

i.MX Linux® Release Notes

1 Overview

This document contains important information about the package contents, supported features, known issues and limitations in this release.

For information on changes in this release, see the manifest Readme at <index: imx-manifest.git> and the Change Logs at <index: imx-manifest.git>.

Supported hardware SoC/board

- i.MX 8MMini EVK Board (Alpha Quality)

NOTE

In this document, the following notation is used:

- 8MMini stands for the i.MX 8MMini EVK Platform.

The following table lists what testing validation scope was done for each SoC. The following list is what each validation type means:

- No build or test
- Build - verified it builds but no testing
- BSP Automation Test - limited automated testing for previously GA SoC
- Graphics Conformance Test - BSP testing and graphics conformance

Contents

1	Overview.....	1
2	What's New?.....	5
3	SoC Feature Summary.....	6
4	BSP Supported Features.....	6
5	Kernel Boot Parameters.....	8
6	Known Issues/Limitations.....	8
7	Multimedia.....	9
8	Revision History.....	13



Overview

- Alpha Test - alpha quality verification
- Beta Test - beta quality verification
- Full Test - general availability tests including stress tests, multimedia and graphics testing
- Unsupported - no testing

Table 1. Validation

SoC	Test Validation Scope
8MMini	Alpha Test

1.1 Release contents

This release consists of the following package files:

- Prebuilt images
- Manufacturing tools (not supported by the Alpha release)
- Documentation

The following tables list the contents included in each package.

Table 2. Release contents

Component	Description
Linux® OS Kernel and Device Trees	4.9.88
U-Boot	v2017.03
SD Card images	Pre-built images for download, and image files with a selection of packages and libraries needed for the common tests.
Manufacturing Tools	MFGTools is a program used to burn a production image into the board using a set of predefined parameters, such as the target memory to be used. USB recognition may fail in serial download mode. You can use SD boot mode without an SD card in socket to force ROM to enter serial download mode, and then the MFGTools can work.

In the following table, the U-Boot configurations are listed for each machine configuration. The machine configurations are provided through the Yocto Project layers in the meta-freescale and meta-fsl-bsp-release layers in the `conf/machine` sub-directory.

Table 3. U-Boot configurations

U-Boot configuration for Boot device	Description	Supported machine configuration
sd	This supports booting from the SD card. This is the default U-Boot configuration.	imx8mmevk
flexspi	This supports FlexSPI boot.	imx8mmek

The following table describes the kernel and device trees included in this release. A list of several device tree files are provided for each board to offer examples on how to handle different pin conflicts due to pin muxing.

Table 4. Kernel and device tree configurations

Kernel and device tree configuration	Description
Kernel Binary Image	MX8 Image kernel is built with defconfig in arch/arm64/configs/.
Default DTB	Each reference board has a standard device tree as follows: <ul style="list-style-type: none"> • Image-fsl-imx8mm-evk.dtb
8MMini DTB	<ul style="list-style-type: none"> • Image-fsl-imx8mm-evk.dtb • Image-fsl-imx8mm-evk-ak4497.dtb • Image-fsl-imx8mm-evk-ak5558.dtb • Image-fsl-imx8mm-evk-m4.dtb • Image-fsl-imx8mm-evk-tdm.dtb

The release package contains the following pre-built images.

Table 5. Pre-built images

Package	Description
XWayland SDCard	<ul style="list-style-type: none"> • fsl-image-validation-imx-xwayland-imx8mmevk.tar.bz2
Kernel	Kernel and device trees as specified in Table 3.
U-Boot	U-Boot files as specified in Table 2.
mfgtools_with_rootfs.tar.gz	Manufacturing tools with the rootfs support.
M4-Demo	i.MX 8MMini M4 demos: <ul style="list-style-type: none"> • imx8mm_m4_hello_world.bin • imx8mm_m4_TCM_hello_world.bin • imx8mm_m4_TCM_rpmsg_lite_pingpong_rtos_linux_remote.bin • imx8mm_m4_TCM_rpmsg_lite_str_echo_rtos.bin

Table 6. imx-yocto-L4.9.88_2.1.0-8mm-alpha.tar.gz content

File name	Description
README	README for L4.9.88_2.1.0_8mm-alpha.
/doc	The following docs are provided for Consolidated GA Releases: i.MX Linux® Release Notes, User's Guide, and Yocto Project User's Guide.

