



# STM32MP15 distribution for Android release note - v1.0.0



# STM32MP15 distribution for Android release note - v1.0.0

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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

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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

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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

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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

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### 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
	SELinux	✓	
	Runtime verification	✗	
	Disk encryption	✗	
	Trusted environment	✓	OP-TEE
	Keystore	✗	only software backup used



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<b>Security</b>	Gatekeeper	✘	
<b>Network and connectivity</b>	Ethernet	✔	
	Wifi	✔	Using TP-LINK dongle (TL-WN722N) for test purpose
	Wifi hotspot	✘	
	BT / BLE	✘	
	USB	✔	Mass storage / MTP / PTP
<b>Systems</b>	Boot control	<i>Partially</i>	Available but not enable
	Power control	✔	
	Thermal control	✔	Only one temperature managed for CPU/GPU (others are stubbed)
	Update engine	✘	
<b>Sensors</b>	Accelerometer	✘	
	Gyroscope	✘	
	Magnetometer	✘	
	Proximity	✘	
	Pressure	✘	
	Temperature	✘	
	Hub	✘	
<b>Debug</b>	ADB (USB)	✔	
	ADB (Ethernet)	✔	
	ADEB	✔	Only for SELinux trace
	Perfetto	✔	Several limitations with Android 9.0.0
	SYSTRACE	✔	
	Metrics	✘	
<b>Storage</b>	USB Key	✔	
	microSD card	✔	
	eMMC	✔	
<b>Others</b>	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 deliver 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<sup>®</sup> Cortex<sup>®</sup>M4).

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

The associated application project is available on github<sup>®</sup> (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<sup>®</sup> Cortex<sup>®</sup>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<sup>®</sup> Cortex<sup>®</sup>M4 side.

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

The associated firmware project is available on github<sup>®</sup> (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

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Initial version.





## 13 Detailed delivery content

### 13.1 Detailed description of STMicroelectronics modules

#### 13.1.1 BSP modules

Module name	Path of module	Description				
stm32mp1-bootloader	device/stm/ stm32mp1- bootloader	Primary (Trusted Firmware-A) and secondary (Universal Boot Loader for embedded devices) bootloaders for STM32MP				
		<table border="1"><thead><tr><th>Name</th><th>Version</th></tr></thead><tbody><tr><td>tf-a-stm32mp1</td><td>2.0</td></tr></tbody></table>	Name	Version	tf-a-stm32mp1	2.0
		Name	Version			
		tf-a-stm32mp1	2.0			
<table border="1"><thead><tr><th>Name</th><th>Version</th></tr></thead><tbody><tr><td>u-boot-stm32mp1</td><td>2018.11</td></tr></tbody></table>	Name	Version	u-boot-stm32mp1	2018.11		
Name	Version					
u-boot-stm32mp1	2018.11					
stm32mp1-kernel	device/stm/ stm32mp1-kernel	Linux STM32MP Kernel				
		<table border="1"><thead><tr><th>Name</th><th>Version</th></tr></thead><tbody><tr><td>linux-stm32mp1</td><td>4.19</td></tr></tbody></table>	Name	Version	linux-stm32mp1	4.19
Name	Version					
linux-stm32mp1	4.19					
stm32mp1-tee	device/stm/ stm32mp1-tee	OPTEE OS for STM32MP				
		<table border="1"><thead><tr><th>Name</th><th>Version</th></tr></thead><tbody><tr><td>optee_os-stm32mp1</td><td>3.3.0</td></tr></tbody></table>	Name	Version	optee_os-stm32mp1	3.3.0
Name	Version					
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				
		<table border="1"><thead><tr><th>Name</th><th>Version</th></tr></thead><tbody><tr><td>stm32mp1-openocd</td><td>0.10.0</td></tr></tbody></table>	Name	Version	stm32mp1-openocd	0.10.0
Name	Version					
stm32mp1-openocd	0.10.0					

#### 13.1.2 Common and peripherals modules

Module name	Path of module	Description
stm32mp1	device/stm/ stm32mp1	Configuration of the STM32MP1 distribution for Android



