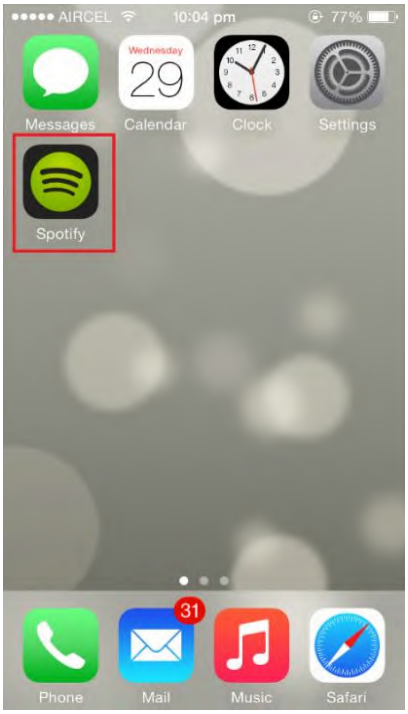


Figure 7.18.5-1: Spotify APP

Step 4. Login to Spotify, using the Username and Password received, during registration.

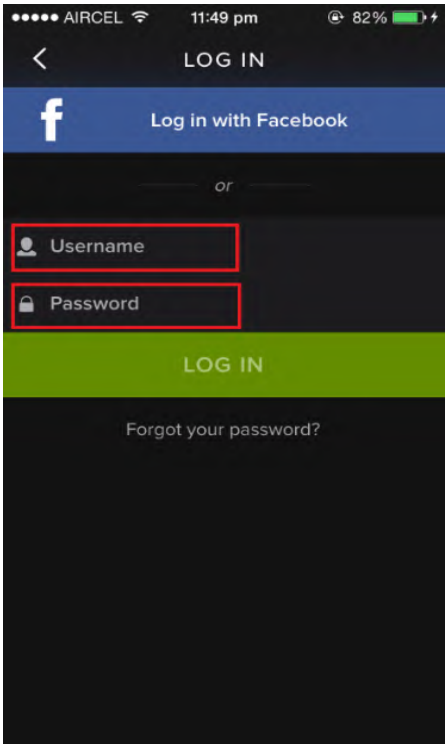


Figure 7.18.5-1: Spotify Login Screen

Step 5. Browse for songs in the Spotify Server

Step 6. In Now playing screen, select Speaker symbol in right bottom

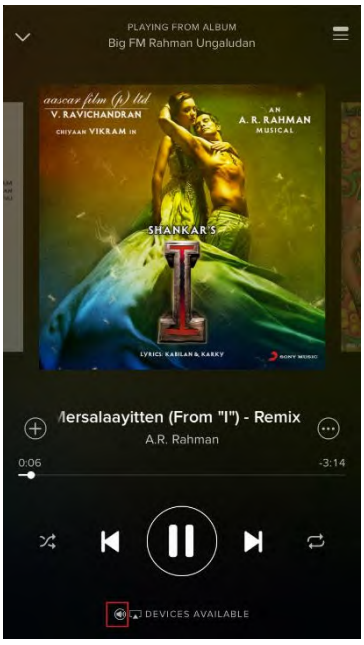


Figure 7.18.5-2: Device Selection

Step 7. Select the LS enabled device

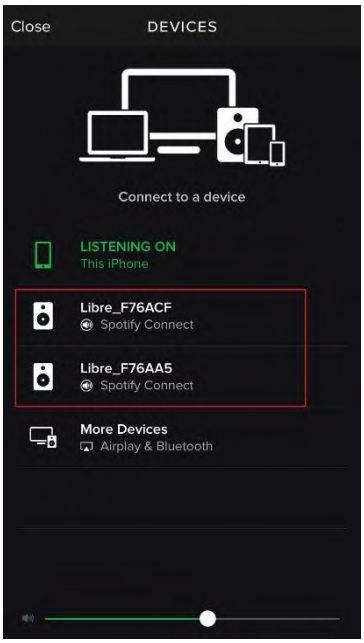


Figure 7.18.5-3: Device List

LS enabled device starts streaming music from Spotify Connect

End --

7.22.6. Deezer

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

To stream music from Deezer proceed as below.