Table 7. Multimedia standard packages

File name	Description	Comment
imx-codec-4.4.1.bin	i.MX codecs	i.MX optimized A/V core codec
imx-parser-4.4.1.bin	i.MX parser	i.MX optimized core parser

Contact a marketing representative to get access to the following controlled packages.

Table 8. Controlled access packages

File name	Description	Comment
imx-aacpcodec-4.4.1.bin	AACplus decoder	i.MX optimized AACplus decoder
imx-mscodec-4.4.1.bin	Microsoft codecs	i.MX optimized Microsoft codecs
imx-msparser-4.4.1.bin	Microsoft parser	i.MX optimized Microsoft ASF parser
imx-ac3codec-4.4.1.bin	AC3 decoder	i.MX optimized Dolby audio AC3 decoder
imx-ddpcodec-4.4.1.bin	DDplus decoder	i.MX optimized Dolby audio DDplus decoder
imx-real-4.4.1.bin	Real Networks codecs and parser	i.MX optimized Real Networks real audio decoder, real media parser.

1.2 License

The Board Support Package (BSP) is composed of a set of packages and metadata (for Yocto Project Recipes) and each one has its own licensing. Verify the license of the target package before developing. The license can be found at the top of a recipe or a source file (such as *.c or *.h). For details, contact your NXP representative.

The following components are released as binary files on the Yocto Project Mirror and have NXP Proprietary Licenses. During the Yocto Project setup, to set up an i.MX build, accept the NXP license. This acceptance is recorded in the build configuration files so that the following proprietary binaries can be extracted during the build process. The NXP proprietary packages contain a Software Content Register (SCR) file that lists information about the package: imx-gpu-viv, imx-codec, and imx-parser.

1.3 Proprietary Licensing Packages

i.MX packages can be found in two locations:

- Standard packages are provided on the NXP mirror. They are accessed automatically by the Yocto Project scripts as needed.
- Limited Access packages listed in the following table are provided on nxp.com with controlled access. Contact your sales representative for access. These include codecs to support WMA, WMV, RMVB, AAC+, AC3, DD+ decoding, encoding, WMA, Broadcom firmware, and E Ink firmware. Each package has its own Readme file with instructions on how to build, install, and run.

Table 9. Limited access packages for Yocto project releases

Name	Package	Comment
AACPlus Decoder	imx-aacpcodec-4.4.1.bin	i.MX AACplus core decoder
Microsoft Codec	imx-mscodec-4.4.1.bin	i.MX optimized MS codec
Microsoft Parser	imx-msparser-4.4.1.bin	i.MX optimized ASF parser
AC3 Decoder	imx-ac3codec-4.4.1.bin	i.MX AC3 core decoder
DDplus Decoder	imx-ddpcodec-4.4.1.bin	i.MX DD-plus decoder
RMVB Decoders and Parser	imx-real-4.4.1.bin	i.MX Real Networks

1.4 References

i.MX has multiple families supported in software. The following are the listed families and SoCs per family. The i.MX Linux[®] Release Notes will describe which SoC is supported in current release. Some previously released SoC might be buildable in current release but not validated if they are at the previous validated level.

- i.MX 6 Family: 6QuadPlus, 6Quad, 6DualLite, 6SoloX, 6SoloLite, 6SLL 6UltraLite, 6ULL
- i.MX 7 Family: 7Dual, 7ULP
- i.MX 8 Family: 8QuadMax
- i.MX 8M Family: 8MQuad, 8MMini
- i.MX 8X Family: 8QuadXPlus

This release includes the following references and additional information.

- *i.MX Linux[®] Release Notes (IMXLXRN)* - Provides the release information.
- *i.MX Linux[®] User's Guide (IMXLUG)* - Contains the information on installing U-Boot and Linux OS and using i.MX-specific features.
- *i.MX Yocto Project User's Guide (IMXLXYOCTOUG)* - Contains the instructions for setting up and building Linux OS in the Yocto Project.

2 What's New?

This section describes the changes in this release, including new features and defect fixes.

2.1 New features

A summary of the main new features is as follows.

