



Application Notes

**Linux 3.14.29 Package Release Note**  
Revision 1.4

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## Amlogic Application Notes

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### 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
1.4	Nov 4, 2016	Ao Xu	Add 32bit userland for S905,S905X,S905D,S912

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## 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 <a href="http://www.alsa-project.org/">http://www.alsa-project.org/</a>
alsa-utils	1.1.2	Command line utilities for the ALSA. See <a href="http://www.alsa-project.org/">http://www.alsa-project.org/</a>
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 <a href="http://www.boost.org/">http://www.boost.org/</a>
brcmap6xxx		Broadcom wifi driver
busybox	1.25.0	Tiny versions of many common UNIX utilities. See <a href="http://www.busybox.net/">http://www.busybox.net/</a>
bzip2	1.0.6	Bzip compression utility. See <a href="http://www.bzip.org/">http://www.bzip.org/</a>
cairo	1.14.6	2D graphics library. See <a href="http://cairographics.org">http://cairographics.org</a>
cjson	58	ANSI-C compliant JSON parser. See <a href="http://sourceforge.net/projects/cjson/">http://sourceforge.net/projects/cjson/</a>
dbus	1.10.8	Message bus system. See <a href="http://www.freedesktop.org/wiki/Software/dbus/">http://www.freedesktop.org/wiki/Software/dbus/</a>
dhcpcd	6.11.1	DHCP client daemon. See <a href="http://roy.marples.name/projects/dhcpcd/wiki">http://roy.marples.name/projects/dhcpcd/wiki</a>
directfb	1.7.7	Graphics library. See <a href="http://www.directfb.org/">http://www.directfb.org/</a>
dnsmasq	2.76	Network utility. See <a href="http://www.thekelleys.org.uk/dnsmasq/doc.html">http://www.thekelleys.org.uk/dnsmasq/doc.html</a>
e2fsprogs	1.43.1	Filesystem utilities for use with the ext2/3/4 filesystem. See <a href="http://e2fsprogs.sourceforge.net/">http://e2fsprogs.sourceforge.net/</a>
expat	2.2.0	Library for parsing XML written in C. See <a href="http://expat.sourceforge.net/">http://expat.sourceforge.net/</a>
fbdump	0.4.2	Tools to captures the contents of framebuffer device. See <a href="http://www.rcdrummond.net/fbdump/">http://www.rcdrummond.net/fbdump/</a>
fbgrab	1.3	Framebuffer screenshot program. See <a href="http://freecode.com/projects/fbgrab">http://freecode.com/projects/fbgrab</a>
fbset	2.1	Fbset. See <a href="http://users.telenet.be/geertu/Linux/fbdev/">http://users.telenet.be/geertu/Linux/fbdev/</a>
fbterm	1.7.0	Framebuffer based terminal emulator. See <a href="http://code.google.com/p/fbterm/">http://code.google.com/p/fbterm/</a>
fb-test-app	rosetta-1.1.0	Test suite for Linux framebuffer. See <a href="https://github.com/prpplague/fb-test-app">https://github.com/prpplague/fb-test-app</a>
fontconfig	2.11.1	Font configuration and customization library. See <a href="http://www.freedesktop.org/wiki/Software/fontconfig/">http://www.freedesktop.org/wiki/Software/fontconfig/</a>
freetype	2.6.5	Fonts rendering library. See <a href="http://www.freetype.org">http://www.freetype.org</a>
gdb	7.10.1	GNU debugger. See <a href="https://www.gnu.org/software/gdb/">https://www.gnu.org/software/gdb/</a>

