Document Number: ARN
Rev. P9.0.0_1.0.0-beta, 11/2018

Android™ Release Notes

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1 Release Description

The i.MX Android™ P9.0.0_1.0.0-beta release is a PRC (Beta) release for the Android Pie 9.0 (P) on NXP's i.MX 8M Mini, i.MX 8M Quad, i.MX 8QuadMax, and i.MX 8QuadXPlus applications processors.

i.MX Android P9.0.0_1.0.0-beta release includes all necessary code, documents, and tools to assist users in building and running the Android Pie 9.0 on the i.MX 8M Mini, i.MX 8M Quad, i.MX 8QuadMax, and i.MX 8QuadXPlus Board.

The prebuilt images are also included for a quick trial on NXP i.MX 8M Mini, i.MX 8M Quad, i.MX 8QuadMax, and i.MX 8QuadXPlus Board and Platforms.

This release includes all porting and enhancements based on the Android open source code.

Most of the deliveries in this release are provided in source code with the exception of some proprietary modules/libraries from third parties.

2 Supported Hardware SoC/ Boards

The supported hardware system-on-chip (SoCs)/boards are listed as follows:

- i.MX 8M Mini EVK Rev. B Board and Platform
- i.MX 8M Quad EVK Rev. B3/B4 Board and Platform
- i.MX 8QuadMax MEK Rev. B0 Board and Platform
- i.MX 8QuadXPlus MEK Rev. B0 Board and Platform

3 Release Package Contents

The P9.0.0_1.0.0-beta release package includes the following software and documents.

Table 1. Release package contents

i.MX Android proprietary source code package	• imx-p9.0.0_1.0.0-beta.tar.gz: i.MX Android proprietary source code package to enable Android on i.MX boards. For example, Hardware Abstraction Layer implementation, hardware codec acceleration, etc.
Documents	The following documents are included in android_p9.0.0_1.0.0-beta_docs.tar.gz • *Android™ Quick Start Guide* (AQSUG): A document that explains how to run the Android platform on an i.MX board using prebuilt images. • *Android™ User's Guide* (AUG): A document describing procedures for configuring and building this release package. • *Android™ Release Notes* (ARN): A document that introduces key updates and known issues in this release. • *i.MX Android™ Extended Codec Release Notes* (IMXACRN): A document that provides the extended codec information. • *Android™ Frequently Asked Questions* (AFAQ): A document that contains the answers to the Frequently Asked Questions (FAQs). • *i.MX Graphics User's Guide* (IMXGRAPHICUG): A document that describes GPU 2D API, Tools, Memory, and Application programming guidelines.
Tools	Tools in android_p9.0.0_1.0.0-beta_tools.tar.gz • VivanteVTK-6.2.4.p2.1.7.6.tgz: GPU tools for VeriSilicon GPU 6.2.4.p2 driver. For more information about these tools, see *i.MX Graphics User's Guide* (IMXGRAPHICUG). • fsl-sdcard-partition.sh: tool to make partition and flash Android images. • fastboot_imx_flashall.sh: A script for Linux system. It invokes fastboot tool to automatically flash Android images. • fastboot_imx_flashall.bat: A batch file for Windows system. It invokes fastboot tool to automatically flash Android images.
Prebuilt images	You can test the Android platform with a prebuilt image on i.MX reference board before building any code: • android_p9.0.0_1.0.0-beta_image_8mmevk.tar.gz: Prebuilt images with NXP extended features for the i.MX 8M Mini EVK board. The extended features include additional multimedia format support. • android_p9.0.0_1.0.0-beta_image_8mqevk.tar.gz: Prebuilt images with NXP extended features for the i.MX 8M Quad EVK board. The extended features include more multimedia format support. • android_p9.0.0_1.0.0-beta_image_8qmek.tar.gz: Prebuilt images with NXP extended features for the i.MX 8QuadMax/8QuadXPlus MEK board. The extended features include more multimedia format support. All prebuilt images are in a separate package. See the *Android™ Quick Start Guide* (AQSUG) and *Android™ User's Guide* (AUG) to choose the appropriate image.

4 Features

This section contains features in this package.