Features on i.MX 8MMini

- Supports booting from SD, eMMC, and FlexSPI.
- Supports low-power features: CPU hot-plug, ARM DVFS, and CPU idle.
- Supports 1080p60 display with ADV7535 (MIPI-HDMI adapter).
- Supports 1080p30 camera with OV5640.
- Supports Wayland Weston accelerating with GPU2D.
- Supports audio capture from PDM microphone.
- Supports Audio expansion board for:
 - Multiple-channel audio receiver and transmitter
 - SPDIF receiver and transmitter
- Supports 1080p60 video playback of HEVC, H264, VP9, and VP8.

3 SoC Feature Summary

The following table describes the SoC features summarized into groups. In this table, common features are shown on which SoC it supports. As SoC are differentiated, common features can be shown per SoC and future tables can show difference

Table 10. SoC Hardware Acceleration Features

Feature	SoC
2D Graphics with GPU	i.MX 8M Family: 8MMini
3D GPU	i.MX 8M Family: 8MQuad, 8MMini
VPU	i.MX 8M Family: 8MQuad, 8MMini
DRM Display	i.MX 8M Family: 8MQuad, 8MMini
M4 Boot	i.MX 8M Family: 8MQuad, 8MMini

4 BSP Supported Features

The following table describes the features that are supported in this BSP release. In this table, if no board is explicitly stated, the feature is shared across all boards listed in Supported Hardware in the Release contents section; otherwise, the feature is only supported on the boards listed.

Table 11. Supported features

Feature	Supported board	Comment
Kernel		
Kernel	All i.MX	Kernel version: 4.9.88
File System	All i.MX	EXT2/EXT3/EXT4 are used as the file system in MMC/eMMC/SD card.
Bootloader		
U-Boot	All i.MX	U-Boot delivery is based on U-Boot version v2017.03. Clock, Anatop regulator, ENET, UART, MMC/SD, eMMC4.3/4.4/4.5. High-Assurance Boot, ROM Plug-in Mode. SPI-NOR, NAND, FlexSPI-NOR, USB Mass Storage. See Table 2 in Section 1.1 for U-Boot configurations supported on each board for SPI_NOR, NAND, Parallel NOR, FlexSPI-NOR. These are not supported on all boards. 8MMini, 8MQuad, 8QuadMax, and 8QuadXPlus use seek=33 bs=1k.
Machine-specific layer		
Arm® Core	All i.MX	i.MX 8MQ and i.MX 8MMini supports four Cortex-A53 cores.
Memory	All i.MX	On i.MX 8 with 64-bit configuration, the memory is not split.
Interrupt	All i.MX	GIC.
Clock	All i.MX	Controls the system frequency and clock tree distribution.
Timer (GPT)	All i.MX	System timer tick and broadcast timer support.

Table continues on the next page...

Table 11. Supported features (continued)

Feature	Supported board	Comment
GPIO/EDIO	All i.MX	GPIO is initialized in earlier phase according to hardware design.
Character device drivers		
MXC UART	All i.MX	i.MX 8 supports Cortex-A53 processor through UART0 and Cortex-M4 processor through UART2.
Networking drivers		
IEEE® 1588		<p>Supports Linuxptp stack.</p> <p>Features:</p> <ul style="list-style-type: none"> • Supports IPv4, IPv6, and IEEE 802.3 transport. • Supports E2E, and P2P transparent clock. • Supports IEEE802.1AS-2011 in the role of end station. <p>Note:</p> <p>Linuxptp stack is open source.</p> <p>Command instance:</p> <pre>ptp4l -A -4 -H -m -i eth0</pre>
Wi-Fi/Bluetooth wireless technology	8MMini	Supports Murata 1PJ (QCA9377) Wi-Fi/Bluetooth on i.MX 8MMini.
Sound drivers		
Input device drivers		
USB devices	All i.MX	Supports USB mouse and USB keypad through USB ports.
MTD driver		
FlexSPI-NOR	8MMini	i.MX 8MMini supports NOR Flash Boot.
USB drivers		
USB Device	All i.MX	Supports USB OTG device mode.
USB	All i.MX	<p>Supports USB OTG2.0, USB Host2.0.</p> <p>USB Host mode: MSC, HID, UVC, and USB audio.</p> <p>USB device mode: MSC, Ethernet, and Serial.</p> <p>USB OTG pin detect support for Dual-role switch at USB2.</p>
Graphics drivers		
MIPI Display	8MMini	Supports MIPI display up to 1080p60 on i.MX 8MMini.
Multimedia Drivers		
General drivers		
uSDHC	All i.MX	<p>Supports SD2.0 and SDXC.</p> <p>Supports SD3.0 on all i.MX except 6SABRE-SD.</p>
Watchdog	All i.MX	Supports Watchdog reset.
I ² C	All i.MX	Supports I ² C master.
SPI	All i.MX	Supports SPI master mode.
PWM	All i.MX	Supports the backlight driver through PWM.
Temperature monitor	All i.MX	Pre-calibrated. See the "Thermal Driver" chapter in <i>i.MX Linux[®] Reference Manual (IMXLXRM)</i> for more information.

