Amlogic Buildroot Openlinux Release Note

Revision V20170831

AMLOGIC, Inc.
2518 Mission College Blvd，
Suite 120, Santa Clara, CA 95054
U.S.A.

www.amlogic.com

Revision History

Revision	Date	Author	Changes
V20170630	Jun 30, 2017	Peipeng Zhao	Alpha Release for Chip A113D/A113X
V20170731	July 31,2017	Peipeng Zhao	Beta Release for Chip A113D/A113X
V20170831	Aug 31,2017	Peipeng Zhao	MP Release for Chip A113D/A113X

Content

1. Overview

This document describes the packages and features that are supported in Amlogic A113D/A113X chips.

It includes:

- Supported Boards
- How to Get Code and Compile the System
- Test Reports
- Known Issues
- Player Software List
- Supported Packages
- Appendix A: Wi-Fi Enabling Procedures
- Appendix B: GStreamer Test Procedures
- Appendix C: WiFI Setup Procedures

2. Supported Boards

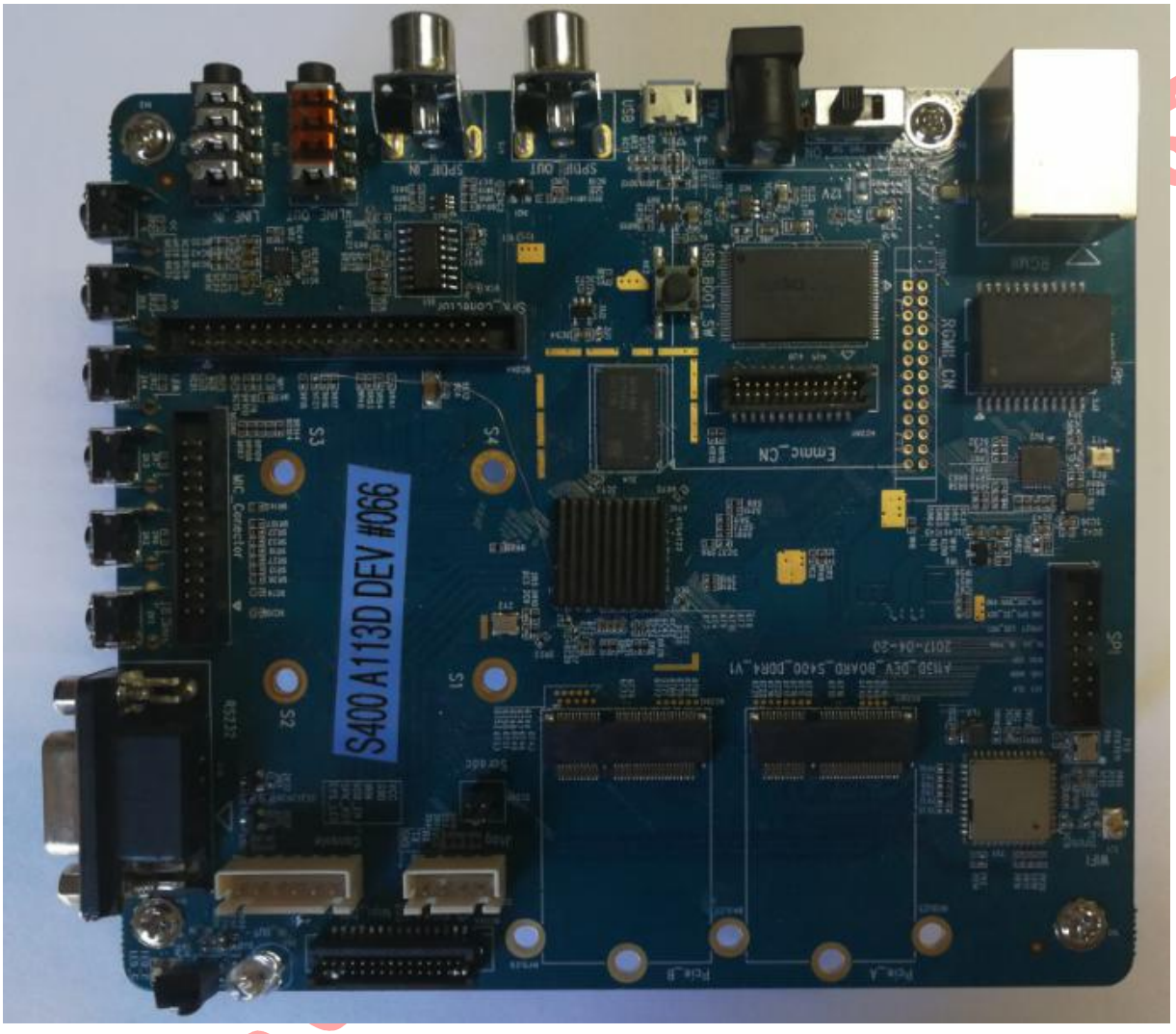
This chapter lists the reference boards that Amlogic currently supports.

