

---

# **i.MX Linux Multimedia Framework**

## **User's Guide**

**Document Number: 924-76335**  
**Rev. 1.7.3**  
**04/2010**

## ***How to Reach Us:***

### **Home Page:**

[www.freescale.com](http://www.freescale.com)

### **Web Support:**

<http://www.freescale.com/support>

### **USA/Europe or Locations Not Listed:**

Freescale Semiconductor  
Technical Information Center, EL516  
2100 East Elliot Road  
Tempe, Arizona 85284  
+1-800-521-6274 or +1-480-768-2130  
[www.freescale.com/support](http://www.freescale.com/support)

### **Europe, Middle East, and Africa:**

Freescale Halbleiter Deutschland GmbH  
Technical Information Center  
Schatzbogen 7  
81829 Muenchen, Germany  
+44 1296 380 456 (English)  
+46 8 52200080 (English)  
+49 89 92103 559 (German)  
+33 1 69 35 48 48 (French)  
[www.freescale.com/support](http://www.freescale.com/support)

### **Japan:**

Freescale Semiconductor Japan Ltd.  
Headquarters  
ARCO Tower 15F  
1-8-1, Shimo-Meguro, Meguro-ku,  
Tokyo 153-0064, Japan  
0120 191014 or +81 3 5437 9125  
[support.japan@freescale.com](mailto:support.japan@freescale.com)

### **Asia/Pacific:**

Freescale Semiconductor China Ltd.  
Exchange Building 23F  
No. 118 Jianguo Road  
Chaoyang District  
Beijing 100022  
China  
+86 010 5879 8000  
[support.asia@freescale.com](mailto:support.asia@freescale.com)

### **For Literature Requests Only:**

Freescale Semiconductor Literature Distribution Center  
P.O. Box 5405  
Denver, Colorado 80217  
1-800-441-2447 or 303-675-2140  
Fax: 303-675-2150  
[LDCForFreescaleSemiconductor@hibbertgroup.com](mailto:LDCForFreescaleSemiconductor@hibbertgroup.com)

Information in this document is provided solely to enable system and software implementers to use Freescale Semiconductor products. There are no express or implied copyright licenses granted hereunder to design or fabricate any integrated circuits or integrated circuits based on the information in this document.

Freescale Semiconductor reserves the right to make changes without further notice to any products herein. Freescale Semiconductor makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does Freescale Semiconductor assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation consequential or incidental damages. "Typical" parameters that may be provided in Freescale Semiconductor data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals", must be validated for each customer application by customer's technical experts. Freescale Semiconductor does not convey any license under its patent rights nor the rights of others. Freescale Semiconductor products are not designed, intended, or authorized for use as components in systems intended for surgical implant into the body, or other applications intended to support or sustain life, or for any other application in which the failure of the Freescale Semiconductor product could create a situation where personal injury or death may occur. Should Buyer purchase or use Freescale Semiconductor products for any such unintended or unauthorized application, Buyer shall indemnify and hold Freescale Semiconductor and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that Freescale Semiconductor was negligent regarding the design or manufacture of the part.

Freescale and the Freescale logo are trademarks or registered trademarks of Freescale Semiconductor, Inc. in the U.S. and other countries. All other product or service names are the property of their respective owners. Microsoft and Windows are registered trademarks of Microsoft Corporation.

© Freescale Semiconductor, Inc. 2009. All rights reserved..

---

# Contents

<b>About This Book .....</b>	<b>V</b>
Audience .....	v
Organization.....	v
Conventions .....	v
References.....	v
Definitions, Acronyms, and Abbreviations .....	vi
 <b>Chapter 1 Installing and Building the Plugins .....</b>	 <b>1-1</b>
1.1 Building the Plugins with LTIB.....	1-1
1.1.1 BSP Requirements .....	1-1
1.1.2 Building the Plugins with LTIB.....	1-2
1.2 Installing/Building the Plugins on Ubuntu .....	1-8
1.2.1 BSP Requirements .....	1-8
1.2.2 Installing/Building the Plugins .....	1-8
 <b>Chapter 2 Testing the Installation .....</b>	 <b>2-12</b>
2.1 Testing the Codecs with Gstreamer .....	2-12
2.1.1 gst-inspect Tool.....	2-12
2.1.2 gst-launch Tool .....	2-13
2.1.3 gplay Player .....	2-21
2.1.4 Totem Player.....	2-21
2.1.5 Cheese webcam application.....	2-21
2.2 Testing the Core Codec Libraries .....	2-22
2.3 Debug exception in multimedia plugin.....	2-22
 <b>Appendix A : Multi-overlay support.....</b>	 <b>2-23</b>
A.1 How to use mfw_isink .....	2-23
A.1.1 gst-launch.....	2-23
A.1.2 Totem player .....	2-24
 <b>Appendix B : Subtitle support .....</b>	 <b>2-25</b>

---

<b>Appendix C : DLNA/UPnP support.....</b>	<b>2-26</b>
--	-------------

---

## About This Book

This document describes the package contents and provides instructions for building the libraries that are based on the Gstreamer architecture. Gstreamer is a powerful, versatile framework for creating streaming media applications.

## Audience

This document is intended for software, hardware, and system engineers who are planning to use the Multimedia codecs with Gstreamer architecture and for anyone who wants to understand more about the Multimedia codecs. A basic understanding of Gstreamer and LTIB architecture is required.

## Organization

This document contains the following chapters.

- |           |  |
|-----------|--|
| Chapter 1 | Identifies the BSP requirements, and explains how to build the multimedia components from LTIB or install multimedia components on Ubuntu OS |
| Chapter 2 | Explains how to test and use the multimedia codecs.  |

## Conventions

This document uses the following conventions:

- |                |  |
|----------------|--|
| <i>Courier</i> | Is used to identify commands, explicit command parameters, code examples, expressions, data types, and directives. |
| <i>Italic</i>  | Is used for emphasis, to identify new terms. For replaceable command parameters it will start with \$.             |

## References

The following documents were referenced to build this document.