5 Kernel Boot Parameters

Depending on the booting or usage scenario, you may need different kernel boot parameters.

The following table describes different boot parameters.

Table 12. Common kernel boot parameters

Kernel parameter	Description	Typical value	Used when
console	Where to output the kernel logging by printk.		All use cases
nosmp	A command-line option of 'nosmp' disables SMP activation entirely.	nosmp	CONFIG_SMP is defined. Use this to disable SMP activation. SMP is activated by default through the CONFIG_SMP configuration.
ip	Tells the kernel how or whether to get an IP address.	ip=none ip=dhcp ip=static_ip_address	"ip=dhcp" or "ip=static_ip_address" is mandatory in "boot from TFTP/NFS."
nfsroot	Location of the NFS server/directory.	nfsroot=<ip_address>:<rootfs path>	Used in "boot from tftp/NFS" together with "root=/dev/nfs."
root	Location of the root file system.	root=/dev/nfs or root=/dev/mmcblk0p2	Used in "boot from tftp/NFS" (that is, root=/dev/nfs); Used in "boot from SD" (that is, root=/dev/mmcblk0p2).
rootfstype	Indicates the file system type of the root file system.	rootfstype=ext4	Used in "boot from SD" together with "root=/dev/mmcblkXpY" (X is the MMC device number while Y is the rootfs partition number.)
rootwait	Waits (indefinitely) for the root device to show up.	rootwait	Used when mounting SD root file system.
mem	Tells the kernel how much memory can be used.	None or mem=864M	Note: MemTotal-<mem> - <gpu_memory> is reserved.
fec.macaddr	Tells the Ethernet MAC address.	fec.macaddr=0x00,0x04,0x9f,0x01,0x30,0x05	Changes the FEC MAC address.

NOTE

For full command line list, see kernel source tree Documentation/Kernel-parameter.txt.

6 Known Issues/Limitations

Read through all hardware-related reference material and ensure that the necessary hardware modifications are made before using the software.

This Alpha release has no known issues.

7 Multimedia

This chapter contains the information on the 4.4.1 multimedia component of the BSP.

The GStreamer version in this release is 1.12.2.

7.1 i.MX GStreamer plugins

Table 13. i.MX GStreamer 1.0 plugins

Plugin	Features
Audio decoder	beepdec: unified audio decoder plugin Supports MP3, AAC, AAC+, WMA, AC3, Vorbis, DD+, AMR, RA
Demux	aiurdemux: aiur universal demuxer plugin supporting Supports AVI, MKV, MP4, MPEG2, ASF, OGG, FLV, WebM, RMVB
Video Decoder	vpudec: video decoder plugin based on the hardware video decoder
Video render	<ul style="list-style-type: none"> gimagesink: video sink based on EGL waylandsink: video sink based on wayland interfaces
OpenGL (ES) Plugins	<ul style="list-style-type: none"> gimagesink: OpenGL (ES)-based video sink plugin, supported in Wayland and FB backends gleffects: GL Shading Language effects plugin gldeinterlace: video deinterlacing based on shaders glvideomixer: compositing multiple videos together glcolorconvert: video color space convert based on shaders glcolorbalance: adjusting brightness, contrast, hue, and saturation on a video stream

NOTE

- To support WMA, AAC+, AC3, DD+, and RA decoding, install separate packages.
- OpenGL (ES) plugins are from the `gst-plugins-bad` package, accelerated with Vivante private APIs.