List of Supported Boards

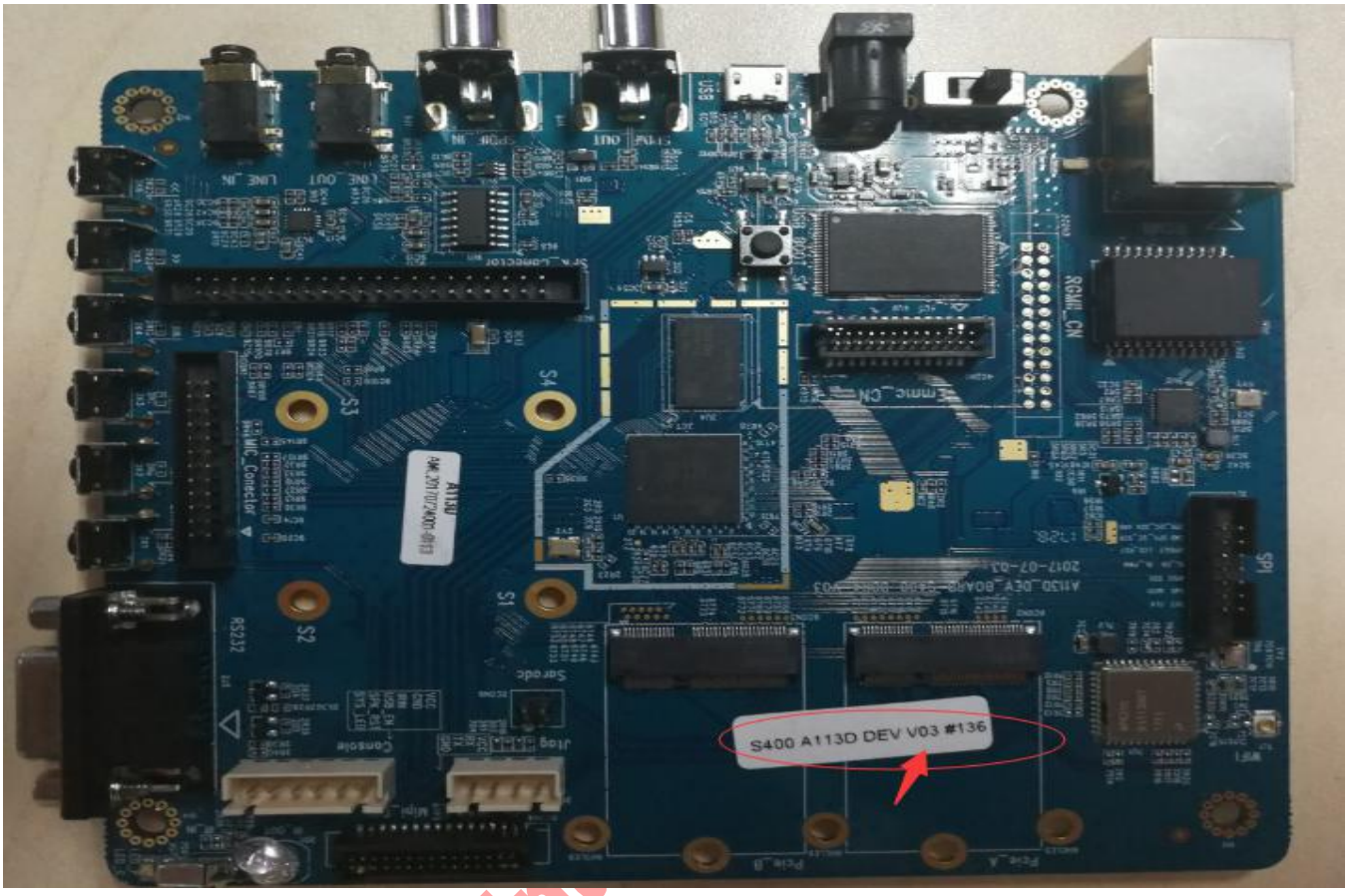
Amlogic supports the following reference boards for Chip A113D and A113X, This section lists the features and peripherals for these boards.

S400 Board:

● Amlogic A113D CPU
● 1G Bytes DDR3
● SDIO WiFi/BT (AP6356S)
● ADC Key x 6
● USB 2.0 OTG
● SLC NAND 512M Bytes
● SPDIF_IN/SPDIF_OUT
● UART Interface
● Audio Interface x 2(MIC_Connector & SPK_Connector)
● LINE_IN/LINE_OUT
● IR_IN/IR_OUT
● PCIe 2.0 Port x2
● MiPi Display Interface
● Gigabit Ethernet