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

Step 2. Tap ***Deezer*** 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.

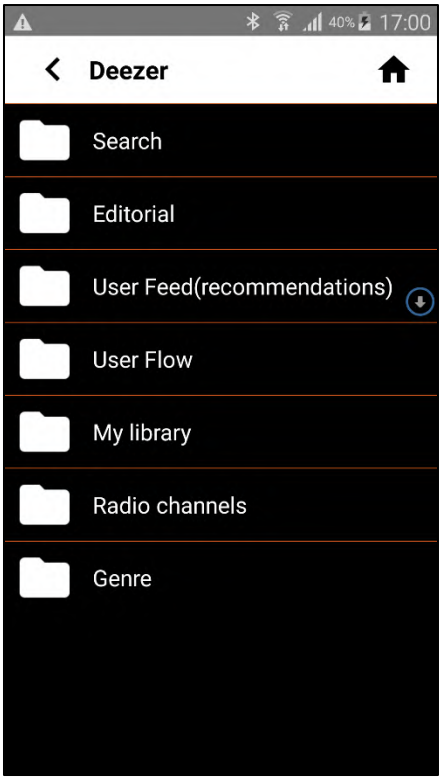


Figure 7.18.6-1: Deezer Browse Screen

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

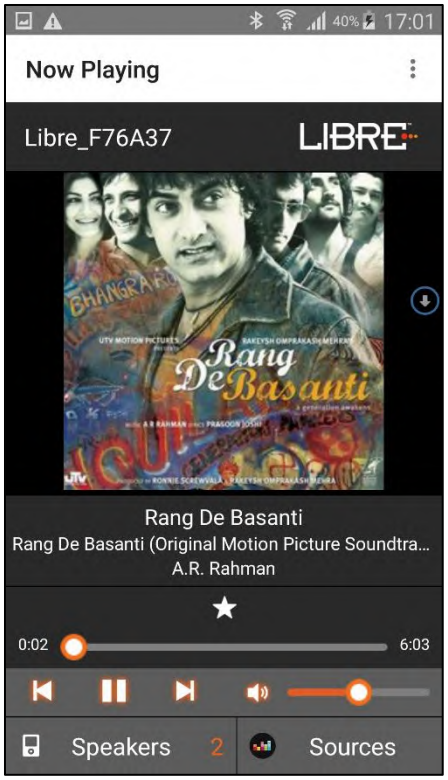


Figure 7.18.6-2: Now Playing Screen for Deezer

End --

7.22.7. 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.