7.2 i.MX playback example

i.MX provides an example `gplay-1.0` application based on GStreamer's high-level API `GstPlayer`. The example provides the following functions.

Table 14. i.MX playback engine example

Function	Feature
Playback	<ul style="list-style-type: none"> Play, Stop Pause, Resume Fast seek, Accurate seek Playback rate control (fast forward, fast rewind, slow forward)
Media Info	<ul style="list-style-type: none"> Media meta data (artist, year, etc.)

Table continues on the next page...

Table 14. i.MX playback engine example (continued)

Function	Feature
	<ul style="list-style-type: none"> • Video Thumbnail • Audio Album Art
Subtitle	<ul style="list-style-type: none"> • Supports internal and external subtitle
Track Selection	<ul style="list-style-type: none"> • Audio Track Selection • Video Track Selection • Subtitle Selection
Display Control	<ul style="list-style-type: none"> • Resize

7.3 Multimedia feature matrix

This section provides feature matrix details of various codecs used for playback.

7.3.1 Parser/Demuxer specifications

The demuxer support of a particular audio or video type requires the availability of the codec.

Table 15. Parser/Demuxer supported audio/video

	Demuxer feature	ASF	AVI	MP4	OGG	FLV	MPG2	MKV	RMVB
MPEG2	-	Y	-	-	-	Y	Y	-	
MPEG4	Y	Y	Y	-	-	-	Y	-	
H263	-	Y	Y	-	Y	-	Y	-	
MJPEG	-	Y	Y	-	-	-	Y	-	
VC1	Y	Y	-	-	-	-	Y	-	
DivX	Y	Y	Y	-	-	-	Y	-	
Xvid	-	Y	-	-	-	-	Y	-	
VP8	-	-	-	-	-	-	Y	-	
VP6	-	-	-	-	Y	-	Y	-	
Theora	-	-	-	Y	-	-	-	-	
RV	-	-	-	-	-	-	Y	Y	
Audio	AAC	-	Y	Y	-	Y	Y	Y	Y
	MP3	Y	Y	Y	-	Y	Y	Y	-
	WMA	Y	Y	-	-	-	-	Y	-
	AC3	-	Y	Y	-	-	Y	Y	-
	PCM/ADPCM	Y	Y	Y	-	Y	Y	Y	-
	AMR	-	-	Y	-	-	-	Y	-
	Vorbis	-	Y	Y	Y	-	-	Y	-
	SPEEX	-	-	-	Y	Y	-	Y	-
	DTS	-	-	-	-	-	-	Y	Y

Table continues on the next page...

Table 15. Parser/Demuxer supported audio/video (continued)

	Demuxer feature	ASF	AVI	MP4	OGG	FLV	MPG2	MKV	RMVB
	FLAC	-	-	-	Y	-	-	Y	-
	DD+	Y	-	Y	-	-	Y	Y	-
	RA	-	-	-	-	-	-	-	Y

7.3.2 Audio codec specification

Table 16. Audio codec specification

Decoder	Feature/Profile	Channel	Sample rate (KHz)	Bit rate (kbps)	H/W or S/W	Comment
MP3	MPEG-1 (Layer-1/ Layer-2/Layer-3) MPEG-2 (Layer-1/ Layer-2/Layer-3) MPEG-2.5 (Layer-3)	stereo/mono	<= 48	8 - 448	8QuadXPlus supports H/W. 8QuadMax does not support H/W audio decoder.	-
AACLC	MPEG-2 AACLC MPEG-4 AACLC	<= 5.1	8 - 96	8 - 256	8QuadXPlus supports H/W. 8QuadMax does not support H/W audio decoder.	For H/W, it only supports mono and stereo channels.
HE-AAC	HE-AAC V1 HE-AAC V2	stereo/mono	8 - 96	Mono: 8 - 384 stereo: 16 - 768	S/W	-
WMA10 Std	L1 @ QL1	stereo/mono	44.1	64 - 161	S/W	-
	L2 @ QL1	stereo/mono	<= 48	<= 161	S/W	-
	L3 @ QL1	stereo/mono	<= 48	<= 385	S/W	-
WMA10 Pro	M0a @ QL2	stereo/mono	<= 48	48 - 192	S/W	-
	M0b @ QL2	stereo/mono	<= 48	<= 192	S/W	-
	M1 @ QL2	<= 5.1	<= 48	<= 384	S/W	-
	M2 @ QL2	<= 5.1	<= 96	<= 768	S/W	-
	M3 @ QL2	<= 7.1	<= 96	<= 1500	S/W	-
WMA 9 Lossless	N1	stereo/mono	<= 48	<= 3000	S/W	-
	N2	<=5.1	<= 96	<= 3000	S/W	-
	N3	<=7.1	<= 96	<= 3000	S/W	-
AC-3	-	<=5.1	<= 48	32 - 640	S/W	-
FLAC	-	<=7.1	8 - 192	-	N/A	-