1. i.MX Linux User's Guide
2. i.MX Linux Multimedia Framework Release Notes
3. i.MX Advanced ToolKit Standard User's Guide

---

## Definitions, Acronyms, and Abbreviations

The following list defines the abbreviations used in this document.

FSL	<b>F</b> reescale
Codec	<b>c</b> oder- <b>d</b> ecoder
LTIB	<b>L</b> inux <b>T</b> arget <b>I</b> mage <b>B</b> uilder
ARM	<b>A</b> dvanced <b>R</b> ISC <b>M</b> achine
ASRC	<b>A</b> synchronous <b>S</b> ample <b>R</b> ate <b>C</b> onverter
APT	<b>A</b> dvanced <b>P</b> ackaging <b>T</b> ool
Gst	Gstreamer (open source multimedia framework)
gplay	Freescle command line player with Gstreamer backend

---

# Chapter 1

## Installing and Building the Plugins

This chapter describes how to build/install Freescale multimedia core libraries and Freescale Gstreamer plugins.

Freescale multimedia core libraries are released in binary only. Freescale Gstreamer plugins include source code.

Freescale provides two types of release packages; LTIB packages are for Freescale core libraries and Gstreamer plugins, while Debian packages are for Ubuntu system.

The LTIB packages contain Freescale multimedia core binary libraries and Freescale Gstreamer plugins source code.

Debian binary packages are used to install Freescale core libraries and Gstreamer plugins binaries into an i.MX51 Babbage board running Ubuntu OS. Debian source packages are used to build Freescale Gstreamer plugins on an i.MX51 Babbage board.

## 1.1 Building the Plugins with LTIB

### 1.1.1 BSP Requirements

Requirements:

- i.MX series board
- Compliant i.MX series Linux BSP 09.12.0 or above.
- Gstreamer
  - Gstreamer (version $\geq$ 0.10.22)
  - Gstreamer-plugins-base (version $\geq$ 0.10.22)
  - Gstreamer-plugins-good (version $\geq$ 0.10.14)

#### NOTE

The Freescale Gstreamer plugins are dependent on the Gstreamer framework including the Gstreamer Core, Gst-Plugins-base, and Gst-Plugins-good.

### 1.1.2 Building the Plugins with LTIB

Following LTIB related procedures are running on a PC(x86) with a Linux OS.

To install LTIB and extract the package files, please follow these steps:

1. Install LTIB on PC.

For instructions, see the *i.MX Linux User's Guide* for the target platform.

- 
2. Obtain the following packages included in the release

There are two standard packages for building the Freescale multimedia Linux codecs.

Standard packages:

- `gst-fsl-plugin-$VERSION.tar.gz` is **gstreamer plugin source package** that contains source code for the multimedia Gstreamer-based plugin for the i.MX application processor.
- `fsl-mm-codeclib-$VERSION.tar.gz` is **codec/parser binary package** that contains the Freescale multimedia core codec/parser libraries for the i.MX application processor.

#### NOTE

These two packages **MUST** be compliant with LTIB specifications.

3. Copy these two standard packages to the LPP directory, which by default is set to `/opt/freescale/pkgs`.

#### NOTE

For the first LTIB installation create this directory manually.

To build the package, please follow these steps:

1. Go to LTIB setup directory and run `./ltib -c`.

The LTIB Configuration Menu is displayed (Figure 1).