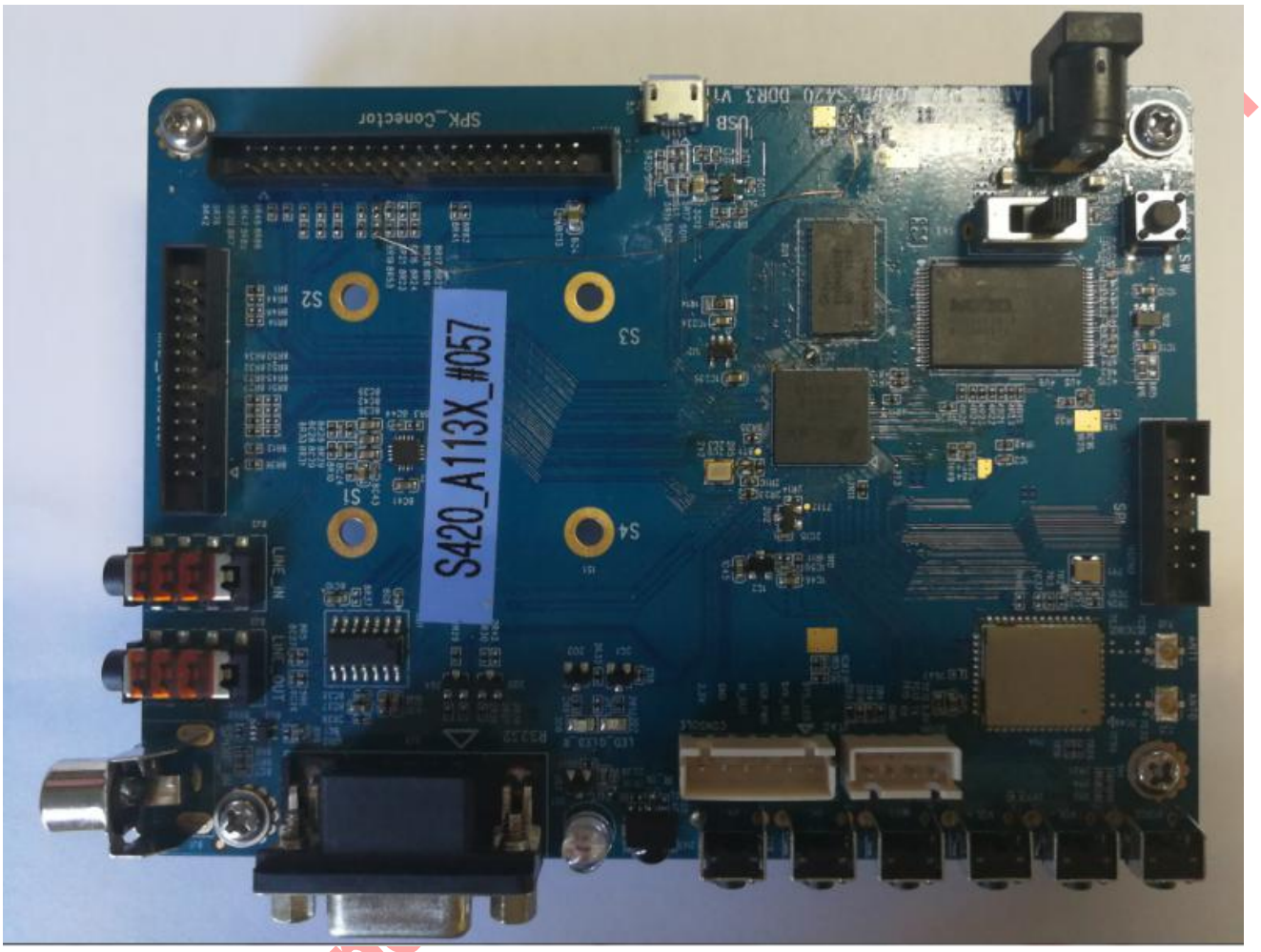
S400 Board Version 01



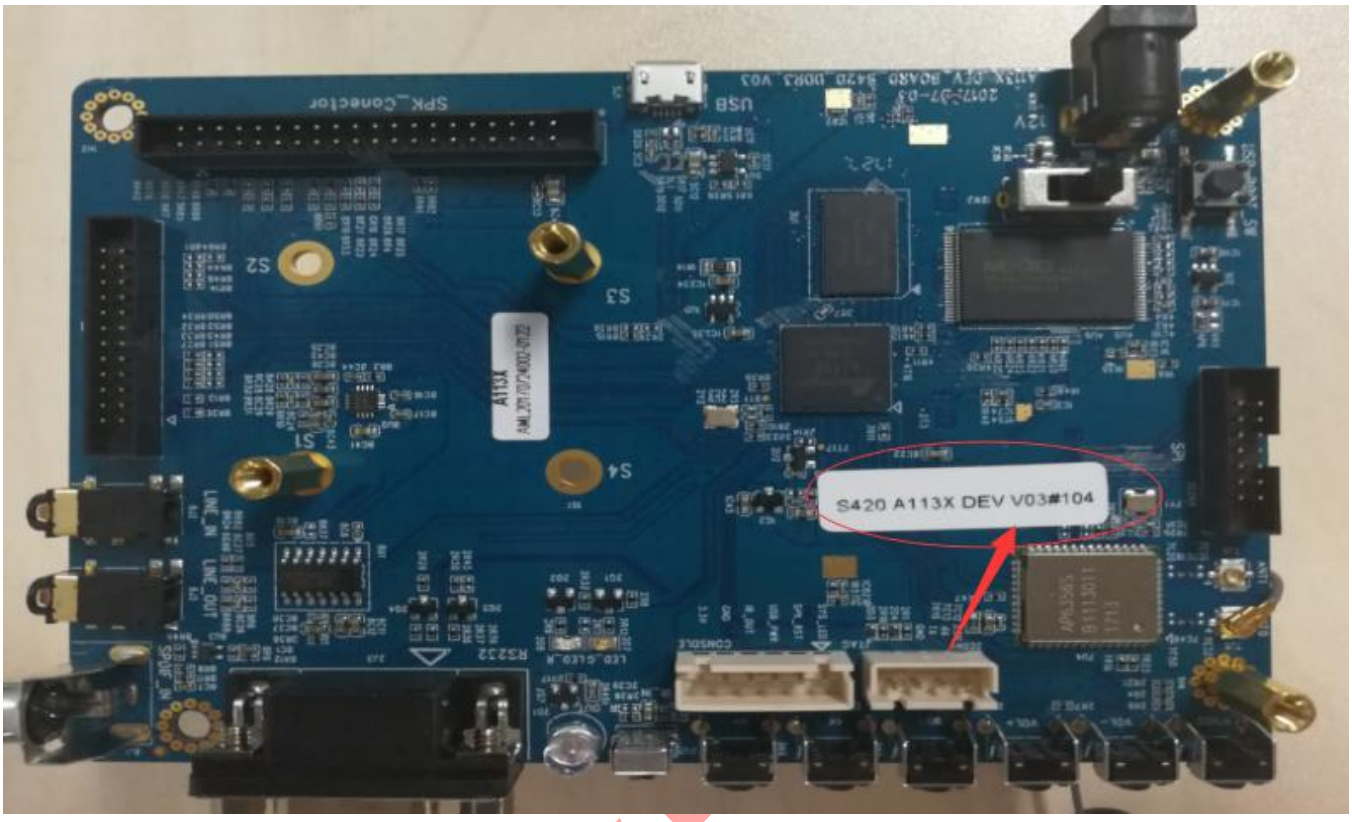
S400 Board Version 03

S420 Board:

● Amlogic A113X CPU
● 512M Bytes DDR3
● SDIO WiFi/BT (AP6356S)
● ADC Key x 6
● USB 2.0 OTG
● SLC NAND 512M Bytes
● SPDIF_IN
● UART Interface
● Audio Interface x 2(MIC_Connector & SPK_Connector)
● LINE_IN/LINE_OUT
● IR_IN/IR_OUT



S420 Board Version 01



S420 Board Version 03

3.System requirements

Buildroot is designed to run on Linux systems. Please use 64bit Ubuntu 12.04 or 14.04 or 16.04 version.
While Buildroot itself will build most host packages it needs for the compilation, certain standard Linux utilities are expected to be already installed on the host system. Below you will find an overview of the mandatory

Mandatory packages

Build tools:

- Which
- sed
- make (version 3.81 or any later)
- binutils
- gcc (version 2.95 or any later)
- g++ (version 2.95 or any later)
- bash
- patch
- gzip
- bzip2
- perl (version 5.8.7 or any later)
- tar
- cpio
- python (version 2.6 or any later)
- unzip
- rsync
- file
- Bc
- Texinfo
- libmpc.so.2
- git

Source fetching tools:

- wget

4. How to Get Code and Compile the System

4.1 Introduction

This document provides the openlinux notes for Amlogic buildroot reference source code release running on Amlogic reference hardware. To obtain Amlogic Buildroot reference source code, you will need to have an account to access Amlogic GIT source code repository.

