



# Qualcomm Linux Migration Guide

80-70018-150 AB

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# 1 Qualcomm Linux migration

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This guide aids you in migrating your software to Qualcomm® Linux® 1.4. It details the behavioral changes in the 1.4 release compared to the 1.3 release, focusing on key updates and improvements. This is particularly relevant if you're a current developer looking to update your existing software to the latest Qualcomm Linux release.

If you're new to Qualcomm Linux and using the latest release, there's no need to migrate your software.

With the 1.4 release, Qualcomm Linux has upgraded to the latest long-term support (LTS) version of Yocto 5.0, known as Yocto `scarthgap`. Additionally, the generic buffer management (GBM) memory manager and Weston drivers have transitioned to upstream versions, replacing the downstream versions used in 1.3 and earlier releases.

For the list of new features, enhancements, and limitations of the latest release, see [Qualcomm Linux 1.4 Release Notes](#).

## 1.1 Changes in Yocto

The changes in Yocto for the 1.4 release are as follows:

- The Yocto release has been upgraded from `kirkstone` (v4.0.22) to `scarthgap` (v5.0.6). For the features and enhancements of `scarthgap`, see [Release notes for 5.0 \(scarthgap\)](#).
- The GNU Compiler Collection (GCC) compiler has been upgraded to v13.2. To avoid compatibility issues, recompile any prebuilt applications with the latest 1.4 release.

## 1.2 Changes in memory manager

In the 1.4 release, the upstream [libgbm package](#) for memory management replaces the downstream variant. This change affects the memory formats and GBM functionality across display, graphics, video, and camera modules.

For the list of formats supported by the upstream GBM, see the [mesa repository](#).

## 1.3 Changes in display

In the 1.4 release, the display stack of the QCS6490 and QCS5430 system-on-chip (SoC) platforms has migrated to a fully upstream solution, eliminating the need for the proprietary Snapdragon® Display Manager (SDM) backend. The QCS8275 and QCS9075 SoC platforms already use an upstream display solution.

Due to this migration, some features that depend on the SDM component aren't available by default. If you need these features, you can switch the display stack to the downstream implementation.

To enable these features, use the information in the following table:

Feature	Enable in 1.4
Embedded DisplayPort (eDP) support	Enable the downstream path as described in <a href="#">Qualcomm Linux Display Guide - Addendum</a> .
TypeC over DisplayPort (DP)	Enable the downstream path as described in <a href="#">Qualcomm Linux Display Guide - Addendum</a> .
Prebuild modetest binary	In the <code>libdrm_2.4.120.bb</code> file, enable the <code>install-test-programs</code> option. For more information, see <a href="#">Qualcomm Linux Display Guide</a> .

## 1.4 Changes in camera

In the 1.4 release, the buffer management utility uses the upstream GBM component instead of the downstream component. Therefore, change the Qualcomm Intelligent Multimedia (QIM) commands that invoke camera buffer management.

The default format for raw buffers is now `memory:GBM`. You needn't specify the memory format in the `gst` commands.

### Pipeline example

- The pipeline for the 1.3 release is as follows:

```
gst-launch-1.0 qtiqmmfsrc name=camsrc video_0::type=preview ! video/x-raw(memory:GBM),format=NV12,width=1920,height=1080,framerate=30/1,compression=ubwc ! waylandsink fullscreen=true async=true sync=false
```

- The pipeline for the 1.4 release is as follows:

```
gst-launch-1.0 -e qtiqmmfsrc name=camsrc video_1::type=preview ! video/x-raw,format=NV12,width=1920,height=1080,framerate=30/1,interlace-mode=progressive,colorimetry=bt601 ! waylandsink
```

```
fullscreen=true sync=false
```

For more information about changes in the plugins, see [Changes in QIM SDK](#).

## 1.5 Changes in video

To manage buffers for video encoding or decoding, the 1.4 release supports direct memory access (DMA) Export mode (4), DMA Import mode (5), and Memory Map (MMAP) mode (2). Select the appropriate mode based on your specific use case.

### Example

When you encode in camera, it already produces DMA buffers. In this case, do the following:

- Set the encoder input to DMA Import mode (5). This mode ensures that the camera buffer file descriptor (FD) is used directly, without allocating new buffer at video driver-side and copying the content.
- Set the encoder output to DMA Import mode (5). This mode ensures that the video driver allocates output buffers.

The video pipeline for this example is as follows:

```
gst-launch-1.0 qtiqmmfsrc ! video/x-raw,format=NV12,width=1920,
height=1080,framerate=30/1 ! v4l2h264enc output-io-mode=5 capture-io-
mode=4 ! h264parse ! mp4mux ! filesink location=/opt/cam_enc.mp4
```

In this pipeline, the `output-io-mode` is DMA Import mode (5), indicating input to the encoder, and the `capture-io-mode` is DMA Export mode (4), indicating output to the encoder.

