Application Notes

# Linux 3.14.29 Package Release Note

Revision 1.3

Amlogic, Inc.
3930 Freedom Circle
Santa Clara, CA 95054
U.S.A.
www.amlogic.com

## Revision History

| Revision | Date | Author | Changes |
|---|---|---|---|
| 1.0 | Dec 25, 2015 | Matthew Shyu | Release for 3.14/s905 |
| 1.1 | Apr 25, 2016 | Matthew Shyu | Preparation for s905X |
| 1.2 | May 5, 2016 | Ao Xu | Update S905X |
| 1.3 | Aug 18, 2016 | Ao Xu | Update S905X,S905D,S912 |

# 1. Overview

This document describes the packages and features that are supported in Amlogic Linux platforms.

It includes:

- Chapter 1: Supported Packages
- Chapter 2: Supported Boards
- Chapter 3: Linux Building and Installation Procedures
- Appendix A: Wi-Fi Enabling Procedures
- Appendix B: Libplayer Test Procedures
- Appendix C: Mali and QT5 Test Procedures

# 2. Chapter 1: Supported Packages

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

## *2.1 List of Supported Package*

| Package | Version | Description |
|---|---|---|
| alsa-lib | 1.1.2 | ALSA User space library. See http://www.alsa-project.org/ |
| alsa-utils | 1.1.2 | Command line utilities for the ALSA. See http://www.alsa-project.org/ |
| aml_libs | | Amlogic video/audio decoder |
| aml_nand | | Amlogic Nand driver |
| aml_pmu | | Amlogic PMU driver |
| aml_thermal | | Amlogic thermal driver |
| aml_util | 0.1 | Utilities |
| boost | 1.61.0 | Set of libraries for C++. See http://www.boost.org/ |
| brcmap6xxx | | Broadcom wifi driver |
| busybox | 1.25.0 | 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 | 1.14.6 | 2D graphics library. See http://cairographics.org |
| cjson | 58 | ANSI-C compliant JSON parser. See http://sourceforge.net/projects/cjson/ |
| dbus | 1.10.8 | Message bus system. See http://www.freedesktop.org/wiki/Software/dbus/ |
| dhcpcd | 6.11.1 | 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 | 1.43.1 | 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 | 2.11.1 | Font configuration and customization library. See http://www.freedesktop.org/wiki/Software/fontconfig/ |
| freetype | 2.6.5 | Fonts rendering library. See http://www.freetype.org |
| gdb | 7.10.1 | GNU debugger. See https://www.gnu.org/software/gdb/ |

| | | |
|---|---|---|
| gmp | 6.1.1 | Library for arbitrary precision arithmetic. See https://gmplib.org/ |
| gnutls | 3.4.14 | Transport Layer Security Library. See http://www.gnutls.org/. |
| gpu | | Amlogic Mali gpu driver |
| gst1-plugins-bad | 1.8.2 | Gstreamer bad set. See http://gstreamer.freedesktop.org/modules/gst-plugins-bad.html |
| gst1-plugins-base | 1.8.2 | See http://gstreamer.freedesktop.org/modules/gst-plugins-base.html |
| gst1-plugins-good | 1.82 | See http://gstreamer.freedesktop.org/modules/gst-plugins-good.html |
| gst1-plugins-ugly | 1.8.2 | See http://gstreamer.freedesktop.org/modules/gst-plugins-ugly.html |
| gst-aml-plugins1 | 1.0 | Gstreamer1 Amlogic plugin |
| gstreamer1 | 1.8.2 | Gstreamer. See http://gstreamer.freedesktop.org/ |
| harfbuzz | 1.3.0 | Opentext shaping engine. See http://www.freedesktop.org/wiki/Software/HarfBuzz/ |
| icu | 57.1 | International Components for Unicode. See http://site.icu-project.org/ |
| iw | 4.7 | 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 | 7.50.1 | 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 | 2.0.22 | Signaling events. See http://libevent.org/ |
| libffi | 3.2.1 | Event notification library. See http://libevent.org/ |
| libglib2 | 2.48.1 | 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/ |
| libplayer | 2.1.0 | Amlogic media player library |
| libpng | 1.6.23 | 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/ |
| libsoup | 2.54.1 | HTTP client/server library for GNOME. See https://developer.gnome.org/libsoup/ |
| libsvg | 0.1.4 | Provides a parser for SVG content. See http://cairographics.org/ |
| libsvg-cairo | 0.1.6 | Provides the ability to render SVG content. See http://cairographics.org/ |
| libtasn1 | 4.8 | 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 | 3.14.29 | Amlogic Linux kernel |
| mali_examples | 2.4.4 | Mali OpenGL ES examples. See http://malideveloper.arm.com/cn/develop-for-mali/sdks/opengl-es-sdk- |