4.2 How to Get Code

You can download Buildroot source code by running the following repo commands:

If you are in China, please use the following method to download code so that you can quick get code.

```
$ cd ~/<your-buildroot-repo-dir>/
$ repo init -u ssh://git@openlinux.amlogic.com/buildroot-audio/linux/manifest.git
-b buildroot-openlinux --repo-url=ssh://git@openlinux.amlogic.com/repo.git
$ repo init -m    20170831.xml
$ repo sync
```

If you are not in China, please use the following method to download code so that you can quick get code.

```
$ cd ~/<your-buildroot-repo-dir>/
$ repo init -u ssh://git@openlinux2.amlogic.com/buildroot-audio/linux/manifest.git
-b buildroot-openlinux --repo-url=ssh://git@openlinux2.amlogic.com/repo.git
$ repo init -m    20170831.xml
$ repo sync
```

4.3 Compile the System

We use repo tool to manage the source code. Previous tar package are still exsited, but tar package is not a efficient source code management.

Compilation:

```
$ source buildroot/build/setenv.sh
You're building on Linux
Lunch menu...pick a combo:
1. mesonaxg_s400_32_release
2. mesonaxg_s400_32_debug
3. mesonaxg_s400_debug
4. mesonaxg_s400_release
5. mesonaxg_s420_32_debug
```

6. mesonaxg_s420_32_release
7. mesonaxg_s420_debug
8. mesonaxg_s420_release

Which would you like? [Choice Number]

$ make
Note: Do not use make -jN here as Buildroot does not support top-level parallel make. This does not mean that Buildroot does not support parallel compilation, but just that it will handle this inside the Buildroot compilation system.

4.4 How to Upgrade

There are 3 ways for update.

- **Upgrade with USB_Burning_Tool , after version 2.0.9,include this version.**
    1. Copy aml_upgrade_package.img to your PC.
    2. Install the usb device driver for the board and usb burnning tool on your PC.
    3. Connect the USB cable between PC and board.
    4. With uboot burned on your platform, under uboot command line mode,execute “update”, then enter usb burnning mode.
        # update
    5. When the status shows connection is successful, import the aml_upgrade_package.img.
    6. Press the start button, then aml_upgrade_package.img will be flashed on the board.
    7. When the status shows flashing is successful, unplug the USB cable and reboot.

    System will boot up with kernel and root filesystem on NAND.

- **Single image burn with Flash disk**
    1). Flash disk with one partition in vfat format
    2). Copy u-boot.bin，dtb.img,boot.img，rootfs.ubi to Flash disk
    3).Insert Flash disk into your platform and reboot into uboot.
    4).Uboot burn:
    #usb_update bootloader u-boot.bin
    #reset
    5).dtb.img burn:
    #usb_update _aml_dtb dtb.img
    #reset
    6).Kernel burn：
    #nand erase.part boot
    #usb_update boot boot.img
    #reset
    7).Rootfs burn

#nand erase.part system
#usb_update system rootfs.ubi
#reset

- **Using update command to single image burn with PC, support Linux version and Windows version**

Mainly Related Informations:
Windows OS : update.exe:
Windows version of the update tool, it's command line mode so need be called at Windows' shell cmd.exe.
Linux OS : Aml_usb_update_tool_4_ubuntu.zip:
Linux version of this update tool, only 64-bit binary is provided, can be called at Ubuntu shell terminal.

1). Copy u-boot.bin dtb.img boot.img rootfs.ubi to PC disk
2).Uboot burn:
Windows:
#update.exe partition bootloader u-boot.bin
#update.exe bulkcmd “reset”
Ubuntu:
#update partition bootloader u-boot.bin
#update bulkcmd “reset”

3).dtb.img burn:
Windows:
#update.exe partition _aml_dtb dtb.img
#update.exe bulkcmd “reset”
Ubuntu:
#update partition _aml_dtb dtb.img
#update bulkcmd “reset”

4).Kernel burn：
Windows:
#update.exe partition boot boot.img
#update.exe bulkcmd “reset”
Ubuntu:
#update partition boot boot.img
#update bulkcmd “reset”

5).Rootfs burn
Windows:
#update.exe partition system rootfs.ubi
#update.exe bulkcmd “reset”
Ubuntu:
#update partition system rootfs.ubi
#update bulkcmd “reset”

If you want to get more detail information,please check with your Amlogic Sales/Technical support window for latest document

"Amlogic Update USB Tool User Guide"

5. A113D/A113X Audio Feature List

Module	Feature Description	Status
TDM in	i2s/pcm mode	Verified
	different bit number	16,24,32 bit verified
	different channel number	2~16 channels verified
	different sample rate	8K~192K verified
TDM out	i2s/pcm mode	Verified
	different bit number	16,24,32 bit verified
	different channel number	2~16 channels verified
	different sample rate	8K ~192K verified
S/PDIF in	different sample rate	22K ~ 192K verified
	different bit number	16, 24,32 bit verified
S/PDIFout	different sample rate	22K ~ 192K verified
	different bit number	16,24,32 bit verified
PDM IN	different bit number	16,24,32 bit Verified
	different channel bit	1,2,4,8 channels
	different sample rate	8K ~ 48K verified