## 1.6 Changes in QIM SDK

In the QIM SDK 1.4 release, the behavior of the `waylandsink`, `qtiqmmfsrc`, `v4l2h264dec`, and `v4l2h264enc` plugins has changed due to the upstream migration of the memory manager component. For more details, see [Changes in memory manager](#).

To reflect the changes in the QIM SDK plugins and the upstream GBM alignment, update the sample applications as follows.

## waylandsink plugin

Earlier versions of the QIM SDK used a downstream version of the `waylandsink` plugin, which included `x, y, width, height` coordinates as extra arguments. In later releases, this functionality is not available due to the switch to the upstream `waylandsink` plugin. Applications should now use the `qtivcomposer` plugin for this functionality.

The plugin changes and the corresponding actions you must take are as follows:

Change		Action
1.3	1.4	
Has <code>x, y, width, height</code> coordinates.	Provides functionality through the <code>qtivcomposer</code> plugin.	Use the <code>qtivcomposer</code> plugin for composition.

### Pipeline example

- The pipeline for the 1.3 release is as follows:

```
gst-launch-1.0 -e qtivcomposer name=mixer sink_0::position="<0, 0>"
sink_0::dimensions="<1280, 720>" sink_1::position="<590, 310>" sink_
1::dimensions="<640, 360>" mixer. ! queue ! waylandsink enable-last-
sample=false sync=true fullscreen=true filesrc location=/opt/mux1.mp4
! qtdemux ! queue ! h264parse ! v4l2h264dec capture-io-mode=5 output-
io-mode=5 ! mixer. filesrc location=/opt/mux1.mp4 ! qtdemux ! queue !
h264parse ! v4l2h264dec capture-io-mode=5 output-io-mode=5 ! mixer.
```

- The pipeline for the 1.4 release is as follows:

```
gst-launch-1.0 -e qtivcomposer name=mixer sink_0::position="<0, 0>"
sink_0::dimensions="<1280, 720>" sink_1::position="<590, 310>" sink_
1::dimensions="<640, 360>" mixer. ! queue ! waylandsink
fullscreen=true filesrc location=/opt/mux1.mp4 ! qtdemux ! queue !
h264parse ! v4l2h264dec capture-io-mode=4 output-io-mode=4 ! video/x-
raw, format=NV12 ! mixer. filesrc location=/opt/mux1.mp4 ! qtdemux !
queue ! h264parse ! v4l2h264dec capture-io-mode=4 output-io-mode=4 !
video/x-raw, format=NV12 ! mixer.
```

## qtiqmmfsrc plugin

From the 1.4 release, the `qtiqmmfsrc` plugin doesn't support the compression field for universal bandwidth compressed (UBWC) NV12. Instead, the clients must use the new format specifically designed for UBWC compressed NV12 images.

The plugin changes and the corresponding actions you must take are as follows:

Change		Action
1.3	1.4	
<code>format=NV12</code> <code>compression=ubwc</code>	<b>Added</b> <code>format=NV12_Q08C</code>	<ul style="list-style-type: none"> <li>• Change the format from <code>format=NV12</code> to <code>format=NV12_Q08C</code>.</li> <li>• Remove the <code>compression=ubwc</code> parameter.</li> </ul>

### Pipeline example

- The pipeline for the 1.3 release is as follows:

```
gst-launch-1.0 qtiqmmfsrc name=camsrc video_0::type=preview ! video/x-raw(memory:GBM),format=NV12,width=1920,height=1080,framerate=30/1,compression=ubwc ! v4l2h264enc output-io-mode=5 capture-io-mode=5 ! h264parse ! filesink location=/opt/video.h264
```

- The pipeline for the 1.4 release is as follows:

```
gst-launch-1.0 -ev qtiqmmfsrc name=camsrc video_0::type=preview ! video/x-raw,format=NV12_Q08C,width=1920,height=1080,framerate=30/1 ! queue ! v4l2h264enc output-io-mode=5 capture-io-mode=4 ! h264parse ! filesink location=/opt/video.h264
```

## v4l2h264enc and v4l2h264dec plugins

In the earlier releases, the GST framework managed the application buffers. From the 1.4 release, the v4l2 drivers support buffer management internally.

To add this enhancement to the driver, do the following:

- For applications using the camera source with the v4l2h264enc plugin, change the pipeline configuration from `output-io-mode=5/ capture-io-mode=5` to `output-io-mode=5/ capture-io-mode=4`.
- For applications using the filesource with the v4l2h264dec plugin, change the pipeline configuration from `output-io-mode=5/ capture-io-mode=5` to `output-io-mode=4/ capture-io-mode=4`.