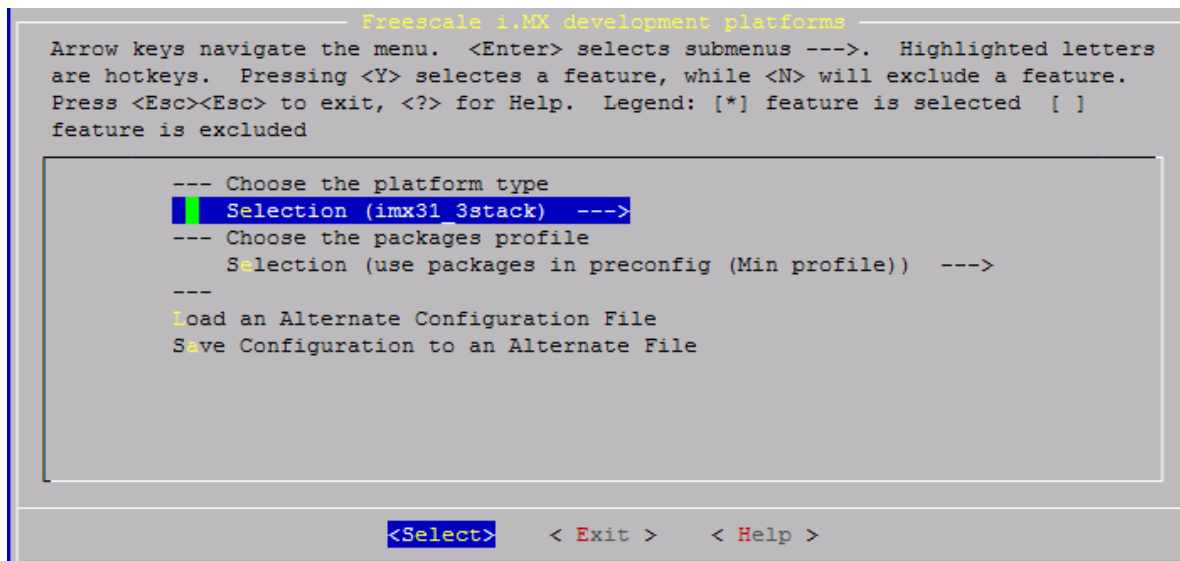


Figure 1 Configuration Menu

2. Select the platform.

The Freescale board setup menu is displayed (Figure 2).

```
Package list
Arrow keys navigate the menu. <Enter> selects submenus --->. Highlighted letters are
hotkeys. Pressing <Y> selects a feature, while <N> will exclude a feature. Press <Esc><Esc>
to exit, <?> for Help. Legend: [*] feature is selected [ ] feature is excluded

--- Platform specific package selection
[ ] sr-bt-bin
[ ] sr-wifi-bin
[*] sl-gui-imx31
[ ] hntro-binary
[ ] mx-x-bin
[ ] mx-test
[*] mx-lib
[ ] l-gps
[ ] te
[ ] pa supplicant
Freescale Multimedia Plugins/Codecs --->
--- Common package selection list
[ ] tk
[ ] autoconf
[ ] automake
--- alsa-lib
[*] alsa-utils
[ ] kash
[ ] kind
[ ] kinutils
[ ] kison
[ ] kbluez-hcidump
[ ] kbluez-libs
[ ] kbluez-utils
v(+)

<Select> < Exit > < Help >
```

Figure 2 LTIB Package Selection Menu

3. Select **Package List > Freescale Multimedia Plugins/Codecs**.

4. Select the **gststreamer-fsl-plugins**, the **fsl-mm-codec-libs** will be automatically selected. (Figure 3).

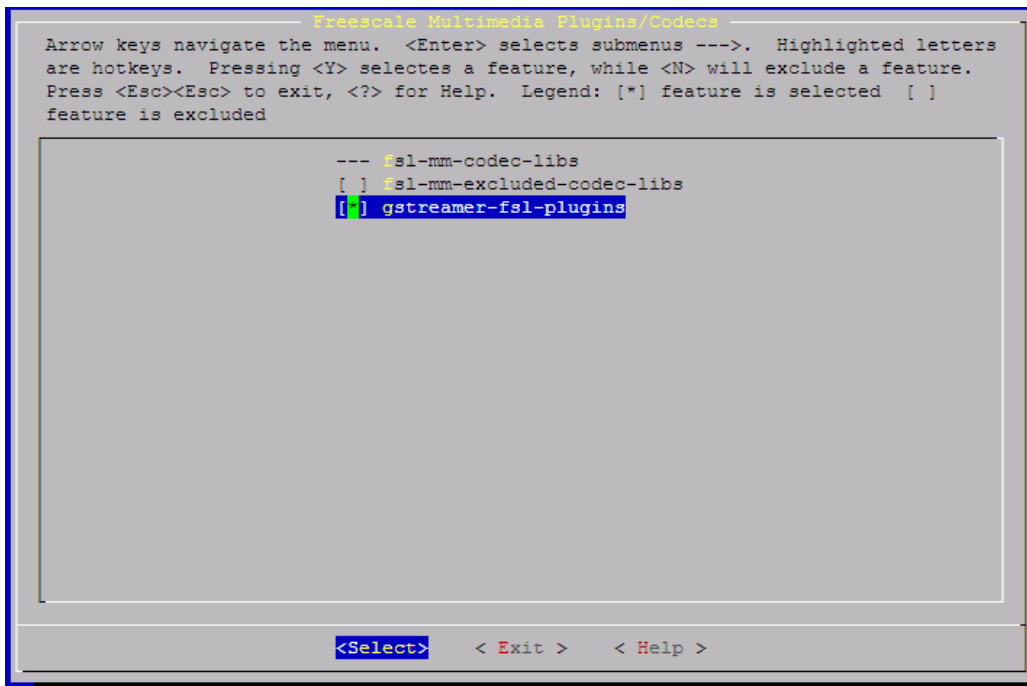


Figure 3 Selecting the Plugins

5. Select **gststreamer-plugins-good** package (Figure 4)

```

Package list
Arrow keys navigate the menu.  <Enter> selects submenus --->.  Highlighted letters
are hotkeys.  Pressing <Y> selectes a feature, while <N> will exclude a feature.
Press <Esc><Esc> to exit, <?> for Help.  Legend: [*] feature is selected  [ ]
feature is excluded

^(-)
[ ] yroff
--- gstreamer
--- gstreamer-plugins-base
[*] gstreamer-plugins-good
[ ] gstreamer-plugins-bad
[ ] gstreamer-plugins-ugly
[ ] gstreamer FFmpeg plugins
[ ] gstreamer farsight plugins
[ ] gtk+
[ ] h_parm
[ ] h_llo world
[ ] h_llo world module example
[ ] h_siod
--- h_tplug
[ ] h_tpd (apache) web server
[ ] l2c-tools
[ ] ozone
[ ] nput-utils
[ ] proute(2)
v(+)

<Select>  < Exit >  < Help >

```

**Figure 4** Selecting gstreamer-plugins-good package

6. Follow the LTIB compilation instructions.

After a successful build, zImage and rootfs will be created. The rootfs is located in LTIB directory. It includes the Freescale multimedia Linux codecs and Freescale Gstreamer plugins. The zImage is located in rootfs/boot in LTIB build directory.

## 1.2 Installing/Building the Plugins on Ubuntu

### 1.2.1 BSP Requirements

Requirements:

- i.MX51 Babbage board runs Ubuntu OS (9.10).
- imx-lib Debian package (version>=09.12.00).
- Gstreamer
  - Gstreamer (version=0.10.25 on Ubuntu 9.10)
  - Gstreamer-plugins-good (version=0.10.16 on Ubuntu 9.10)

### 1.2.2 Installing/Building the Plugins

The Freescale Multimedia core libraries and Freescale Gstreamer plugins are released in Debian release package format. Ubuntu OS uses APT to manage all these packages. For detailed information about how to use/manage packages by APT, please refer to <http://www.debian.org/doc/manuals/apt-howto/index.en.html>.