6.Test Reports

Functional Test

name	test case	module case	detail	status
USB OTG		inserted or not		Pass
		read		Pass
		write		Pass
alsaplayer		wav		Pass
		mp3		Pass
		flac		Pass
		ogg		Pass
WiFi	SDIO	wifi driver		Pass
		wifi connected		Pass
		wifi ping		Pass
		wifi throughput		Pass
	PCIE	wifi driver		Pass
		wifi connected		Pass
		wifi ping		Pass
		wifi throughput		Pass
BT		bt connected		Pass
		send file		Pass
		A2DP		Pass
GPIO		PIO		Pass
		IRQ		Pass
		PULL		Pass

Multi Bootloader	BL2	erase	1~7	Pass
		bad data	1~7	Pass
		half ture data	1~3	Pass
	TPL	erase	1~3	Pass
		bad data	1~3	Pass
		half ture data	1~3	Pass
Ethernet		Ethernet connected		Pass
		Ethernet ping		Pass
		Ethernet throughput		Pass
Display	OSD+GE2D	768x1024		Pass
		256x256		Pass
		1920x1080		Pass
	MiPi	lit LCD		Pass
	QT+DirectFB	QT test		Pass
Airplay	shairprot-sync	play/pause		Pass
		Pre song/next song		Pass
		Volume control		Pass
		Device identification		Pass
		Play music fluncy		Pass
DLNA		play/pause		Pass
		Pre song/next song		Pass
		Volume control		Pass
		Device identification		Pass
		Play music fluncy		Pass
UART		Mutli transmission rate		Pass
ADC_KEY		6 keys		Pass
SPDIF	IN/OUT	Mutli sample rate		Pass
Line in/out		Mutli sample rate Mutli bit number		Pass

If you want to get more detail information, please check with your Amlogic Sales/Technical support window for latest test reports.

7. Change List

1). Add adc key function, including power key , vol+, vol- and WiFi AP/Station mode switch.
2). Autorun Airplay(shairport), DLNA(MediaRendererTest), Spotify(librespot) service when device startup
3). Autorun Bluetooth a2dp function.
4). Add debug version config for debugging.
5). Add new dts file to support DDR size 128M on S420 board.
6). Add VLC player for media.
7). Optimize QT LinuxFB to direct call GE2D interface.
8). Optimize sound channel map function.
9). WiFI SSID and Password can be wrote with special character.

8. Player Software List

1). aplay ,only support wav audio format.
2). alsaplayer, support mp3, ogg, flac and wav 4 audio formats.
3). gstreamer, support audio and video function, support mp3,flac and wav 3 audio format.
4). Airplay play music (shairport), iOS version 9.3.2, 10.3.2.
5) DLNA play music (MediaRendererTest)
6) Spotfy play music (librespot)
7). VLC play music, support mp3, ogg, flac and wav 4 audio formats.

9. Supported Packages

Amlogic adopts Buildroot as package management system. See http://buildroot.org/ for more details on how it works.

List of Supported Package

Package	Version	Description
alsa-lib	1.1.3	ALSA User space library. See http://www.alsa-project.org/
alsa-utils	1.1.3	Command line utilities for the ALSA. See http://www.alsa-project.org/
boost	1.61.0	Set of libraries for C++. See http://www.boost.org/
brcmap6xxx		Broadcom wifi driver
busybox	1.25.1	Tiny versions of many common UNIX utilities. See http://www.busybox.net/
bzip2	1.0.6	Bzip compression utility. See http://www.bzip.org/
cairo	1.14.8	2D graphics library. See http://cairographics.org
cjson	1.2.1	ANSI-C compliant JSON parser. See http://sourceforge.net/projects/cjson/

dbus	1.10.16	Message bus system. See http://www.freedesktop.org/wiki/Software/dbus/
dhcpcd	6.11.5	DHCP client daemon. See http://roy.marples.name/projects/dhcpcd/wiki
directfb	1.7.7	Graphics library. See http://www.directfb.org/
dnsmasq	2.76	Network utility. See http://www.thekelleys.org.uk/dnsmasq/doc.html
e2fsprogs	1.43.3	Filesystem utilities for use with the ext2/3/4 filesystem. See http://e2fsprogs.sourceforge.net/
expat	2.2.0	Library for parsing XML written in C. See http://expat.sourceforge.net/
fbdump	0.4.2	Tools to captures the contents of framebuffer device. See http://www.rcdrummond.net/fbdump/
fbgrab	1.3	Framebuffer screenshot program. See http://freecode.com/projects/fbgrab
fbset	2.1	Fbset. See http://users.telenet.be/geertu/Linux/fbdev/
fbterm	1.7.0	Framebuffer based terminal emulator. See http://code.google.com/p/fbterm/
fb-test-app	rosetta-1.1.0	Test suite for Linux framebuffer. See https://github.com/prpplague/fb-test-app
fontconfig	2.12.1	Font configuration and customization library. See http://www.freedesktop.org/wiki/Software/fontconfig/
freetype	2.7.1	Fonts rendering library. See http://www.freetype.org
gdb	7.10.1	GNU debugger. See https://www.gnu.org/software/gdb/
gmp	6.1.2	Library for arbitrary precision arithmetic. See https://gmplib.org/
gnutls	3.5.8	Transport Layer Security Library. See http://www.gnutls.org/.
gst1-plugins-bad	1.10.4	Gstreamer bad set. See http://gstreamer.freedesktop.org/modules/gst-plugins-bad.html
gst1-plugins-base	1.10.4	See http://gstreamer.freedesktop.org/modules/gst-plugins-base.html
gst1-plugins-good	1.10.4	See http://gstreamer.freedesktop.org/modules/gst-plugins-good.html
gst1-plugins-ugly	1.10.4	See http://gstreamer.freedesktop.org/modules/gst-plugins-ugly.html
gstreamer1	1.10.4	Gstreamer. See http://gstreamer.freedesktop.org/
harfbuzz	1.4.2	Opentext shaping engine. See http://www.freedesktop.org/wiki/Software/HarfBuzz/
icu	58.2	International Components for Unicode. See http://site.icu-project.org/
iw	4.9	nl80211 based utility for wireless devices. See http://wireless.kernel.org/en/users/Documentation/iw
kmod	23	Kernel module tools. See