The plugin changes and the corresponding actions you must take are as follows:

Use case	Change		Action
	1.3	1.4	
Video encode	<code>format=NV12</code> <code>compression=ubwc</code>	Added <code>format=NV12_Q08C</code>	<ul style="list-style-type: none"> <li>• Change the format from <code>format=NV12</code> to <code>format=NV12_Q08C</code>.</li> <li>• Remove the <code>compression=ubwc</code> parameter.</li> </ul>
	<code>output-io-mode=5</code> and <code>capture-io-mode=5</code>	Updated to <code>output-io-mode=5</code> and <code>capture-io-mode=4</code>	Change the modes to <code>output-io-mode=5</code> and <code>capture-io-mode=4</code> .
Video decode	<code>output-io-mode=5</code> and <code>capture-io-mode=5</code>	<ul style="list-style-type: none"> <li>• Added caps and <code>format=NV12</code></li> <li>• Updated to <code>output-io-mode=4</code> and <code>capture-io-mode=4</code></li> </ul>	<ul style="list-style-type: none"> <li>• Add <code>video/x-raw, format=NV12</code>.</li> <li>• Change the modes to <code>output-io-mode=4</code> and <code>capture-io-mode=4</code>.</li> </ul>



## Pipeline example

- The video decoder pipeline for the 1.3 release is as follows:

```
gst-launch-1.0 -e filesrc location=/opt/mux1.mp4 ! qtdemux ! queue !
h264parse ! v4l2h264dec capture-io-mode=5 output-io-mode=5 !
waylandsink fullscreen=true
```

- The video decoder pipeline for the 1.4 release is as follows:

```
gst-launch-1.0 -e filesrc location=/opt/mux1.mp4 ! qtdemux ! queue !
h264parse ! v4l2h264dec capture-io-mode=4 output-io-mode=4 ! video/x-
raw,format=NV12 ! waylandsink fullscreen=true
```

- The video encoder pipeline for the 1.3 release is as follows:

```
gst-launch-1.0 -e qtiqmmfsrc name=camsrc video_0::type=preview !
video/x-raw(memory:GBM),format=NV12,width=3840,height=2160,
framerate=30/1,compression=ubwc,interlace-mode=progressive,
colorimetry=bt601 ! queue ! v4l2h264enc capture-io-mode=5 output-io-
mode=5 ! queue ! h264parse ! mp4mux ! queue ! filesink location="/
opt/mux1.mp4"
```

- The video encoder pipeline for the 1.4 release is as follows:

```
gst-launch-1.0 -e qtiqmmfsrc name=camsrc video_0::type=preview !
video/x-raw,format=NV12_Q08C,width=3840,height=2160,framerate=30/1,
interlace-mode=progressive,colorimetry=bt601 ! queue ! v4l2h264enc
capture-io-mode=4 output-io-mode=5 ! queue ! h264parse ! mp4mux !
queue ! filesink location="/opt/mux1.mp4"
```

## 1.7 Next steps

- To update over-the-air (OTA) for Qualcomm Linux, see [Qualcomm Linux Yocto Guide](#).
- To learn more about the new features, enhancements, and limitations of the Qualcomm Intelligent Multimedia Product (QIMP) SDK, see [Qualcomm Linux QIMP SDK Release Notes](#).
- To learn more about the new features, enhancements, and limitations of the latest release, see [Qualcomm Linux 1.4 Release Notes](#).

## 2 References

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### 2.1 Reference documents

Document title	DCN
<a href="#">Qualcomm Linux Kernel Guide</a>	80-70018-3
<a href="#">Qualcomm Linux Display Guide</a>	80-70018-18
<a href="#">Qualcomm Linux Display Guide - Addendum</a>	80-70018-18A
<a href="#">Qualcomm Linux Yocto Guide</a>	80-70018-27
<a href="#">Qualcomm Linux QIMP SDK Release Notes</a>	80-70018-52
<a href="#">Qualcomm Linux 1.4 Documentation</a>	80-70018-115
<a href="#">Qualcomm Linux 1.4 Release Notes</a>	RNO-250403001134

### 2.2 Acronyms and terms

Acronyms/terms	Definition
DMA	Direct memory access
DP	DisplayPort
eDP	Embedded DisplayPort
FD	File descriptor
GBM	Generic buffer management
GCC	GNU Compiler Collection
HDR	High Dynamic Range
IoT	Internet of Things
LTS	Long-term support
MMAP	Memory map
QIM	Qualcomm Intelligent Multimedia
QIMP	Qualcomm Intelligent Multimedia Product
SDK	Software development kit
SDM	Snapdragon Display Manager
SoC	System-on-chip
UBWC	Universal bandwidth compression

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