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gmp	6.1.1	Library for arbitrary precision arithmetic. See <a href="https://gmplib.org/">https://gmplib.org/</a>
gnutls	3.4.14	Transport Layer Security Library. See <a href="http://www.gnutls.org/">http://www.gnutls.org/</a> .
gpu		Amlogic Mali gpu driver
gst1-plugins-bad	1.8.2	Gstreamer bad set. See <a href="http://gstreamer.freedesktop.org/modules/gst-plugins-bad.html">http://gstreamer.freedesktop.org/modules/gst-plugins-bad.html</a>
gst1-plugins-base	1.8.2	See <a href="http://gstreamer.freedesktop.org/modules/gst-plugins-base.html">http://gstreamer.freedesktop.org/modules/gst-plugins-base.html</a>
gst1-plugins-good	1.8.2	See <a href="http://gstreamer.freedesktop.org/modules/gst-plugins-good.html">http://gstreamer.freedesktop.org/modules/gst-plugins-good.html</a>
gst1-plugins-ugly	1.8.2	See <a href="http://gstreamer.freedesktop.org/modules/gst-plugins-ugly.html">http://gstreamer.freedesktop.org/modules/gst-plugins-ugly.html</a>
gst-aml-plugins1	1.0	Gstreamer1 Amlogic plugin
gstreamer1	1.8.2	Gstreamer. See <a href="http://gstreamer.freedesktop.org/">http://gstreamer.freedesktop.org/</a>
harfbuzz	1.3.0	Opentext shaping engine. See <a href="http://www.freedesktop.org/wiki/Software/HarfBuzz/">http://www.freedesktop.org/wiki/Software/HarfBuzz/</a>
icu	57.1	International Components for Unicode. See <a href="http://site.icu-project.org/">http://site.icu-project.org/</a>
iw	4.7	nl80211 based utility for wireless devices. See <a href="http://wireless.kernel.org/en/users/Documentation/iw">http://wireless.kernel.org/en/users/Documentation/iw</a>
kmod	23	Kernel module tools. See <a href="https://www.kernel.org/pub/linux/utils/kernel/kmod/">https://www.kernel.org/pub/linux/utils/kernel/kmod/</a>
libcurl	7.50.1	Multiprotocol file transfer library. See <a href="http://c-ares.haxx.se/">http://c-ares.haxx.se/</a>
liberation	2.00.1	Font. See <a href="http://www.fedorahosted.org/releases/l/i/liberation-fonts">http://www.fedorahosted.org/releases/l/i/liberation-fonts</a>
libevent	2.0.22	Signaling events. See <a href="http://libevent.org/">http://libevent.org/</a>
libffi	3.2.1	Event notification library. See <a href="http://libevent.org/">http://libevent.org/</a>
libglib2	2.48.1	See <a href="https://developer.gnome.org/glib/">https://developer.gnome.org/glib/</a>
libid3tag	0.15.1b	See <a href="http://sourceforge.net/projects/mad/files/libid3tag/">http://sourceforge.net/projects/mad/files/libid3tag/</a>
libjpeg	9b	Jpeg library. See <a href="http://libjpeg.sourceforge.net/">http://libjpeg.sourceforge.net/</a>
libmad	0.15.1b	MPEG audio decoder. See <a href="http://sourceforge.net/projects/mad/">http://sourceforge.net/projects/mad/</a>
libnl	3.2.27	Libraries for netlink protocol. See <a href="http://www.infradead.org/~tgr/libnl/doc/api/">http://www.infradead.org/~tgr/libnl/doc/api/</a>
libogg	1.3.2	Ogg container. See <a href="https://xiph.org/ogg/">https://xiph.org/ogg/</a>
libplayer	2.1.0	Amlogic media player library
libpng	1.6.23	PNG reference library. See <a href="http://www.libpng.org/pub/png/libpng.html">http://www.libpng.org/pub/png/libpng.html</a>
libsamplerate	0.1.8	Sample rate converter. See <a href="http://www.mega-nerd.com/SRC/">http://www.mega-nerd.com/SRC/</a>
libsoup	2.54.1	HTTP client/server library for GNOME. See <a href="https://developer.gnome.org/libsoup/">https://developer.gnome.org/libsoup/</a>
libsvg	0.1.4	Provides a parser for SVG content. See <a href="http://cairographics.org/">http://cairographics.org/</a>
libsvg-cairo	0.1.6	Provides the ability to render SVG content. See <a href="http://cairographics.org/">http://cairographics.org/</a>
libtasn1	4.8	ASN.1 library. See <a href="https://www.gnu.org/software/libtasn1/">https://www.gnu.org/software/libtasn1/</a>
libxml2	2.9.4	XML toolkit. See <a href="http://xmlsoft.org/">http://xmlsoft.org/</a>
libxslt	1.1.29	XSLT support for libxml2. See <a href="http://xmlsoft.org/XSLT/">http://xmlsoft.org/XSLT/</a>
linux-amlogic	3.14.29	Amlogic Linux kernel
mali_examples	2.4.4	Mali OpenGL ES examples. See <a href="http://malideveloper.arm.com/cn/develop-for-mali/sdks/opengl-es-sdk-">http://malideveloper.arm.com/cn/develop-for-mali/sdks/opengl-es-sdk-</a>