Table continues on the next page...

Table 16. Audio codec specification (continued)

Decoder	Feature/Profile	Channel	Sample rate (KHz)	Bit rate (kbps)	H/W or S/W	Comment
BSAC	-	<=5.1	<= 48	64 per channel	N/A	Core codec only
Ogg Vorbis	q1 - q10	Stereo	8 - 192	<= 500	S/W	-
DD-plus	-	<=7.1	32, 44.1, 48 64, 88.2, 96	<= 6.144 Mbps	S/W	-
RA	cook	stero/mono	8k, 11.025k, 22.05k, 44.1k	-	S/W	-

NOTE

- The bitrate (bps) supported for MP3 encoder: 32 k, 48 k, 56 k, 64 k, 80 k, 96 k, 112 k, 128 k, 160 k, 192 k, 224 k, 256 k, 320 k
- The sample and supported bitrate (bps) combinations for WMA8 encoder:
 - For mono output:
 - 22050 Hz: 20 k, 16 k, 22 k, 17.6 k
 - 32000 Hz: 20 k, 22 k
 - 44100 Hz: 32 k, 35.2 k, 48 k, 52.8 k
 - For Stereo output:
 - 22050 Hz: 35.2 k, 32 k, 22 k, 20 k
 - 32000 Hz: 52.8 k, 48 k, 44 k, 40 k, 35.2 k, 32 k
 - 44100 Hz: 211.2 k, 192 k, 176 k, 160 k, 140.8 k, 128 k, 105.6 k, 96 k, 88 k, 80 k, 70.4 k, 64 k
 - 48000 Hz: 211.2 k, 192 k, 176 k, 160 k, 140.8 k, 128 k

7.3.3 Speech codec specification**Table 17. Speech codec specification**

	Feature	Sample rate	Bit rate (kbps)	H/W or S/W
Speech codec	G.711	8 KHz	64	S/W
	G.723.1	8 KHz	5.3, 6.3	S/W
	G.726	8 KHz	16, 24, 32, 40	S/W
	G.729ab	8 KHz	8	S/W
	AMR_NB	8 KHz	12.2, 10.2, 7.9, 7.4, 6.7, 5.9, 5.15, 4.75	S/W
	AMR_WB	16 KHz	23.85, 23.05, 19.85, 18.25, 15.85, 14.25, 12.65, 8.85, 6.6	S/W

7.3.4 Streaming protocol specification

Table 18. Streaming protocol specification

Protocol	Feature
HTTP	HTTP progressive streaming
RTSP	RTP, SDP
RTP/UDP	RTP/UDP MPEGTS streaming

7.3.5 Subtitle specification

Table 19. Subtitle specification

Internal/External	Subtitle format
Internal	SRT, SSA, ASS
External	SRT

7.4 Known issues and limitations for multimedia

None.

8 Revision History

This table provides the revision history.

Table 20. Revision history

Revision number	Date	Substantive changes
L4.9.51_imx8qxp-alpha	11/2017	Initial release
L4.9.51_imx8qm-beta1	12/2017	Added i.MX 8QuadMax
L4.9.51_imx8mq-beta	12/2017	Added i.MX 8MQuad
L4.9.51_8qm-beta2/8qxp-beta	02/2018	Added i.MX 8QuadMax Beta2 and i.MX 8QuadXPlus Beta
L4.9.51_imx8mq-ga	03/2018	Added i.MX 8MQuad GA
L4.9.88_2.0.0-ga	05/2018	i.MX 7ULP and i.MX 8MQuad GA release
L4.9.88_2.1.0_8mm-alpha	06/2018	i.MX 8MMini Alpha release

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