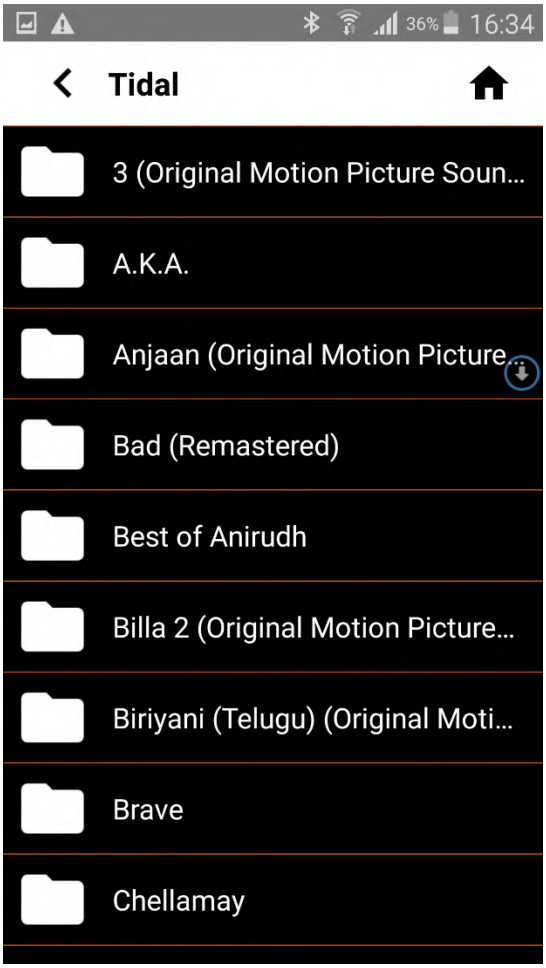


Figure 7.18.7-1: Tidal Browse Screen

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

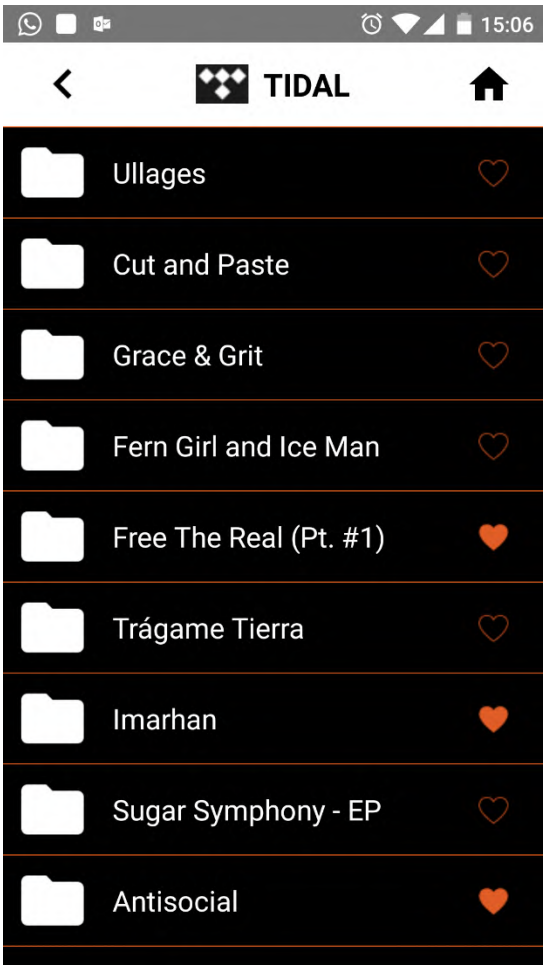
Figure 7.18.7-2: Now Playing Screen for Tidal

End --

Favorites in TIDAL

You can save a play-list as favorite, or an entire album, or an artist as favorite in the browse view of TIDAL.

For the play-list / album / artist of your favorite, Just tap the icon against it.



7.23. 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.

7.24. Dynamic Output Sampling Frequency

Dynamic Output Sampling Frequency enables the output sample rate of the speaker to be changed according to the audio track sample rate. To enable this feature, the NV-item to be used is outputfs (Refer NV-item document available in Libre Portal). The sample rates to be supported should be mentioned in the NV-item value.

For example,

```
# setenv outputfs 44100,48000,88200,96000,176400,192000

#Rebbot
```

When the audio track is being played, the sample rate of the track is matched from the values listed in the NV-Item outputfs. If the sample rate is not present, the nearest lower value from the values listed is selected to play the track.

1. This sample rate is then informed to the HOST-MCU over LUCI message-box 230 (Refer to LUCI Tech Note available in Libre Portal),to use this sample rate to configure the DAC.
2. LS speaker then waits for a response from the HOST-MCU.
3. After HOST-MCU has configured DAC response should be sent immediately to LS5B/LS9 over the same LUCI message-box 230 with data "success" and then the playback will begin.

HOST-CODED is the I2S Master.

IF HOST-CODEC is I2S Slave , then LS device only informs the HOST-About the changed sample rate.

FCC Statement

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.

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

The modular can be installed or integrated in mobile or fix devices only. This modular cannot be installed in any portable device .

FCC Radiation Exposure Statement

This modular complies with FCC RF radiation exposure limits set forth for an uncontrolled environment. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter. This modular must be installed and operated with a minimum distance of 20 cm between the radiator and user body.

If the FCC identification number is not visible when the module is installed inside another device, then the outside of the device into which the module is installed must also display a label referring to the enclosed module. This exterior label can use wording such as the following: "Contains Transmitter Module FCC ID: 2ADBM-LS5BVDN11S Or Contains FCC ID: 2ADBM-LS5BVDN11S"

When the module is installed inside another device, the user manual of the host must contain below warning statements;

1. 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.

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

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

The devices must be installed and used in strict accordance with the manufacturer's instructions as described in the user documentation that comes with the product.