Following steps illustrate how to install Freescale Multimedia Plugins on Ubuntu and also how to build a Debian package from the source.

1. Prepare an i.MX51 Babbage board running Ubuntu OS(9.10)
2. Install BSP support libraries package, the package is released with BSP.

```
sudo dpkg -i imx-lib-$VERSION-$RELEASE.deb
```

3. Install dpkg-dev package by running command.

```
sudo aptitude install dpkg-dev
```

4. Obtain the following packages, which are included in the Debian release.
  - libgstreamer0.10-\$VERSION-\$RELEASE\_armel.deb is **Gstreamer-core** libraries modified by Freescale.
  - gstreamer0.10-x\_\$VERSION-\$RELEASE\_armel.deb is **Gst-plugins-base-x** libraries modified by Freescale.
  - libgstreamer-plugins-base0.10-\_\$VERSION-\$RELEASE\_armel.deb is **Gst-plugins-base libraries** modified by Freescale.
  - gstreamer0.10-plugins-base\_\$VERSION-\$RELEASE\_armel.deb is **Gst-plugins-base binary** modified by Freescale to enable playbin/playbin2 compatible with Freescale Gstreamer plugins. This package is needed for playback with a player such as gplay or totem.

- libfsl-mm-core1\_\${VERSION}.\$RELEASE\_armel.deb is **Freescale Multimedia core binaries** that contains the Freescale multimedia core codec/parser libraries for the i.MX application processor.
- libgst-fsl-mm-plugins\_\${VERSION}.\$RELEASE\_armel.deb is **Freescale Multimedia gstreamer plugin binary package** which contains binaries for the multimedia Gstreamer-based plugin for the i.MX application processor.
- totem-plugins\_\${VERSION}.\$RELEASE\_armel.deb is optimized version of totem support plugins package for using Freescale Multimedia gstreamer plugins
- totem\_\${VERSION}.\$RELEASE\_armel.deb is optimized version of totem application for using Freescale Multimedia gstreamer plugins
- cheese\_\${VERSION}.\$RELEASE\_armel.deb is optimized version of cheese application for using Freescale Multimedia gstreamer plugins

To build the codec and plugin deb packages from source, the following packages are also needed.

- libgstreamer0.10-dev\_\${VERSION}.\$RELEASE\_armel.deb is the Gstreamer-core development support package.
- libgstreamer-plugins-base0.10-dev\_\${VERSION}.\$RELEASE\_armel.deb is the **Gst-plugins-base** development support package.
- libfsl-mm-core-dev\_\${VERSION}.\$RELEASE\_armel.deb is the **Freescale Multimedia core libraries** development support package.
- fsl-mm-codeclib-\${VERSION}.orig.tar.gz, fsl-mm-codeclib-\${VERSION}.\$RELEASE.diff.gz, fsl-mm-codeclib-\${VERSION}.\$RELEASE.dsc are **codec/parser binary packages** that contain the Freescale multimedia core codec/parser libraries for the i.MX application processor.
- gst-fsl-plugin-\${VERSION}.orig.tar.gz, gst-fsl-plugins\_\${VERSION}.\$RELEASE.diff.gz, gst-fsl-plugins\_\${VERSION}.\$RELEASE.dsc are **gstreamer plugin source packages** that contain source code of the multimedia Gstreamer-based plugin for the i.MX application processor.

5. Create a local directory /root/debs in the rootfs and copy all these packages to this directory.
6. Change directory to /root and run following commands to generate package/source list files for these packages.

```
sudo dpkg-scanpackages debs | gzip > debs/Packages.gz
```

```
sudo dpkg-scansources debs | gzip > debs/Sources.gz
```

7. Add following lines to /etc/apt/sources.list

```
deb file:/root debs/
```

```
deb-src file:/root debs/
```

8. Run following command to update local package list.

```
sudo aptitude update
```

9. Install **Gst-plugins-base** by following commands.

```
sudo aptitude install libgstreamer-plugins-base0.10-0
```

```
sudo aptitude install gstreamer0.10-plugins-base
```

10. Install **Gst-plugins-good** by following command.

```
sudo aptitude install gstreamer0.10-plugins-good
```

To build the codec and plugin deb packages from source, please jump to step 13.

11. Install Freescale Multimedia core libraries by following command

```
sudo aptitude install libfsl-mm-core1
```

12. Install Freescale Multimedia gstreamer plugins by following command

```
sudo aptitude install libgst-fsl-mm-plugins
```

### NOTE

This version of multimedia debian package only is compatible with GCC 4.4.1 related rootfs. In order to applying the multimedia plugins with other type of rootfs such as Ubuntu 9.04, these debian packages need be recompiled in Ubuntu 9.04 with GCC version 4.3.3

13. Update totem by using following command

```
sudo aptitude install totem-plugins
```

```
sudo aptitude install totem
```

14. Update cheese by using following command

```
sudo aptitude install cheese
```

The Freescale Multimedia core libraries and Freescale Gstreamer plugins are now successfully installed into the i.MX Babbage Ubuntu rootfs. Ignore the following steps if not building the Debian packages from source.