Table 2. Features

Feature	i.MX 8M Mini EVK	i.MX 8M Quad EVK	i.MX 8QuadMax MEK	i.MX 8QuadXPlus MEK	Remarks
Google Pie 9.0 release	Y	Y	Y	Y	Based on android-9.0.0_r8 release
Linux 4.14.62 kernel (merged with the AOSP kernel)	Y	Y	Y	Y	Based on Linux® OS BSP L4.14.62_1.0.0_beta release.
U-Boot	Y	Y	Y	Y	v2018.03.
Graphic-HW	Y	Y	Y	Y	VeriSilicon GC7000NanoUltr GPU with the 6.2.4.p2 driver for i.MX 8M Mini. VeriSilicon GC7000L GPU with 6.2.4.p2 driver for i.MX 8M Quad. VeriSilicon GC7000XSVX GPU with 6.2.4.p2 driver for i.MX 8QuadMax. VeriSilicon GC7000L GPU with 6.2.4.p2 driver for i.MX 8QuadXPlus.
Graphic-HW 3D acceleration	Y	Y	Y	Y	OpenGL ES1.1/2.0 through GC7000NanoUltr for i.MX 8M Mini. OpenGL ES1.1/2.0/3.1 through GC7000L for i.MX 8M Quad. OpenGL ES 1.1/2.0/3.1/3.2 through GC7000XSVX for i.MX 8QuadMax. OpenGL ES 1.1/2.0/3.1 via GC7000L for i.MX 8QuadXPlus.
Graphic-HW accelerated UI surface composition	Y	Y	Y	Y	OpenGL ES2.0 through GC7000NanoUltr for i.MX 8M Mini. OpenGL ES3.1 through GC7000L for i.MX 8M Quad, OpenGL ES 3.2 through GC7000XSVX for i.MX 8QuadMax. OpenGL ES 3.1 through GC7000L for i.MX 8QuadXPlus.
Boot source	SD/eMMC	SD/eMMC	SD/eMMC	SD/eMMC	-
Splash Screen	Y	Y	Y	Y	-
UI (input)	Y	Y	Y	Y	-
UI (display)	MIPI-to-HDMI/ MIPI panel display	HDMI/MIPI-to-HDMI/MIPI panel display	HDMI display	HDMI display	i.MX 8M Mini supports MIPI-DSI to HDMI display and MIPI Panel display.

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Table 2. Features (continued)

Feature	i.MX 8M Mini EVK	i.MX 8M Quad EVK	i.MX 8QuadMax MEK	i.MX 8QuadXPlus MEK	Remarks
					i.MX 8M Quad supports physical HDMI display, MIPI-DSI to HDMI display, and MIPI panel display. i.MX 8QuadMax supports LVDS-to-HDMI/MIPI-to-HDMI and physical HDMI display.
UI (dual display, HDMI+HDMI, UI mirror displayed on second device)	N	Y	Y	Y	Supports dual LVDS-to-HDMI display.
UI (brightness control)	N	N	N	N	-
Storage - External Media	Y	Y	Y	Y	USB 2.0 port supports udisk, but USB 3.0 port does not support udisk.
Connectivity - Ethernet	Y	Y	Y	Y	-
Connectivity - Bluetooth® wireless technology	Y	Y	Y	Y	Hardware: • Qualcomm 1PJ QCA9377 for i.MX 8M Mini • Qualcomm 1CQ QCA6174A for i.MX 8M Quad, i.MX 8QuadMax, and i.MX 8QuadXPlus. Profiles: • A2DP Source • AVRCP • BLE Central
Connectivity - Wi-Fi	Y	Y	Y	Y	Hardware: • Qualcomm 1PJ QCA9377 for i.MX 8M Mini • Qualcomm 1CQ QCA6174A for i.MX 8M Quad, i.MX 8QuadMax, and i.MX 8QuadXPlus Features: • AP mode • Wi-Fi Direct • STA mode
Connectivity - USB Tethering	Y	Y	Y	Y	Supports Wi-Fi and Ethernet as upstream.
Power - CPU Freq	Y	Y	Y	Y	-
Power - Bus Freq	Y	Y	Y	Y	-
Media - Music Play	Y	Y	Y	Y	SSI + WM8524 for i.MX 8M Mini and i.MX 8M Quad. ESAI+CS42888 for i.MX 8QuadMax (not support multichannel).