| | | |
|---|---|---|
| | | for-linux/ |
| ncurses | 5.9 | New curses library. See http://www.gnu.org/software/ncurses/ |
| nettle | 3.2 | Crypto library. See http://www.lysator.liu.se/~nisse/nettle/. |
| openssl | 1.0.2h | Cryptography library. See http://www.openssl.org/ |
| pango | 1.40.1 | Library for layout and rendering of text. See http://www.pango.org/ |
| pcre | 8.39 | Perl compatible regular expression. See http://www.pcre.org/. |
| pixman | 0.34.0 | Low-level pixel manipulation library. See http://www.pixman.org/ |
| qt5base | 5.6.1 | Cross-platform application and UI framework. See http://qt-project.org/ |
| qt5imageformats | 5.6.1 | See http://qt-project.org/ |
| qt5multimedia | 5.6.1 | See http://qt-project.org/ |
| qt5sensors | 5.6.1 | See http://qt-project.org/ |
| qt5serialport | 5.6.1 | See http://qt-project.org/ |
| qt5svg | 5.6.1 | See http://qt-project.org/ |
| qt5xmlpatterns | 5.6.1 | See http://qt-project.org/ |
| remotecfg | 1.0.1 | Amlogic remote configuration tool |
| rtk8188eu | | Realtek 8188EU driver |
| rtk8189es | | Realtek 8189ES driver |
| rtk8723au | | Realtek 8723AU driver |
| rtk8723bs | | Realtek 8723AU driver |
| sqlite | 3130000 | SQL database engine. See http://www.sqlite.org/ |
| taglib | 1.11 | Audio tags. See https://taglib.github.io/ |
| tslib | 1.1 | Abstraction layer for touchscreen panel events. See http://tslib.berlios.de/ |
| uboot | 2016 | Amlogic uboot |
| util-linux | 2.28 | Essential utilities for Linux. See https://www.kernel.org/pub/linux/utils/util-linux/ |
| wavpack | 4.75.2 | Open audio codec. See http://www.wavpack.com/ |
| wpa_supplicant | 2.5 | See http://hostap.epitest.fi/wpa_supplicant/ |
| wifi-fw | | Wifi DSP firmware |
| zlib | 1.2.8 | Data compression library. See http://www.zlib.net/ |

# 3. Chapter 2: Supported Boards

This chapter lists the reference boards that Amlogic currently supports.

## *3.1 List of Supported Boards*

Amlogic supports the following reference boards for S905X(namely p212), S905D(namely p230), S912(namely q200) with openlinux0701. Because S905(namely p200 or p201) has not been tested strictly, so it is not updated to the openlinux0701 version. This section lists the features and peripherals for these boards.

P212:

- Amlogic S905X CPU
- 2GB DDR3
- HDMI out x 1
- TF Card x 1
- Ethernet with internal phy x 1
- SDIO Wifi/BT (RTL8189ETV) x 1
- SPDIF x 1
- USB hub x 2
- EMMC x 1

P230:

- Amlogic S905D CPU
- 2GB DDR3
- HDMI out x 1
- TF Card x 1
- Ethernet 100M x 1, 1000M x 1
- SDIO WIFI/BT (AP6356S) x 1
- SPDIF x 1
- USB hub x 2
- USB otg x 1
- EMMC x 1

Q200:

- Amlogic S912 CPU
- 2GB DDR3
- HDMI out x 1
- TF Card x 1
- Ethernet 100M x 1, 1000M x 1
- SDIO WIFI/BT (AP6356S) x 1
- SPDIF x 1
- USB hub x 2
- USB otg x 1
- EMMC x 1

# 4. Chapter 3: Linux Compilation and Installation Procedures

## *4.1 Toolchains*

Two set of toolchains is used in the compilation.

The first one is used for compiling kernel and applications and it is automatically download from Linaro's website by Buildroot. The path is shown below just for completeness.

http://releases.linaro.org/14.09/components/toolchain/binaries/gcc-linaro-aarch64-linux-gnu-4.9-2014.09_linux.tar.xz

For some build environment, if you get build error info, for example,

MAKEINFO parted.info
/bin/sh: line 9: makeinfo: command not found
make[5]: *** [parted.info] Error 127
make[4]: *** [install-recursive] Error 1
make[3]: *** [install-recursive] Error 1

You should use the following command to install the texinfo package in deb package environmnet.

$ sudo apt-get install texinfo

And in rpm package environment, the command is

$ sudo yum install texinfo

The second set of toolchains is used for compiling uboot and it can be downloaded from Amlogic OpenLinux website through.

wget -c http://openlinux.amlogic.com:8000/deploy/CodeSourcery.tar.gz
wget -c http://openlinux.amlogic.com:8000/deploy/gcc-linaro-aarch64-none-elf-4.8-2013.11_linux.tar

Extract and put them into search path.