15. Install BSP development support package which is released with BSP.

```
sudo dpkg -i kernel_${VERSION}-imx_${RELEASE}_armel.deb
```

16. Install Gstreamer build environment by following command.

```
apt-get build-dep gstreamer0.10-plugins-good
```

17. Get Freescale multimedia core libraries source

```
apt-get source libfsl-mm-core1
```

After this command executed successfully, all source packages and also a patched directory named “fsl-mm-codec-lib-\$VERSION” are download to current directory. Go to the directory and build it by running following command

```
debian/rules binary
```

Go to the up level directory, there are two Debian packages(.deb files), install these packages by following commands:

```
sudo dpkg -i libfsl-mm-core1_${VERSION-RELEASE}_armel.deb
```

```
sudo dpkg -i libfsl-mm-core-dev_${VERSION-RELEASE}_armel.deb
```

18. Get Freescale multimedia gstreamer plugins source

```
apt-get source libgst-fsl-mm-plugins
```

After this command executed successfully, all source packages and also a patched directory named “gst-fsl-plugin-\$VERSION” are download to current directory. Go to the directory and build it by running following command

```
debian/rules binary
```

Go to the up level directory, there is a Debian package(.deb file), install the package by following command:

```
sudo dpkg -i libgst-fsl-mm-plugins_${VERSION-RELEASE}_armel.deb
```

## Chapter 2

# Testing the Installation

This chapter explains how to check and test the multimedia codecs (audio decoder, audio encoder, video decoder and video encoder). It also explains how to enable the post-process filter to the pipeline that is being created in the Gstreamer architecture.

### NOTE

Each platform provides a certain set of codecs. Please refer to the Release Notes to determine which codecs are included in the BSP.

## 2.1 Testing the Codecs with Gstreamer

Gstreamer provides two useful applications for testing multimedia codecs: **gst-inspect** and **gst-launch**.

### 2.1.1 gst-inspect Tool

The **gst-inspect** tool can provide information about an available Gstreamer plugin, a particular plugin, or a particular element.

To view the list of installed multimedia codec plugins, type the following command in a shell:

```
gst-inspect | grep mfw
```

A list similar to the following is displayed.

```
mfw_v4lsrc: mfw_v4lsrc: Freescale Video Source plug-in
mfw_avidemuxer: mfw_avidemuxer: FSL Avi Demuxer
mfw_deinterlacer: mfw_deinterlacer: Mfw De-interlace
mfw_aacplusdecoder: mfw_aacplusdecoder: Freescale AAC Decoder Plugin
mfw_aacdecoder: mfw_aacdecoder: Freescale AAC Decoder Plugin
mfw_wma10decoder: mfw_wma10decoder: Freescale's wma10 decoder
mfw_wmvdecoder: mfw_wmvdecoder: Freescale wmv decoder
mfw_vpudecoder: mfw_vpudecoder: Freescale: Hardware (VPU) Decoder
mfw_audio_pp: mfw_audio_pp: Freescale Audio Post-process Filter
mfw_wma8encoder: mfw_wma8encoder: freescale wma8 encoder
mfw_v4lsink: mfw_v4lsink: Freescale: V4L Sink
mfw_vpuencoder: mfw_vpuencoder: Freescale: Hardware (VPU) Encoder
mfw_mp4demuxer: mfw_mp4demuxer: Freescale-Mp4 demuxer plugin
mfw_mpg2demuxer: mfw_mpg2demuxer: Freescale MPEG demuxer
mfw_downmixer: mfw_downmixer: Freescale Audio Down Mixer
mfw_mp3decoder: mfw_mp3decoder: freescale mp3 decoder
mfw_asfdemuxer: mfw_asfdemuxer: FSL Asf Demuxer
mfw_mp3encoder: mfw_mp3encoder: freescale mp3 encoder
```

The elements contained in this list may be different depend on the target platform

For example:

```
mfw_asfdemuxer: mfw_asfdemuxer: FSL Asf Demuxer
```

The first “mfw\_asfdemuxer” is plugin name, the second “mfw\_asfdemuxer” is element name, “FSL Asf Demuxer” is long name of element.

Use following gst-inspect command to view the detail information of an element.

```
gst-inspect $ELEMENT_NAME
```

For example,

```
gst-inspect mfw_asfdemuxer
```

to display detail information of element mfw\_asfdemuxer

## 2.1.2 gst-launch Tool

The **gst-launch** tool builds and runs the basic Gstreamer pipeline without trick mode support.

### 2.1.2.1 Playback with playbin/playbin2

Freescall recommends using Gstreamer playbin or playbin2 plugins to playback audio or/and video. Playbin and playbin2 are self-constructed pipeline elements which will auto connect all necessary elements to decode a media file/resource, including source, parser, decoder and sink, etc. The command is

```
gst-launch playbin uri=$URI
```

or

```
gst-launch playbin2 uri=$URI
```

The *\$URI* is Universal Resource Identifier. For a local file, URI start with [file://](#), for example, to play a local file test.avi locate in /media directory, please use

```
gst-launch playbin uri=file:///media/test.avi
```

#### NOTE

To make playbin/playbin2 compatible with Freescale multimedia Gstreamer plugins, a Freescale optimized gstreamer-plugins-base package needs to be installed. This package is released in LTIB package or provided in Multimedia Debian release packages.

### 2.1.2.2 Audio playback

Use the following commands to test the MP3 playback, AAC playback, and WMA playback.

To test the MP3 audio playback, use the following command:

```
gst-launch filesrc location=test.mp3 ! queue max-size-time=0 ! mfw_mp3decoder ! audioconvert !  
'audio/x-raw-int, channels=2' ! alsasink
```

To test the AAC audio playback, use the following command:

```
gst-launch filesrc location=test.aac ! queue max-size-time=0 ! mfw_aacdecoder ! audioconvert !  
'audio/x-raw-int, channels=2' ! alsasink
```

To test the WMA audio playback, use the following command:

```
gst-launch filesrc location=test.wma ! mfw_asfdemuxer ! queue max-size-time=0 !  
mfw_wma10decoder ! audioconvert ! 'audio/x-raw-int, channels=2' ! alsasink
```

To test the M4A audio playback, use the following command:

```
gst-launch filesrc location=test.m4a ! mfw_mp4demuxer ! queue max-size-time=0 !  
mfw_aacplusdecoder ! audioconvert ! 'audio/x-raw-int, channels=2' ! alsasink
```

To test the WAV audio playback, use the following command:

