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.

Contents

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
	Gatekeeper	✗	
Network and connectivity	Ethernet	✓	
	Wifi	✓	Using TP-LINK dongle (TL-WN722N) for test purpose
	Wifi hotspot	✗	
	BT / BLE	✗	
	USB	✓	Mass storage / MTP / PTP

Systems	Boot control	*Partially*	Available but not enable
	Power control	✓	
	Thermal control	✓	Only one temperature managed for CPU/GPU (others are stubbed)
	Update engine	✗	
Sensors	Accelerometer	✗	
	Gyroscope	✗	
	Magnetometer	✗	
	Proximity	✗	
	Pressure	✗	
	Temperature	✗	
	Hub	✗	
Debug	ADB (USB)	✓	
	ADB (Ethernet)	✓	
	ADEB	✓	Only for SELinux trace
	Perfetto	✓	Several limitations with Android 9.0.0
	SYSTRACE	✓	
	Metrics	✗	
Storage	USB Key	✓	
	microSD card	✓	
	eMMC	✓	
Others	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
stm32mp1-bootloader	`device/stm/stm32mp1-bootloader`	Primary (Trusted Firmware-A) and secondary (Universal Boot Loader for embedded devices) bootloaders for STM32MP **Name** **Version** tf-a-stm32mp1 2.0 **Name** **Version** u-boot-stm32mp1 2018.11
stm32mp1-kernel	`device/stm/stm32mp1-kernel`	Linux STM32MP Kernel **Name** **Version** linux-stm32mp1 4.19
stm32mp1-tee	`device/stm/stm32mp1-tee`	OPTEE OS for STM32MP **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 **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 **Name** **Version** stm32mp1 NA
allocator	`device/stm/stm32mp1/peripheral/allocator`	STMicroelectronics allocator HAL public header files useful for composer **Name** **Version** allocator NA
audio	`device/stm/stm32mp1/`	STMicroelectronics Audio HAL source code **Name** **Version**

	`peripheral/audio`	audio	NA
bootctrl	`device/stm/stm32mp1/peripheral/bootctrl`	STMicroelectronics Boot Control HAL source code and the dedicated misc partition image generator	
		Name	**Version**
		bootctrl	NA
camera	`device/stm/stm32mp1/peripheral/camera`	STMicroelectronics Camera HAL source code	
		Name	**Version**
		camera	NA
composer	`device/stm/stm32mp1/peripheral/composer`	STMicroelectronics composer HAL source code	
		Name	**Version**
		composer	NA
copro	`device/stm/stm32mp1/peripheral/copro`	STMicroelectronics Copro HAL source code	
		Name	**Version**
		copro	NA
health	`device/stm/stm32mp1/peripheral/health`	STMicroelectronics Health hardware service source code	
		Name	**Version**
		health	NA
lights	`device/stm/stm32mp1/peripheral/lights`	STMicroelectronics Lights HAL source code	
		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	Version
eval	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

14 Archives

No archive yet.

Reset and Clock Control