$ tar zxf CodeSourcery.tar.gz -C /opt
$ tar xf gcc-linaro-aarch64-none-elf-4.8-2013.11_linux.tar -C /opt
$ export PATH=$PATH:/opt/CodeSourcery/Sourcery_G++_Lite/bin:/opt/CodeSourcery/Sourcery_G++_Lite/arm-none-eabi/bin:/opt/CodeSourcery/Sourcery_G++_Lite/arm-none-linux-gnueabi/bin:/opt/gcc-linaro-aarch64-none-elf-4.8-2013.11_linux/bin/

## *4.2 Compiling the System*

Getting the source code:
$ wget -c http://openlinux.amlogic.com:8000/download/ARM/filesystem/arm-buildroot-2016-08-18-5aaca1b35f.tar.gz

Compilation:
$ tar arm-buildroot-2016-08-18-5aaca1b35f.tar.gz
$ cd buildroot
$ make mesongxl_p212_release_defconfig
$ make

mesongxl_p230_release_defconfig is for p230, and mesongxm_q200_release_defconfig is for q200.
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.

## *4.3 Installing Linux on SD Card*

The following steps show how to install the resulting system on your SD card.

Note: You should use an SD card that is **at least 4GB**.

1. Create an SD card with one partition in ext2 format.
2. Copy boot.img, rootfs.tar.gz to this partition

```
$ sudo cp output/images/boot.img /media/sdcard
$ sudo cp output/images/rootfs.tar.gz /media/sdcard
$ sudo sync
```

3. Extract rootfs.tar.gz on SD card

```
$ cd /media/sdcard
    $ sudo tar zxvf    rootfs.tar.gz
    $ sync
```

4. Write uboot to SD card

```
$ sudo dd if=output/images/u-boot.bin.sd.bin of=/dev/mmcblk0 bs=1 count=442
$ sudo dd if=output/images/u-boot.bin.sd.bin of=/dev/mmcblk0 bs=512 skip=1 seek=1
$ sudo sync
```

5. If there's some old data on the flash, you might wish to erase them all

```
# store init 3
# reset // now the system starts from sd card
```

6. When running into uboot, execute “run bootsdcard” under the prompt:

```
# env default -a
# env save
# run bootsdcard
```

## *4.4 Installing Linux on EMMC/Nand Flash*

**Warning! All previous changes will be lost.**

1. Create an SD card with one partition in vfat format
2. copy boot.img and root file system to SD card

```
$ cp output/images/u-boot.bin /media/mySD
$ cp output/images/boot.img /media/mySD
$ cp output/images/rootfs.tar.gz /media/mySD
```

Insert SD card into your platform and reboot into uboot.

Replace original uboot with the new one under uboot prompt:

```
# mmcinfo
# fatload mmc 0 ${loadaddr} u-boot.bin
# store rom_write    ${loadaddr} 0 120000
# fatload mmc 0 ${loadaddr} gxl_p212_2g.dtb    // This step writes a valid dtb first
# store dtb write    ${loadaddr}
# reset
```

3. With new uboot burned on your platform, enter uboot prompt again and execute “run bootupdate”

```
# env default -a
# env save
# run bootupdate
```

4. System will automatically write kernel to boot partition and extract rootfs.tar.gz to system partition.
5. Reboot platform.
6. System will boot up with kernel and root filesystem on EMMC/NAND.

# Appendix A: 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/meson_XXX/rootfs/etc/ and regenerate your file system. Next time system will automatically enable Wi-Fi.
  **Note: Modify meson_XXX according to your platform.**
  **For example: meson_g18 --> g18**
  **meson_k200 --> k200**

# Appendix B: Libplayer Test Procedures

This appendix demonstrates how to use kplayer to exercise Libplayer. ( For non-X platforms only )
Usage: kplayer <file>

0 show main menu
a start play
s get media info
1 Pause play
2 Resume play
3 Stop play
4 Fast forward
5 Fast rewind
6 Seek
7 Set repeat
8 Quit tools

# Appendix C: GStreamer1 Test Procedures

This appendix demonstrates how to use gplay to exercise Gstreamer1. ( For non-X platforms only )
I. Local file playback

gst-play-1.0 movie.mp4

gst-play-1.0 can take commands during playback.

space : pause/unpause
q or ESC : quit
> : play next
< : 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
k : show keyboard shortcuts

# Appendix D: Mali and QT5 Test Procedures

Leave Framebuffer sleep mode
# echo 0 > /sys/class/graphics/fb0/blank
# echo 1 > /sys/class/graphics/fb1/blank

Mali examples: ( For non-X platforms only )

There are a couple Mali execution examples under /usr/share/arm/opengles_20
For example,
# sh /etc/set_display_mode.sh
# cd /usr/share/arm/opengles_20/cube
# ./cube

QT5 examples:

QT5 demos are located under /usr/lib/qt/examples
For example,
# sh /etc/set_display_mode.sh
# cd /usr/lib/qt/examples/widgets/animation/animatedtiles
# ./animatedtiles
# cd /usr/lib/qt/examples/gui/openglwindow
# ./openglwindow