		https://www.kernel.org/pub/linux/utils/kernel/kmod/
libcurl	7.53.0	Multiprotocol file transfer library. See http://c-ares.haxx.se/
liberation	2.00.1	Font. See http://www.fedorahosted.org/releases/l/i/liberation-fonts
libevent	2.1.8	Signaling events. See http://libevent.org/
libffi	3.2.1	Event notification library. See http://libevent.org/
libglib2	2.50	See https://developer.gnome.org/glib/
libid3tag	0.15.1b	See http://sourceforge.net/projects/mad/files/libid3tag/
libjpeg	9b	Jpeg library. See http://libjpeg.sourceforge.net/
libmad	0.15.1b	MPEG audio decoder. See http://sourceforge.net/projects/mad/
libnl	3.2.27	Libraries for netlink protocol. See http://www.infradead.org/~tgr/libnl/doc/api/
libogg	1.3.2	Ogg container. See https://xiph.org/ogg/
libpng	1.6.28	PNG reference library. See http://www.libpng.org/pub/png/libpng.html
libsamplerate	0.1.8	Sample rate converter. See http://www.mega-nerd.com/SRC/
libtasn1	4.9	ASN.1 library. See https://www.gnu.org/software/libtasn1/
libxml2	2.9.4	XML toolkit. See http://xmlsoft.org/
libxslt	1.1.29	XSLT support for libxml2. See http://xmlsoft.org/XSLT/
linux-amlogic	4.9.36	Amlogic Linux kernel
ncurses	5.9	New curses library. See http://www.gnu.org/software/ncurses/
nettle	3.3	Crypto library. See http://www.lysator.liu.se/~nisse/nettle/.
openssl	1.0.2k	Cryptography library. See http://www.openssl.org/
pango	1.40.3	Library for layout and rendering of text. See http://www.pango.org/
pcre	8.40	Perl compatible regular expression. See http://www.pcre.org/.
pixman	0.34.0	Low-level pixel manipulation library. See http://www.pixman.org/
qt5base	5.6.2	Cross-platform application and UI framework. See http://qt-project.org/
qt5imageformats	5.6.2	See http://qt-project.org/
qt5multimedia	5.6.2	See http://qt-project.org/
qt5sensors	5.6.2	See http://qt-project.org/
qt5serialport	5.6.2	See http://qt-project.org/
qt5svg	5.6.2	See http://qt-project.org/
qt5xmlpatterns	5.6.2	See http://qt-project.org/
rtk8188eu		Realtek 8188EU driver
rtk8189es		Realtek 8189ES driver
rtk8723au		Realtek 8723AU driver
rtk8723bs		Realtek 8723AU driver

sqlite	3160200	SQL database engine. See http://www.sqlite.org/
taglib	1.11.1	Audio tags. See https://taglib.github.io/
util-linux	2.29.2	Essential utilities for Linux. See https://www.kernel.org/pub/linux/utils/util-linux/
wavpack	5.1.0	Open audio codec. See http://www.wavpack.com/
wpa_supplicant	2.6	See http://hostap.epitest.fi/wpa_supplicant/
Shairport-sync	3.0.1	https://github.com/mikebrady/shairport-sync
boa	0.94.14rc21	http://www.boa.org
Upnp-app	1.0.0	vendor/amlogic/external/platinum/upnp-app/src
wifi-fw		Wifi DSP firmware
zlib	1.2.11	Data compression library. See http://www.zlib.net/

10. Appendix A: SDIO Interface Wi-Fi Enabling Procedures

The appendix describes procedures for enabling Wi-Fi on Amlogic Linux platform manually:

- Check module existence:

```
# lsmod
Module                  Size  Used by    Not tainted
dhd                   410618  0
```

If not,

```
# modprobe dhd
```

Note: “dhd” is the driver module name for broadcomm WIFI module. This name may vary depends on different WIFI modules equipped on your platform.

- Set up /etc/wpa_supplicant.conf:
  Example:

```
ctrl_interface=/var/run/wpa_supplicant
ctrl_interface_group=0
ap_scan=1

network={
    ssid=”myAP”
    pairwise=CCMP TKIP
    group=CCMP TKIP
    proto=WPA RSN
    key_mgmt=WPA-PSK
    priority=5
    psk=”my_passwd”
}
```

- Restart wpa_supplicant:

```
# /etc/init.d/S42wifi reload
```

or enable wpa_supplicant directly:

```
#   wpa_supplicant   -B -Dnl80211 -iwlan0   -c/etc/wpa_supplicant.conf
```

- Enable DHCP client:
  ```
  #   dhcpcd
  ```

- Put your wpa_supplicant.conf under /board/amlogic/mesonaxg_XXX/rootfs/etc/ and regenerate your file system. Next time system will automatically enable Wi-Fi.

11. Appendix B: GStreamer Test Procedures

This appendix demonstrates how to use gst-play-1.0 to exercise Gstreamer. (For non-X platforms only)

I. Local file playback
gst-play-1.0 file.mp3

II. Play audio and video file (connected mipi display screen)
gst-play-1.0 file.mp4

Playing back a playlist:

gst-play-1.0 can take commands k to show command list during playback.