#### NOTE

For this test, the Gstreamer Good Plugin package must be installed. Due to hardware and opensource element limitation, for some combine configurations of specific channels and samplerate, the sound may not be heard.

```
gst-launch filesrc location=test.wav ! wavparse ! alsasink
```

### 2.1.2.3 Video only playback

To create a video-only pipeline with the gst-launch tool, use these commands:

```
gst-launch filesrc location= test.video ! demuxer_plugin ! queue max-size-time=0 !  
video_decoder_plugin ! mfw_v4lsink
```

For example, for an ASF(WMV only) file playback, use this command:

```
gst-launch filesrc location=test.asf ! mfw_asfdemuxer ! queue max-size-time=0 ! mfw_wmvdecoder !  
mfw_v4lsink
```

### 2.1.2.4 AV file playback

To create an audio/video combined pipeline with the gst-launch tool, use these commands.

```
gst-launch filesrc location=test_file ! demuxer_plugin name=demux demux. !  
queue max-size-buffers=0 max-size-time=0 ! $video_decoder_plugin ! mfw_v4lsink demux. !  
queue max-size-buffers=0 max-size-time=0 ! $audio_decoder_plugin ! audioconvert ! 'audio/x-raw-  
int, channels=2' ! alsasink
```

In VPU mode, change video\_decoder\_plugin to mfw\_vpudecoder. The VPU mode is only used for the Freescale i.MX SoC with embedded VPU.

The **max-size-time** in Queue element should be set because the playback could be not smoothly with default value one second.

## Example commands

The following commands are examples for different parsers and codecs:

### AVI(H264+MP3) video playback

```
gst-launch filesrc location=test.avi ! mfw_avidemuxer name=demux demux. !  
queue max-size-buffers=0 max-size-time=0 ! mfw_h264decoder ! mfw_v4lsink demux. !  
queue max-size-buffers=0 max-size-time=0 ! mfw_mp3decoder ! audioconvert ! 'audio/x-raw-int,  
channels=2' ! alsasink
```

### MP4(MPEG4+AAC) video playback

```
gst-launch filesrc location=test.mp4 ! mfw_mp4demuxer name=demux demux. !  
queue max-size-buffers=0 max-size-time=0 ! mfw_mpeg4aspdecoder ! mfw_v4lsink demux. !  
queue max-size-buffers=0 max-size-time=0 ! mfw_aacplusdecoder ! audioconvert ! 'audio/x-raw-int,  
channels=2' ! alsasink
```

### ASF(WMV9+WMA) video playback

```
gst-launch filesrc location=test.asf ! mfw_asfdemuxer name=demux demux. !  
queue max-size-buffers=0 max-size-time=0 ! mfw_wmv9mpdecoder ! mfw_v4lsink demux. !  
queue max-size-buffers=0 max-size-time=0 ! mfw_wma10decoder ! audioconvert ! 'audio/x-raw-int,  
channels=2' ! alsasink
```

### ASF(WMV7/WMV8+WMA) video playback

```
gst-launch filesrc location=test.asf ! mfw_asfdemuxer name=demux demux. !  
queue max-size-buffers=0 max-size-time=0 ! mfw_wmvdecoder ! mfw_v4lsink demux. !  
queue max-size-buffers=0 max-size-time=0 ! mfw_wma10decoder ! audioconvert ! 'audio/x-raw-int,  
channels=2' ! alsasink
```

### MPEG2 system stream video playback

```
gst-launch filesrc location=test.mpeg ! mfw_mpg2demuxer name=demux demux. !  
queue max-size-buffers=0 max-size-time=0 ! mfw_mpeg2decoder ! mfw_v4lsink demux. !  
queue max-size-buffers=0 max-size-time=0 ! mfw_mp3decoder ! audioconvert ! 'audio/x-raw-int,  
channels=2' ! alsasink
```

### VPU + Deinterlace video playback

```
gst-launch filesrc location=test_file ! demuxer_plugin name=demux demux. !  
queue max-size-buffers=0 max-size-time=0 ! mfw_vpudecoder ! mfw_deinterlacer ! mfw_v4lsink  
demux. ! queue max-size-buffers=0 max-size-time=0 ! audio_decoder_plugin ! audioconvert !  
'audio/x-raw-int, channels=2' ! alsasink
```

## NOTE

The VPU decoder is currently available only for the Freescale i.MX SoC with embedded VPU.

### 2.1.2.5 MPEG4 Hantro Encode Record

Use these steps:

19. To perform the initial setup,

- a) Insert the **memalloc.ko** kernel module with the **insmod** command.
- b) Check that the **memalloc** module is present using the **lsmod** command.

```
$ insmod memalloc.ko
$ lsmod
```

20. Create the `/dev/memalloc` device using the following commands:

```
$ cat /proc/devices | grep memalloc
$ mknod /dev/memalloc c 244 0
```

21. Run the encoder using the following commands:

```
gst-launch-0.10 filesrc blocksize=38016 location=yuv_file !
'video/x-raw-yuv,format=(fourcc)I420,width=176,height=144,framerate=(fraction)25/1' !
mfwmpeg4encoder bitrate=200000 scheme=0 ! filesink location=outstream.bits
```

#### NOTES

For i.MX31 3-Stack board, **memalloc.ko** will be built in **rootfs**. For more information, see the *i.MX Linux User's Guide*.

The **memalloc** device uses a dynamic major number. The first command displays the dynamic number used. For this example, the dynamic number generated was 244. Use the dynamic number generated in the second command, rather than 244.

The **blocksize** property of the **filesrc** plugin depends on the resolution of the input image. For example:

`blocksize = inputwidth * inputheight * 1.5.`

Change the width and height of the **mpeg4** encoder plugin to match the resolution of the mandatory input image.

### 2.1.2.6 Audio Encoder Record

This release provides two audio encoders: MP3 and WMA8. Both may be enabled.

