

Android 13

Evidence of Compliance to the ETSI
TS103 732-1/TS 103 732-2 and GSMA
Requirements



ZEBRA

Table of Contents

General Assistance	2
Overview	2
Devices for Certification.....	5
Evaluated Devices.....	5
Equivalent Devices	5
TS 103 732-1 SFRs.....	6
Cryptographic Support	6
FCS_COP.1 Note.....	8
User Data Protection	16
Identification and Authentication.....	26
FIA_UAU.5/Peer.....	29
Security Management.....	33
Privacy	38
Protection of the TSF	40
Trusted Path/Channels	45
TS 103 732-2 SFRs.....	50
Identification and Authentication.....	50
Management.....	50
TS 103 732-4 SFRs.....	51
Applications.....	51
Application Risk.....	52
TS 103 732-5 SFRs.....	56
Bootloader - User data protection.....	56
Bootloader - Protection of the TSF.....	56
Root of Trust - Protection of the TSF	58
GSMA Requirements (FS.56).....	60
Cryptographic Support	60
Identification and Authentication.....	60
Privacy	60
Protection of the TSF	61

<i>Consolidated Life Cycle Requirements</i>	62
ADV: Development	62
AGD: Guidance documents	65
ALC: Life-cycle support	67
AVA: Vulnerability assessment	74

Overview

The general purpose of this document is to provide a natural language translation of the Common Criteria requirements that can be more readily understood. The requirements here are

a combination of Security Functional Requirements (SFRs) and Security Assurance Requirements (SARs).

SFRs can generally be considered testable requirements on the device, though this is not always the case. In cases where it is not explicitly testable, generally evidence of meeting the requirement is provided, such as source code or pointing to another evaluation which proves the requirement is met. SFRs are always focused on the device itself, either a software or hardware component of the device which supports a security requirement.

SARs can generally be considered documentation requirements and may be focused on the device, on the production of the device (manufacturing) or in-market support. There may be some device testing done where it is possible to prove a requirement with a test (instead of documentation), but the majority of SARs will not require testing (this may change over time).

Beyond the TS 103 732 requirements, there are additional areas that require documentation to support the security evaluation of the device. These are listed after the TS 103 732 requirements.

How to complete the questionnaire:

TS 103 732 SFR, SAR or GSMA requirement	Requirement description	Supported? (Y/N)
	Evidence required for submission	
	<i>SFR from TS 103 732 or GSMA to be filled out OEM response goes here, depending on evidence requirement either provide a description, documentation or a reference to supporting material to be included with submission of the completed questionnaire.</i>	Y or N

Several items will need to be submitted along with the completed questionnaire. These may include, but not limited to:

- Process, policy, procedure, architectural and design documentation
- Source code listings, samples, and repositories
- Configuration data such as kernel defconfigs, bootloader configuration, SELinux policies
- Assessment reports for items such as privileged applications, OTA update services
- Devices configured as production, as well as userdebug, and any custom tools required for loading software

When answering the questionnaire, the set of devices being considered should be limited to those released in the last 12 months or with an impending release. Where appropriate, general responses covering all devices may be provided; device-specific responses should not be needed unless requirement implementation differs significantly.

The ETSI TS 103 732-1 questionnaire sections are grouped as they are in the Protection Profile:

- [Cryptographic Support](#)
- [User Data Protection](#)

- [Identification and Authentication](#)
- [Security Management](#)
- [Privacy](#)
- [Protection of the TSF](#)
- [Trusted Path/Channels](#)
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The ETSI TS 103 732-2 sections:

- [Identification and Authentication](#)

The ETSI TS 103 732-4 sections:

- [Applications](#)
- [Application Risk](#)

The ETSI TS 103 732-5 sections:

- [Bootloader - User Data Protection](#)
- [Bootloader - Protection of the TSF](#)
- [Bootloader - Life Cycle](#)
- [Root of Trust - Protection of the TSF](#)

The GSMA FS.56 sections:

- [Cryptographic Support](#)
- [Identification and Authentication](#)
- [Privacy](#)
- [Protection of the TSF](#)
- [Live Cycle Requirements](#)

Devices for Certification

The following tables are for specifying the devices that will be certified. Add rows as necessary for each separate device covered in the evaluation.

Evaluated Devices

Device	Operating System	OS Version	Kernel Version
TC57	Android	13	4.19

Device	Model(s)	CPU Architecture	CPU
		ARMv8	SD660

Table 1

Equivalent Devices

The devices here are claimed by the developer as equivalent to an evaluated device.

Claimed Device	Evaluated Device	Differences between devices
CC600 CC6000 ET51 ET56 L10A MC9300 PS20 TC21 TC21-HC TC26 TC26-HC TC52 TC52ax TC52-HC TC52x TC52x-HC TC57 TC57x TC72 TC77 VC83 WT6300	TC57	All the devices are based on SD660/A13 platform share a common image.

Table 2

TS 103 732-1 SFRs

Cryptographic Support

This section is focused on the cryptography that is used in the system. This includes both key lifecycles and the cryptographic algorithms that are in use.

The requirements for cryptographic algorithms are open as long as the algorithm is able to meet the requirements set by ISO for adding the algorithm to the ISO standard. Note that this does not mean that the algorithm shall be submitted to ISO for inclusion in their standards, only that it meets those requirements. This ensures that the algorithm has been publicly available and reviewed, and so is considered acceptable for use to meet the security claims of this evaluation.

