

STM32MP15 distribution for Android release note

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This article describes the content of [STM32MPU distribution for Android software](#) release version **st-android-9.0.0-2019-09-27** (tag), which is part of [STM32MP15 ecosystem release note - v1.1.0](#).

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1 Intended audience

The targeted audience is STM32MP15 customers or partners.

2 Delivery scope and purpose

The STM32MPU distribution for Android™ provides all necessary components for running, developing and/or making your own platform based on Android™ framework. It runs on the Arm® Cortex®-A7 processors, and is a fundamental part of the [STM32MPU Embedded Software distribution for Android](#).

It is compatible with **Android 9.0.0 (Pie)**.

It is provided as **example**. The Android certifications are not insured.

This delivery of STM32MP15 distribution for Android™ v1.0.0 is part of STM32MP15-Ecosystem-v1.1.0 (see the [STM32MP15 ecosystem release note - v1.1.0](#)).

3 Licensing

This software package is licensed under a SOFTWARE LICENSE AGREEMENT (SLA). Customers may not use this package except in compliance with the [software license agreement \(SLA\)](#).

All of the packages use the same source components. All components and their respective licenses are listed [here](#).

4 Supported hardware

This software delivery is compatible with the following boards:

- STM32MP157C-EV1 Evaluation board. For more information on this board, please read the article [STM32MP157C-EV1 - hardware description](#)

5 Delivered features

5.1 Main software components

- Android version v9.0.0 (AOSP android-9.0.0_r46 tag)
- Kernel version v4.19.49 (AOSP common kernel) + updates for STM32MP1 and associated boards (waiting upstream finalization)
- TF-A version v2.0 + updates for STM32MP1 and associated boards (waiting upstream finalization)
- U-Boot version v2018.11 + updates for STM32MP1 and associated boards (waiting upstream finalization)
- OP-TEE version v3.3.0 + updates for STM32MP1 and associated boards (waiting upstream finalization)
- STM32CubeMP1 FW v1.1.0
- GCC version v8.2
- openOCD version v0.10.0
- GCnano version v6.2.4

5.2 Detailed features






















5.2.1 BSP features

The *STM32MP15 distribution for Android™* v1.0.0 is based on the OpenSTLinux BSP v1.1.0 described in the following chapters:

- [Linux Kernel](#)
- [U-Boot secondary bootloader](#)
- [TF-A primary bootloader](#)
- [OP-TEE trusted environment](#)

5.2.2 Android features

Domain	Feature	STM32MP15 Evaluation board	Comment
Boot	Fastboot	✓	Entering this mode through connect ST-Link console (uart) or by HW control
	Verified boot	✗	
	A/B mechanism	✗	A/B images available but boot on A by default
	Recovery	✗	
Multimedia	Audio speaker	✓	audio speaker output can be used only to connect headset
	Audio headset	✓	not selected by default (no headset detection)
	Audio built-in digital micro	✓	limited to one microphone (mono)
	Audio USB	✗	
	Camera	✓	
	Camera USB	✗	
	Video SW decode	✓	480p30 max. without audio
Security	SELinux	✓	
	Runtime verification	✗	
	Disk encryption	✗	
	Trusted environment	✓	OP-TEE
	Keystore	✗	only software backup used
Network and connectivity	Gatekeeper	✗	
	Ethernet	✓	
	Wifi	✓	Using TP-LINK dongle (TL-WN722N) for test purpose
	Wifi hotspot	✗	
	BT / BLE	✗	
	USB	✓	Mass storage / MTP / PTP

	Boot control	<i>Partially</i>	Available but not enable
Systems	Power control		
	Thermal control		Only one temperature managed for CPU/GPU (others are stubbed)
	Update engine		
Sensors	Accelerometer		
	Gyroscope		
	Magnetometer		
	Proximity		
	Pressure		
	Temperature		
	Hub		
	ADEB		Only for SELinux trace
Debug	ADB (USB)		
	ADB (Ethernet)		
	Perfetto		Several limitations with Android 9.0.0
	SYSTRACE		
Storage	Metrics		
	USB Key		
	microSD card		
Others	eMMC		
	Lights		
	Touchscreen		