#### MP3 Encoder Record

```
gst-launch filesrc location=test.wav ! wavparse ! mfwmpeg4encoder ! filesink location=output.mp3
```

To verify that the MP3 output is correct, use the **mfw\_mp3decoder**:

```
gst-launch filesrc location=output.mp3 ! queue max-size-time=0 ! mfw_mp3decoder ! audioconvert !
'audio/x-raw-int, channels=2' ! alsasink
```

## WMA8 Encoder Record

Encoding from file:

```
gst-launch filesrc location=test.wav ! wavparse ! mfw_wma8encoder ! filesink location=output.wma
```

Recording:

```
gst-launch alsasrc num-buffers=$NUMBER blocksize=$SIZE ! mfw_wma8encoder ! filesink
location=output.wma
```

The time duration of recording equals  $\$NUMBER * \$SIZE * 8 / (\text{samplerate} * \text{channel} * \text{bitwidth})$

For example, to record 60 seconds of stereo channel sample with 44.1K sample rate and 16bit width, use

```
gst-launch alsasrc num-buffers=240 blocksize=44100 ! mfw_wma8encoder ! filesink
location=output.wma
```

To verify that the WMA output is correct, use the **mfw\_wma10decoder**:

```
gst-launch filesrc location=output.wma ! mfw_asfdemuxer ! queue max-size-time=0 !
mfw_wma10decoder ! audioconvert ! 'audio/x-raw-int, channels=2' ! alsasink
```

### 2.1.2.7 VPU based Video Encoder Record

#### NOTE

The VPU encoder is currently available only for some of the Freescale i.MX SoC with embedded VPU.

Camera must be enabled before running video record. For the camera driver install, please refer BSP document.

Use “modprobe mxc\_v4l2\_capture” to enable v4l2 capture interface.

Encoding from file:

```
gst-launch filesrc location=test.yuv blocksize=115200 ! mfw_vpuencoder codec-type=0 ! avimux !
filesink location=output.avi sync=false
```

#### NOTE

The input file support I420 format YUV files.

The **blocksize** property of the **filesrc** plugin depends on the resolution of the input image. For example:

```
blocksize = inputwidth * inputheight * 1.5.
```

The **codec-type** property of the **mfw\_vpuencoder** plugin control the target encode codec type. It could be 0(MPEG4), 1(H263), 2(H264) or 7(MJPEG).

Recording:

```
gst-launch mfw_v4lsrc fps-n=15 capture-width=$WIDTH capture-height=$HEIGHT ! queue !  
mfw_vpuencoder codec-type=0 ! avimux ! filesink location=output.avi sync=false
```

### NOTE

The **fps-n** property of the **mfw\_v4lsrc** plugin control the camera capture frame rate, currently camera ov3640 driver only support 15 or 30.

The **codec-type** property of the **mfw\_vpuencoder** plugin control the target encode codec type. It could be 0(MPEG4), 1(H263), 2(H264) or 7(MJPEG).

## 2.1.2.8 SPDIF Transmit and Receive Converter

The SPDIF supports both transmit and receive feature with PCM or Non-PCM data. With Non-PCM data, the **mfw\_spdifrx** and **mfw\_spdiftx** plugin convert data between the IEC958 format and raw data. In this version, only support AC3 data format.

To verify the SPDIF receive is correct, use the **mfw\_spdifrx**:

```
gst-launch alsasrc device="plughw:1,0" ! mfw_spdifrx ! filesink location= test.bits
```

### NOTES

The SPDIF feature is applied in i.MX35 platform. For more information, see the *i.MX Linux User's Guide* for target platform.

To verify the SPDIF transmit is correct, use the **mfw\_spdiftx**:

```
gst-launch filesrc location= test.bits ! mfw_spdiftx ! alsasink device="plughw:1,0"
```

## NOTE

Insert the `snd-spdif.ko` kernel module with the **insmod** command. For i.MX35 3-Stack board, **snd-spdif** module will be built in **rootfs**. For more information, see the *i.MX Linux User's Guide*.

The “plughw” parameter depends on target system.

### 2.1.2.9 Audio Post-Process

To verify the Parametric EQ is correct, use the **mfw\_audio\_pp**:

```
gst-launch filesrc location=test.mp3 ! queue ! mfw_mp3decoder ! mfw_audio_pp enable=1 eqmode=2 ! alsasink
```

## NOTE

The `eqmode` value 2 means the “bass booster” scene.

To verify the ASRC is correct, use the **mfw\_audiosrc**:

```
gst-launch filesrc location= test.mp3 ! mfw_mp3decoder ! mfw_audiosrc use-ASRC=1 out-rate=32000 asrc-outclk=1 ! alsasink
```

```
gst-launch filesrc location=test.mp3 ! mfw_mp3decoder ! mfw_audiosrc use-ASRC=1 out-rate=48000 asrc_outclk=0 ! capsfilter caps="audio/x-raw-int, channels=2, samplerate=48000" ! wavenc ! filesink location= ./output.wav
```

## NOTES

The ASRC is currently available only for i.MX35 Platform.

The supported input rates and output rates are 32000, 44100, 48000.

The **asrc-outclk** only support `OUTCLK_SSI1_TX`.

With the `filesink`, the **asrc-outclk** should be 0.

To verify the Downmixing is correct, use the **mfw\_downmixer**:

```
gst-launch filesrc location= test.mp3 ! mfw_mp3decoder ! mfw_downmixer ochannels=2 ! alsasink
```

---

### 2.1.3 gplay Player

gplay is a command line based player. It is based on Gstreamer playbin element and provides full functions of playback, including trick mode, video display setting etc.

The command line is

```
gplay $MEDIA_FILE
```

For detail information of gplay tool, please refer to

*Gstreamer\_Command-line\_Player\_Application\_Specification.pdf*.