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Table 2. Features (continued)

Feature	i.MX 8M Mini EVK	i.MX 8M Quad EVK	i.MX 8QuadMax MEK	i.MX 8QuadXPlus MEK	Remarks
					ESAI+CS42888 for i.MX 8QuadXPlus (supports multichannel).
Media-Sound Record	Y	Y	Y	Y	-
Media - Video Play	Y	Y	Y	Y	-
Media - Camera	Y	Y	Y	Y	OV5640CSI for i.MX 8M Mini and i.MX 8M Quad. OV5640MIPI for i.MX 8QuadXPlus. For i.MX 8M Quad, the camera cannot co-work with MIPI Display due to the I2C address conflict.
Media - TVIN	N	N	N	N	-
Media - Dual Camera	Y	Y	Y	Y	Dual OV5640MIPI for i.MX 8QuadMax OV5640MIPI and OV5640CSI for i.MX 8QuadXPlus
Media - Camcorder	Y	Y	Y	Y	-
Media - USB Camera	Y	Y	N	N	USB camera supports C920, C270, and C525.
Media - USB Mic	Y	Y	Y	Y	-
Media - HDMI audio output	N	Y	N	N	-
Media-DSD Playback	Y	Y	N	N	DSD stream output from Audio Expansion Board.
Media-PlayReady DRM	N	Y	N	N	Moderated download for licensees
Media-WideVine DRM	N	Y	N	N	Moderated download for licensees
Media-M4 Playback	Y	N	N	N	Audio playback based on FreeRTOS on the Cortex-M4 core for i.MX 8M Mini.
Media-Hi-Res audio output	Y	N	N	N	High resolution audio output from Audio Expansion Board for i.MX 8M Mini. • 2 channel: 384000, 768000 sampling rate • 4 channel: 48000, 96000, 192000, 384000, 768000 sampling rate • 6 channel: 48000, 96000, 192000, 384000 sampling rate • 8 channel: 48000, 96000, 192000, 384000 sampling rate
Misc - ADB over USB	Y	Y	Y	Y	-
Misc - Fastboot utility	Y	Y	Y	Y	-

Table continues on the next page...

Table 2. Features (continued)

Feature	i.MX 8M Mini EVK	i.MX 8M Quad EVK	i.MX 8QuadMax MEK	i.MX 8QuadXPlus MEK	Remarks
Misc - SW update and factory reset	Y	Y	Y	Y	-
Sensor - Magnetometer	N	N	Y	Y	FXOS8700
Sensor - Accelerometer	N	N	Y	Y	FXOS8700
Sensor - Gyroscope	N	N	Y	Y	FXAS2100
Sensor - Light	N	N	Y	Y	ISL29023
Sensor - Pressure	N	N	Y	Y	MPL3115
Sensor - Temperature	N	N	Y	Y	MPL3115
File Based Encryption	N	N	Y	Y	-
USB Accessory	Y	Y	Y	Y	Google AOA v2.0
Screen Recording	Y	Y	Y	Y	-
Ethernet APK	Y	Y	Y	Y	-
webGL	Y	Y	Y	Y	-
Vulkan	N	Y	Y	Y	-
OTA for A/B	Y	Y	Y	Y	-
USB Type-C PD	Y	Y	Y	Y	Supports power role switch with devices that support USB power delivery
DM Verity	Y	Y	Y	Y	-

5 Multimedia Codecs

For multimedia codecs and features, see Section 5 in the Google Pie 9.0 Compatibility Definition Document (CDD).

6 Extended Feature Packages

An enhanced multimedia experience is available for the Android platform. This release delivers an error-resilient, feature-rich multimedia solution by extending the existing multimedia features of the Android platform and introduces additional features.

For more information about the features below, contact "L2manager-android@nxp.com". For detailed extended and additional features, see *i.MX Android™ Extended Codec Release Notes* (IMXACRN).

7 Change Logs

None.

8 Known Issues and Limitations

The known issues about the hardware and hardware rework instructions are not included in this document. There may be hardware-related reference materials for some reference boards. Make sure to check the link i.MX Application Processors to see if it is applicable.

Table 3. Known issues and limitations

Issue description	Remarks
The Google USB driver must be installed multiple times for the MTP, PTP, MTP&ADB, PTP&ADB, and ADB function settings.	Some Windows XP environments may display MTP and PTP windows even with only PTP enabled in the device.
U-Boot will hang when erasing Kingston SD card.	U-Boot will hang when sending the erase command on some Kingston SD cards.

9 Revision History

Table 4. Revision history

Revision number	Date	Substantive changes
P9.0.0_1.0.0-beta	11/2018	Initial release

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Document Number ARN
Revision P9.0.0_1.0.0-beta, 11/2018