6 Recommendations for use

6.1 Safe use

- Flash-load and boot from all supported Flash devices: SDCard and eMMC Flash memories
- Develop Android™ applications, libraries, kernel modules...
- Prototype applications based on ST boards
- Develop your own board based on STM32MP15x

6.2 Non-recommended use

- None

7 Main restrictions list

7.1 BSP restrictions list

- CubeMX configuration panels propose some internal peripheral modes not supported by TF-A or OP-TEE drivers running in Cortex-A7 secure context.

- The following table lists all known restrictions.

IP	Information/Restriction usage in Cortex-A7 secure context
I2C4/I2C6	The SMBus-two-wire-Interface mode proposed is not supported for Cortex-A7 secure context (TF-A , OP-TEE) as no use case foreseen
PWR	TF-A and OP-TEE implementation do not support wake-up events for secure IPs assigned to Cortex-A7 secure context
RCC	The master clock output1 et 2, Audio clock input modes proposed are not applicable for Cortex-A7 secure context (TF-A, OP-TEE)
SPI6	The SPI SW driver is not available in OP-TEE implementation for Cortex-A7 secure context
TAMP	OP-TEE implementation does not support TAMP_IN inputs and TAMP_OUT outputs in Cortex-A7 secure context
USART1	OP-TEE implementation does not support USART synchronous mode in Cortex-A7 secure context

7.2 Android restrictions list

STM32P15 distribution for Android™ is provided as example.

In this context:

- Android 9.0.0 with Linux Kernel 4.19 is not an association officially supported by the frameworks (several limitations to be expected)
- Compliance tests (VTS/CTS) are not insured (but they are executed and treated as much as possible)
- Security HAL (Keystore, Gatekeeper, Oemlock) are not available (removed from manifest) or stubbed
- Verified Boot and A/B boot mechanism not available (or partially)

Available on STM32MP15 Evaluation Board but not integrated in STM32P15 distribution for Android™:

- Audio headset detection is not available (need to force the usage)
- Audio RCA is not available (SPDIF input / SPDIF output)
- Audio digital microphone is limited to mono (record usage)
- Joystick is not available

8 Minor release updates

STMicroelectronics can delivers corrections on purpose through github® components.

9 How to get started with **st-android-9.0.0-2019-09-27**

Refer to [How to get the software and start with this release.](#)

10 Associated tools

Refer to the [Referenced tools release notes](#) .

11 Demo applications

The STM32MP15 distribution for Android™ is delivered with several applications provided as example.

11.1 STCopro M4Echo application

Example of application using the proprietary coprocessor service (allow direct interaction with the firmware started on the embedded Arm® Cortex® M4).

The firmware just returns the received character on the opened serial port.

The associated application project is available on github® (compatible with Android Studio IDE): [STCoproM4Echo application](#).

11.2 STCopro M4Example application

Example of application using the proprietary coprocessor service (allow direct interaction with the firmware started on the embedded Arm® Cortex® M4).

The firmware generates a signal on the DAC and get back a signal from the ADC. A wire can be added to loop the DAC on ADC. The firmware shows also a simple usage of several blocks available on Arm® Cortex® M4 side.

The associated application project is available on github® (compatible with Android Studio IDE): [STCoproM4Example application](#).

The associated firmware project is available on github® (compatible with System Workbench IDE): [STCoproM4Example firmware](#).

11.3 STCamera

Simple Camera application (preview) used to show a way to manage the built-in camera, only compatible with MB1379 camera extension board. An external storage configured as portable device shall be available to allow taking a picture.

11.4 STVideo

Simple Video application used to show a way to play a video. The video files shall be stored in the directory *Movies* of an external storage (ex: USB key) configured as portable device.