### 2.1.4 Totem Player

Totem is the official movie player of the GNOME desktop environment based on GStreamer, it's a graphic UI based player running on Linux desktop system. Totem is default installed on i.MX51 Babbage running Ubuntu OS or Gnome mobile OS.

For detail information of using totem, please refer to totem help.

### 2.1.5 Cheese webcam application

Cheese uses your webcam to take photos and videos. It will be based Freescale Multimedia Gstreamer plugins.

For detail information of cheese, please refer to <http://projects.gnome.org/cheese/>.

## 2.2 Testing the Core Codec Libraries

Some core codec libraries have no corresponding Gstreamer plugins, such as the **image** and some **audio encoders**. To view the list of Gstreamer plugins, see the *i.MX Multimedia Framework Linux Release Notes*.

To test those core codec libraries, use the Freescale proprietary test applications that are included in codec/parser binary package.

## 2.3 Debug exception in multimedia plugin

In the GDB debug mode, some multimedia plugin might generate exceptions on their system check initialization but are safe to continue since the exceptions are handled directly by the multimedia components. This might disturb a debug environment with processing these exceptions. The following step specifies how to configure the debugger so that these exceptions are handled automatically without user input needed.

```
$ handle SIGBUS nostop
```

Add this command to .gdbinit script as the default setting to debug the multimedia plugins.

## Appendix A: Multi-overlay support

**mfw\_isink** plugin for gstreamer is a IPU lib based sink element which provides multi-overlay support of video playback. It means several video playback can run the same time on the same display device or different one, eg. LCD and/or TV, each video can setting the display windows size and position. Currently, mfw\_isink plugin is only available on i.MX51 and i.MX53 platform.

mfw\_isink supports maximum 4 video displays. The video can show on LCD and/or TV. The latest launched video will on the top layer when videos overlapped.

In multi-overlay case, the video maybe not be smoothly due to performance limitation. Generally, i.MX51 can support 2-way D1 resolution video playback smoothly.

### A.1 How to use mfw\_isink

As a standard gstreamer plugin, gst-launch tool and gstreamer-based application (like totem) can use mfw\_isink as video sink element.

Since mfw\_isink need access IPU and framebuffer devices, please use as root user or run following command in a terminal window to change corresponding device permission.

```
chmod 666 /dev/mxc_ipu /dev/fb0 /dev/fb1 /dev/fb2 /sys/class/graphics/fb1/mode  
/sys/class/graphics/fb1/pan /sys/class/graphics/fb2/pan
```

mfw\_isink default use fb2 as display frame buffer on LCD. Since fb2 is default invisible, Please run following command in a terminal window to enable mfw\_isink local alpha feature when use mfw\_isink with gst-launch

```
export VSALPHA=1
```

playbin/playbin2 can used also with gst-launch, since the mfw\_v4lsink is the default video sink element, the mfw\_v4lsink library file need to be renamed when use mfw\_isink with playbin/playbin2.

```
mv /usr/lib/gstreamer-0.10/libmfw_gst_v4lsink.so /usr/lib/gstreamer-  
0.10/libmfw_gst_v4lsink.so.bak
```

#### A.1.1 gst-launch

Following command illustrate a complete pipe to playback a avi file by mfw\_isink as video sink element with advanced property settings. It will playback video on LCD and video position start at (100, 100) with window size 640x480.

```
gst-launch filesrc location=test.avi ! mfw_avidemuxer ! mfw_vpudecoder ! mfw_isink axis-top=100  
axis-left=100 disp-width=640 disp-height=480
```

mfw\_isink also support other properties for display settings. Please use

```
gst-inspect mfw_isink
```

to get detail support property list

Following are the detail information of some properties.

display: bit mask for display device, 1 for LCD, 2 for TV, 3 for LCD and TV dual display

axis-top: y position for top-left corner of video window on LCD in pixel

axis-left: x position for top-left corner of video window on LCD in pixel

disp-width: width of display window on LCD in pixel

disp-height: height of display window on LCD in pixel

tv-axis-top: y position for top-left corner of video window on TV in pixel

tv-axis-left: x position for top-left corner of video window on TV in pixel

tv-disp-width: width of display window on TV in pixel

tv-disp-height: height of display window on TV in pixel

tv-system: tv system setting, 0 for NTSC, 1 for PAL, 2 for 720P

Following command illustrate to playback avi file by playbin2 with mfw\_isink

```
Gst-launch playbin2 uri=file:///test.avi
```

Run the gst-launch command in different terminal windows will show several videos.

## A.1.2 Totem player

Different user accounts are required to run multiple totem applications. Please type

```
totem test.avi
```

in a terminal window with correctly user account to playback test.avi file.

Run several totem by use different user accounts will show several video windows. Also the window can move/resize separately.

---

## Appendix B: Subtitle support

Currently only text-based external subtitle(.srt) is support through mfw\_isink and playbin2 plugins. It can be enabled by using gst-launch or totem. Please reference section A.1 for instructions before use mfw\_isink with playbin2

For gst-launch, please use following command to enable subtitle feature.

```
gst-launch playbin uri=file:///test.avi suburi=file:///test.srt
```

It will playback test.avi with external subtitle file test.srt

For totem, use menu “View”->”Subtitle”->”Select Text Subtitles...” to select a external subtitle file.

## Appendix C: DLNA/UPnP support

Freescall multimedia framework support totem application runs as a DLNA/UPnP client. Please make sure the totem-plugins-extra package is installed for your Ubuntu system on i.MX51 or i.MX53 board.

Also a DLNA/UPnP server with media files sharing is required.

Use menu “Edit”->”Plugins...” to open “Configure Plugins” dialog, enable the “Coherence DLNA/UPnP Client”.

In the sidebar of the totem window, select “Coherence DLNA/UPnP Client”. The media servers will be listed. Choose the media file to playback.