Interactive mode - keyboard controls:

```
space      : pause/unpause
q or ESC : quit
> or n     : play next
< or b     : play previous
?          : seek forward
?          : seek backward
?          : volume up
?          : volume down
+          : increase playback rate
-          : decrease playback rate
d          : change playback direction
t          : enable/disable trick modes
a          : change audio track
```

v : change video track
s : change subtitle track
0 : seek to beginning
k : show keyboard shortcuts

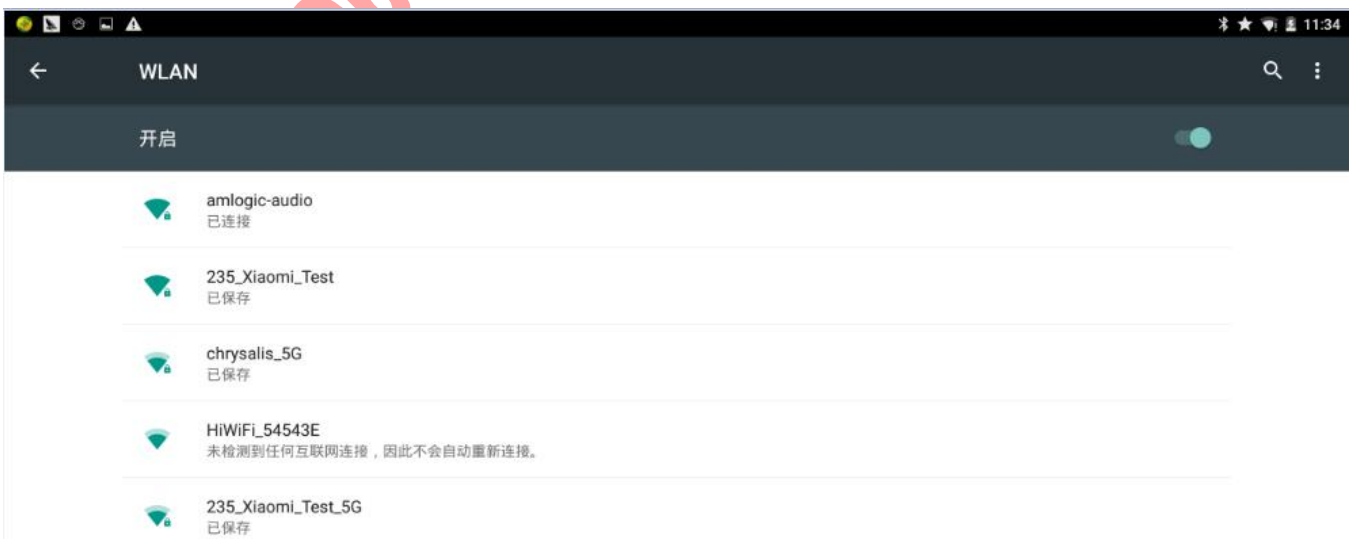
12. Appendix C: WiFI Setup Procedures.

This appendix demonstrates how to switch mode between WiFi AP mode and WiFi Station mode.

I. After the device is upgraded, WiFi will auto enter AP mode. You can use web to send SSID and Password to device, it will connect to WiFi AP.

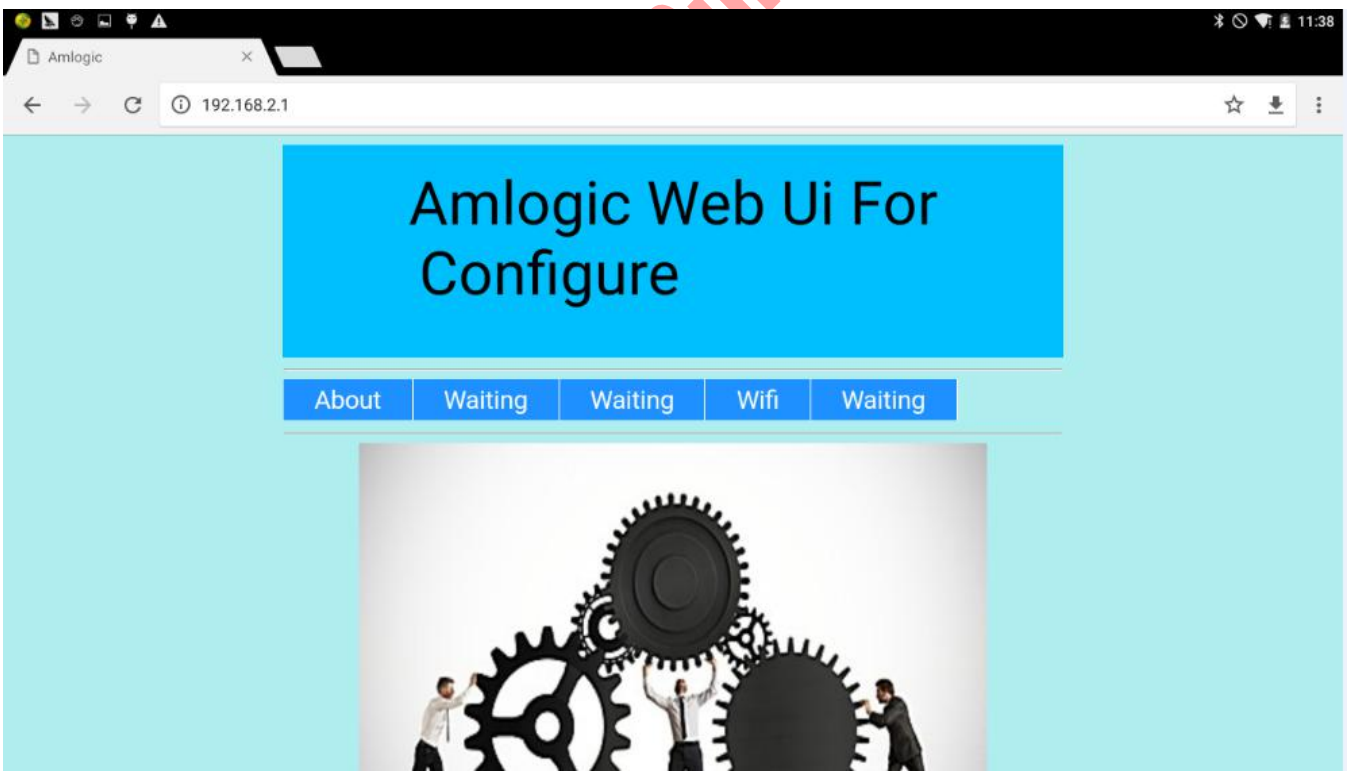
Step1:

Open WLAN on your phone or your tablet PC , you can find AP, its name is “amlogic-audio”, please to connect it, password is “12345678”, you will look the following picture.