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		<a href="#">for-linux/</a>
ncurses	5.9	New curses library. See <a href="http://www.gnu.org/software/ncurses/">http://www.gnu.org/software/ncurses/</a>
nettle	3.2	Crypto library. See <a href="http://www.lysator.liu.se/~nisse/nettle/">http://www.lysator.liu.se/~nisse/nettle/</a> .
openssl	1.0.2h	Cryptography library. See <a href="http://www.openssl.org/">http://www.openssl.org/</a>
pango	1.40.1	Library for layout and rendering of text. See <a href="http://www.pango.org/">http://www.pango.org/</a>
pcre	8.39	Perl compatible regular expression. See <a href="http://www.pcre.org/">http://www.pcre.org/</a> .
pixman	0.34.0	Low-level pixel manipulation library. See <a href="http://www.pixman.org/">http://www.pixman.org/</a>
qt5base	5.6.1	Cross-platform application and UI framework. See <a href="http://qt-project.org/">http://qt-project.org/</a>
qt5imageformats	5.6.1	See <a href="http://qt-project.org/">http://qt-project.org/</a>
qt5multimedia	5.6.1	See <a href="http://qt-project.org/">http://qt-project.org/</a>
qt5sensors	5.6.1	See <a href="http://qt-project.org/">http://qt-project.org/</a>
qt5serialport	5.6.1	See <a href="http://qt-project.org/">http://qt-project.org/</a>
qt5svg	5.6.1	See <a href="http://qt-project.org/">http://qt-project.org/</a>
qt5xmlpatterns	5.6.1	See <a href="http://qt-project.org/">http://qt-project.org/</a>
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 <a href="http://www.sqlite.org/">http://www.sqlite.org/</a>
taglib	1.11	Audio tags. See <a href="https://taglib.github.io/">https://taglib.github.io/</a>
tslib	1.1	Abstraction layer for touchscreen panel events. See <a href="http://tslib.berlios.de/">http://tslib.berlios.de/</a>
uboot	2016	Amlogic uboot
util-linux	2.28	Essential utilities for Linux. See <a href="https://www.kernel.org/pub/linux/utils/util-linux/">https://www.kernel.org/pub/linux/utils/util-linux/</a>
wavpack	4.75.2	Open audio codec. See <a href="http://www.wavpack.com/">http://www.wavpack.com/</a>
wpa_supplicant	2.5	See <a href="http://hostap.epitest.fi/wpa_supplicant/">http://hostap.epitest.fi/wpa_supplicant/</a>
wifi-fw		Wifi DSP firmware
zlib	1.2.8	Data compression library. See <a href="http://www.zlib.net/">http://www.zlib.net/</a>

### 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 openlinux0930. This section lists the features and peripherals for these boards.

P200:

- Amlogic S905 CPU
- 1GB DDR3
- HDMI out x 1
- TF Card x 1
- Ethernet x 1
- SDIO Wifi/BT (AP6354) x 1
- ADC key x 1
- YPbPr out x 1
- SPDIF(coaxial) x 1
- USB hub x 1
- USB otg x 1

P201:

- Amlogic S905 CPU
- 1GB DDR3
- HDMI out x 1
- TF Card x 1
- Ethernet x 1
- SDIO Wifi/BT (brcm 40183) x 1
- USB hub x 1
- USB otg x 1
- SPI & Nand x 1

P212:

- Amlogic S905X CPU
- 2GB DDR3



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- 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

Since this version, there are two userland build type. Aarch64-linux-gnu is still used to build kernel and module. When you use 32bit userland build type, userland library and bin will be compiled into ARM 32bit ELF. And when you use 64bit userland build type, userland library and bin will be compiled into 64bit ELF.

Two sets of toolchain are used in the compilation.

The one is used for compiling kernel and 64bit userland 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](http://releases.linaro.org/14.09/components/toolchain/binaries/gcc-linaro-aarch64-linux-gnu-4.9-2014.09_linux.tar.xz)

If the above url is not connected, you can download from below url.

[http://openlinux.amlogic.com:8000/download/GPL\\_code\\_release/ThirdParty/gcc-linaro-aarch64-linux-gnu-4.9-2014.09\\_linux.tar.xz](http://openlinux.amlogic.com:8000/download/GPL_code_release/ThirdParty/gcc-linaro-aarch64-linux-gnu-4.9-2014.09_linux.tar.xz)

The other one is used for compiling 32bit userland applications and it is automatically download from Linaro's website by Buildroot. The path is shown below just for completeness.

[http://releases.linaro.org/14.05/components/toolchain/binaries/gcc-linaro-arm-linux-gnueabi-4.9-2014.05\\_linux.tar.xz](http://releases.linaro.org/14.05/components/toolchain/binaries/gcc-linaro-arm-linux-gnueabi-4.9-2014.05_linux.tar.xz)

You can also download it from amlogic openlinux server.

[http://openlinux.amlogic.com:8000/download/GPL\\_code\\_release/ThirdParty/gcc-linaro-arm-linux-gnueabi-4.9-2014.05\\_linux.tar.xz](http://openlinux.amlogic.com:8000/download/GPL_code_release/ThirdParty/gcc-linaro-arm-linux-gnueabi-4.9-2014.05_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
```

### 4.2 Compiling the System

Since this version, we use repo tool to manage the source code. Previous tar package are still existed, but tar package is not a efficient source code management.

Getting the source code:

```
$ repo init -u ssh://git@openlinux.amlogic.com/buildroot/platform/manifest.git
$ repo init -m buildroot-openlinux-20160930.xml
$ repo sync
```

Compilation:

```
$ source buildroot/build/setenv.sh
You're building on Linux
Lunch menu...pick a combo:
1. mesongxb_p200_release
2. mesongxb_p200_32_release
3. mesongxb_p201_release
4. mesongxb_p201_32_release
5. mesongxl_p212_release
6. mesongxl_p212_32_release
7. mesongxl_p230_release
8. mesongxl_p230_32_release
9. mesongxm_q200_release
10. mesongxm_q200_32_release
```

```
Which would you like? [5]
```

```
$ make
```

You can choose the target you want to build. For example, mesongxl\_p212\_release is used to build 64bit userland for p212, and mesongxl\_p212\_32\_release is used to build 32bit userland for p212.

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

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```
$ 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 bootstcard” under the prompt:

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

### 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
```

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```
# 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
```