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		<table border="1"> <thead> <tr> <th>Name</th> <th>Version</th> </tr> </thead> <tbody> <tr> <td>stm32mp1</td> <td>NA</td> </tr> </tbody> </table>	Name	Version	stm32mp1	NA
Name	Version					
stm32mp1	NA					
allocator	device/stm /stm32mp1/ peripheral /allocator	<p>STMicroelectronics allocator HAL public header files useful for composer</p> <table border="1"> <thead> <tr> <th>Name</th> <th>Version</th> </tr> </thead> <tbody> <tr> <td>allocator</td> <td>NA</td> </tr> </tbody> </table>	Name	Version	allocator	NA
Name	Version					
allocator	NA					
audio	device/stm /stm32mp1/ peripheral/audio	<p>STMicroelectronics Audio HAL source code</p> <table border="1"> <thead> <tr> <th>Name</th> <th>Version</th> </tr> </thead> <tbody> <tr> <td>audio</td> <td>NA</td> </tr> </tbody> </table>	Name	Version	audio	NA
Name	Version					
audio	NA					
bootctrl	device/stm /stm32mp1/ peripheral /bootctrl	<p>STMicroelectronics Boot Control HAL source code and the dedicated misc partition image generator</p> <table border="1"> <thead> <tr> <th>Name</th> <th>Version</th> </tr> </thead> <tbody> <tr> <td>bootctrl</td> <td>NA</td> </tr> </tbody> </table>	Name	Version	bootctrl	NA
Name	Version					
bootctrl	NA					
camera	device/stm /stm32mp1/ peripheral/camera	<p>STMicroelectronics Camera HAL source code</p> <table border="1"> <thead> <tr> <th>Name</th> <th>Version</th> </tr> </thead> <tbody> <tr> <td>camera</td> <td>NA</td> </tr> </tbody> </table>	Name	Version	camera	NA
Name	Version					
camera	NA					
composer	device/stm /stm32mp1/ peripheral /composer	<p>STMicroelectronics composer HAL source code</p> <table border="1"> <thead> <tr> <th>Name</th> <th>Version</th> </tr> </thead> <tbody> <tr> <td>composer</td> <td>NA</td> </tr> </tbody> </table>	Name	Version	composer	NA
Name	Version					
composer	NA					
copro	device/stm /stm32mp1/ peripheral/copro	<p>STMicroelectronics Copro HAL source code</p> <table border="1"> <thead> <tr> <th>Name</th> <th>Version</th> </tr> </thead> <tbody> <tr> <td>copro</td> <td>NA</td> </tr> </tbody> </table>	Name	Version	copro	NA
Name	Version					
copro	NA					
health	device/stm /stm32mp1/ peripheral/health	<p>STMicroelectronics Health hardware service source code</p> <table border="1"> <thead> <tr> <th>Name</th> <th>Version</th> </tr> </thead> <tbody> <tr> <td>health</td> <td>NA</td> </tr> </tbody> </table>	Name	Version	health	NA
Name	Version					
health	NA					
	device/stm	STMicroelectronics Lights HAL source code				



lights	/stm32mp1/ peripheral/lights	Name		Version	
		lights		NA	
memtrack	device/stm /stm32mp1/ peripheral /memtrack	STMicroelectronics Memtrack HAL source code			
		Name		Version	
		memtrack		NA	
oemlock	device/stm /stm32mp1/ peripheral /oemlock	STMicroelectronics OemLock HAL source code (stub version)			
		Name		Version	
		oemlock		NA	
thermal	device/stm /stm32mp1/ peripheral /thermal	STMicroelectronics Thermal hardware service source code			
		Name		Version	
		thermal		NA	
usb	device/stm /stm32mp1/ peripheral/usb	STMicroelectronics Usb hardware service source code			
		Name		Version	
		usb		NA	
wifi	device/stm /stm32mp1/ peripheral/wifi	STMicroelectronics libwifi HAL source code			
		Name		Version	
		wifi		NA	

### 13.1.3 Board modules

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



### 13.1.4 Coprocessor service module

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

### 13.1.5 ST application modules

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

- Android Open Source Project
- Trusted Firmware for Arm Cortex-A
- Open Portable Trusted Execution Environment
- Board support package
- spelling for older versions of STLink
- BlueTooth
- Bluetooth Low Energy .
- Central processing unit
- Graphics Processing Units
- Android debug bridge (Android specific)
- former spelling for e•MMC ('e' in italic)
- Flash memory shortened to gain space in titles, tables and block diagrams
- System Management Bus
- Reset and Clock Control
- Serial Peripheral Interface
- Tamper
- Universal Synchronous/Asynchronous Receiver/Transmitter
- Vendor Test Suite (Android specific) - NEW
- Compatibility Test Suite (Android specific) or Clear To Send (in UART context)
- Hardware Abstraction Layer
- (Software)Integrated development/design/debugging environment



Digital-to-analog converter

Analog-to-digital converter. The process of converting a sampled analog signal to a digital code that represents the amplitude of the original signal sample.

Operating System

Non Applicable