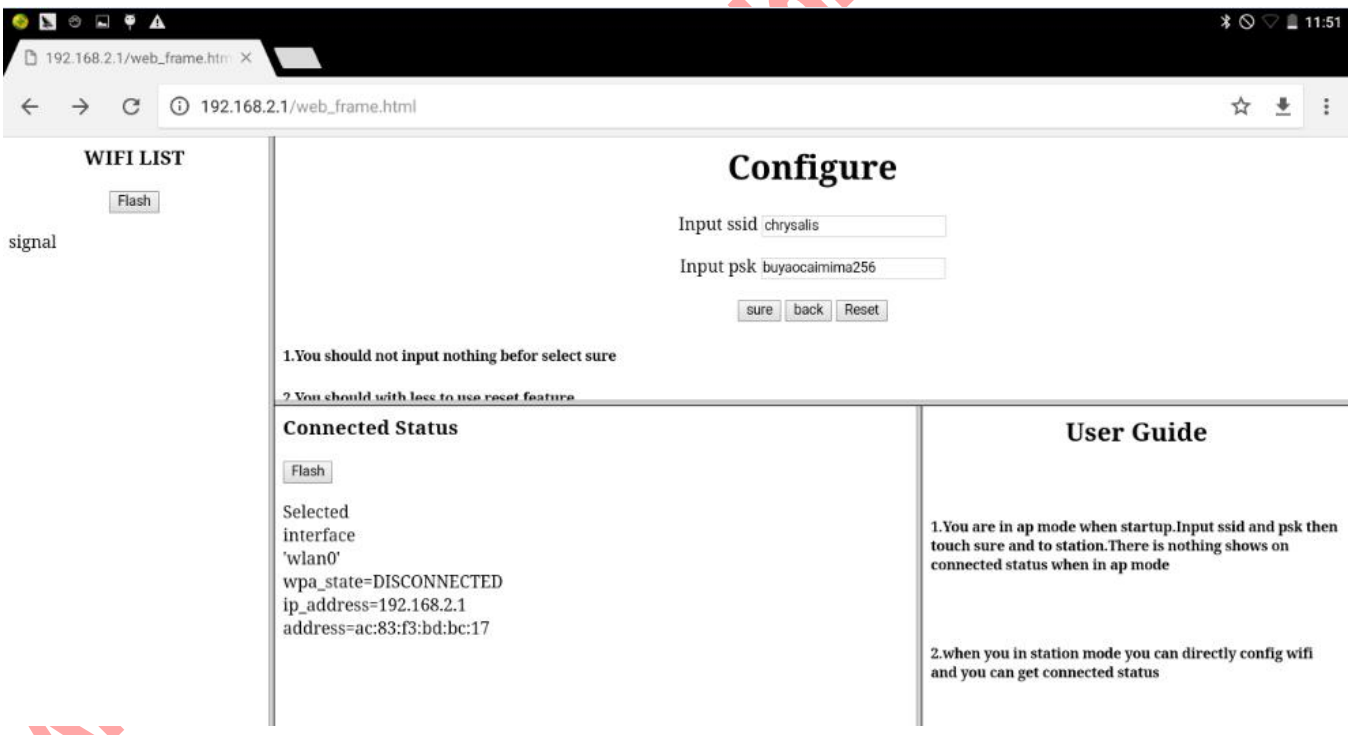
Step2:

Open web app to setup WiFi, please input the URL : 192.168.2.1 ,and then click search button, you will find the following picture.



Step 3:

Please click WiFi button, you can look wifi config surface, please input SSID and Password that you want to connect to AP. And then click sure button , WiFi will auto enter station mode and connect to AP that you set.



II. If you want to enter AP mode again, you can long press WiFi button on board when device is running. WiFi will auto switch Station mode to AP mode

13. Appendix D: AVS Setup And Run Procedures.

1). Create your AlexaClientSDKConfig.json for Alexa Auth

Before you create your build, you'll need to install some software that is required to run `AuthServer`. `AuthServer` is a minimal authorization server built in Python using Flask. It provides an easy way to obtain your first refresh token, which will be used for integration tests and obtaining access token that are required for all interactions with AVS.
IMPORTANT NOTE: `AuthServer` is for testing purposed only. A commercial product is expected to obtain Login with Amazon (LWA) credentials using the instructions provided on the Amazon Developer Portal for **Remote Authorization** and **Local Authorization**. For additional information, see [AVS Authorization](https://developer.amazon.com/public/solutions/alexa/alexa-voice-service/content/avs-api-overview#authorization).

Step 1: Install `pip`
If `pip` isn't installed on your system, follow the detailed install instructions [here](https://packaging.python.org/installing/#install-pip-setuptools-and-wheel).

Step 2: Install `flask` and `requests`
For Windows run this command:
```
pip install flask requests
```
For Unix/Mac run this command:
```
pip install --user flask requests
```
Step 3: Obtain Your Device Type ID, Cliend ID, and Client Secret

If you haven't already, follow these instructions to [register a product and create a security profi
le](https://github.com/alexa/alexa-avs-sample-app/wiki/Create-Security-Profile).
Make sure you note the following, you'll need these later when you configure `AuthServer`:
* Device Type ID
* Client ID
* Client Secret

python AuthServer/AuthServer.py /path/to/AlexaClientSDKConfig.json

IMPORTANT NOTE: Make sure that you've set your **Allowed Origins** and **Allowed Ret
urn URLs** in the **Web Settings Tab**:
* Allowed Origins: http://localhost:3000
* Allowed Return URLs: http://localhost:3000/authresponse
    More details
in https://developer.amazon.com/public/apis/engage/login-with-amazon/docs/adding_website.h
tml

2). Donwload and to run

Update aml_upgrade_package.img via usb_burning tool
cp AlexaClientSDKConfig.json to **/etc/**
cd /usr/bin (ONLY support SampleApp from /usr/bin now)
./SampleApp /etc/AlexaClientSDKConfig.json