11.5 STPerf

Performance overlay application used to show in foreground the device performances (CPU usage, GPU usage, frame rate). The settings and stop commands are available on notifications system interface.

12 Change log / Main changes

Initial version.

13 Detailed delivery content

13.1 Detailed description of STMicroelectronics modules

13.1.1 BSP modules

Module name	Path of module	Description	Name	Version
stm32mp1-bootloader	device/stm/ stm32mp1-bootloader	Primary (Trusted Firmware-A) and secondary (Universal Boot Loader for embedded devices) bootloaders for STM32MP	tf-a-stm32mp1	2.0
			u-boot-stm32mp1	2018.11
			linux-stm32mp1	4.19
stm32mp1-kernel	device/stm/ stm32mp1-kernel	Linux STM32MP Kernel	linux-stm32mp1	4.19
stm32mp1-tee	device/stm/ stm32mp1-tee	OPTEE OS for STM32MP	optee_os-stm32mp1	3.3.0
stm32mp1-openocd	device/stm/ stm32mp1-openocd	Free and Open On-Chip Debugging, In-System Programming and Boundary-Scan Testing	stm32mp1-openocd	0.10.0

13.1.2 Common and peripherals modules

Module name	Path of module	Description	Name	Version
stm32mp1	device/stm/ stm32mp1	Configuration of the STM32MP1 distribution for Android	stm32mp1	NA
allocator	device/stm/stm32mp1/ peripheral/allocator	STMicroelectronics allocator HAL public header files useful for composer	allocator	NA
audio	device/stm/stm32mp1/	STMicroelectronics Audio HAL source code		

	peripheral/audio	audio	NA
bootctrl	device/stm/stm32mp1/ peripheral/bootctrl	STMicroelectronics Boot Control HAL source code and the dedicated misc partition image generator Name bootctrl	Version NA
camera	device/stm/stm32mp1/ peripheral/camera	STMicroelectronics Camera HAL source code Name camera	Version NA
composer	device/stm/stm32mp1/ peripheral/composer	STMicroelectronics composer HAL source code Name composer	Version NA
copro	device/stm/stm32mp1/ peripheral/copro	STMicroelectronics Copro HAL source code Name copro	Version NA
health	device/stm/stm32mp1/ peripheral/health	STMicroelectronics Health hardware service source code Name health	Version NA
lights	device/stm/stm32mp1/ peripheral/lights	STMicroelectronics Lights HAL source code Name lights	Version NA
memtrack	device/stm/stm32mp1/ peripheral/memtrack	STMicroelectronics Memtrack HAL source code Name memtrack	Version NA
oemlock	device/stm/stm32mp1/ peripheral/oemlock	STMicroelectronics OemLock HAL source code (stub version) Name oemlock	Version NA
thermal	device/stm/stm32mp1/ peripheral/thermal	STMicroelectronics Thermal hardware service source code Name thermal	Version NA
usb	device/stm/stm32mp1/ peripheral/usb	STMicroelectronics Usb hardware service source code Name usb	Version NA
wifi	device/stm/stm32mp1/ peripheral/wifi	STMicroelectronics libwifi HAL source code Name wifi	Version NA

13.1.3 Board modules

Module name	Path of module	Description	Name	Version
eval	device/stm/stm32mp1/ eval	STMicroelectronics configuration for Android used to generate images adapted to the STM32MP15 Evaluation boards	eval	NA

13.1.4 Coprocessor service module

Module name	Path of module	Description	Name	Version
CoproService	packages/apps/ CoproService	STMicroelectronics coprocessor service	CoproService	NA

13.1.5 ST application modules

Module name	Path of module	Description	Name	Version
app	vendor/stm/app	STMicroelectronics applications associated if required to their respective coprocessor firmware	app	NA

14 Archives

No archive yet.

Reset and Clock Control