FCS_RNG_EXT.1	Devices shall provide at least one random number generator (RNG) that produces uniformly-distributed, unpredictable output.	Supported? (Y/N)
	For each RNG on the device, provide a description of the type (such as physical or software) and how the amount of entropy provided has been verified. Common examples of proof would be NIST 800-90B or AIS 31 analysis.	
	<p> FCS_RNG_EXT.1.1 The TSF shall provide a [<i>physical, deterministic</i>] random number generator. </p> <p> FCS_RNG_EXT.1.2 The TSF shall provide random numbers that meet [Ring Oscillators producing 0.148 bits of entropy per byte . BoringSSL SP 800-90A AES-256 CTR_DRBG seeded with 3840-bits from <code>getrandom</code>] </p> <p> <i>The device uses several different RNGs to provide sufficient entropy during key generation.</i> </p> <p> <i>In hardware, there are two separate physical sources. The Application Processor (AP) and the SoC each provide independent physical noise sources to generate random output.</i> </p> <p> <i>Normal operating and startup output from both of the physical sources have been checked using the NIST 800-90B entropy test tools to provide sufficient entropy to ensure that the output from the hardware DRBGs will provide at least 1 bit of entropy for every bit requested. The DRBGs both use 384 bits of input to generate the 256-bit output blocks.</i> </p> <p> <i>The AP output is provided to the system via the <code>/dev/hw_random</code> (or similar) device.</i> </p>	Y

	<p>The Android DRBGs are able to use the output from /dev/hw_random for seeding. As this device is normally restricted to only kernel processes, Android provides an entropy daemon that uses the BoringSSL AES CTR_DRBG to provide a constant source of entropy to user-space services (mainly BoringSSL itself). The DRBG in the entropy daemon is reseeded every 200 requests (well below the NIST 800-90B requirements for reseeding an approved DRBG function).</p> <p>In Android itself, when a request for a new random string is made, the AES CTR_DRBG that is provided as part of the BoringSSL library (libcrypto) is called. This DRBG is seeded by calling the entropy daemon for 384 bits to produce a 256-bit key.</p> <p>Each DRBG has been verified according to NIST testing:</p> <p>BoringSSL DRBG- 12533 SD660- DRBG- 2095</p>	
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FCS_CKM.1 /Asymmetric c	Devices shall generate asymmetric keys properly that can meet at least the equivalent of 128-bit symmetric encryption strength.	Supported? (Y/N)
	The process for generating asymmetric keys on the device shall be explained. This will be specific to the algorithm(s) in use.	
	<p>FCS_CKM.1.1/Asymmetric The TSF shall generate cryptographic keys in accordance with a specified cryptographic key generation algorithm [<i>RSA and ECDSA</i>] and specified cryptographic key sizes [<i>RSA keys of 2048, 3072, 4096, ECDSA keys of P-256, P-384, P-521</i>] that meet the following: [<i>FIPS 186-5</i>].</p> <p>BoringSSL and the SD660 chip both support generating RSA and ECDSA keys compliant with NIST FIPS 186-4 that are equivalent (or greater) than 112-bit symmetric strength (RSA 2048 and ECC 256). BoringSSL supports generating keys that are of 128-bit strength and higher for both RSA and ECDSA. In both cases the DRBG from FCS_RNG_EXT.1 is used in the process.</p> <p>BoringSSL DRBG- 12533 SD660- DRBG- 2095</p>	Y

FCS_CKM.1 /Symmetric	Devices shall generate symmetric keys of at least 128-bit length either by generating the key using a RNG or by a derivation function.	Supported? (Y/N)
	The process for generating the keys on the device shall be explained. For example, the key is generated by calling the RNG.	
	FCS_CKM.1.1/Symmetric The TSF shall generate cryptographic keys in accordance with a specified cryptographic key generation algorithm [using AES CTR_DRBG in BoringSSL] and specified cryptographic key sizes [256-bits] that meet the following: [assignment: list of standards].	Y
	BoringSSL supports generating symmetric (AES) keys compliant with NIST FIPS 197 that are equivalent (or greater) than 128-bit symmetric strength. The DRBG from FCS_RNG_EXT.1 is used in the process.	

FCS_COP.1 Note

All the algorithms listed under FCS_COP.1 may have multiple implementations throughout the system. For example, symmetric encryption is likely to be available in low level hardware (i.e. SoC), a hardware storage encryption engine, a hardware-backed key store (if support is provided), the SEE, the kernel and within the main OS itself. Not all algorithms may be available in all components, and different configurations may provide different options.

The expectation for this section is that each instance of an algorithm type be specified if it is key to providing security services for the device (i.e. if an algorithm is available for user-installed applications or is not used by the security components of the device itself, they do not need to be listed).

FCS_COP.1 /SigGen	Devices shall support an asymmetric algorithm that is used to verify the signature of update packages (both for the OS and applications).	Supported? (Y/N)
	Multiple algorithms may be supported for different purposes.	
	Each supported algorithm shall be listed along with the key sizes supported. The listing should point to the standard used to implement the algorithm (for example FIPS 186-4 for RSA).	
	FCS_COP.1.1/SigGen The TSF shall perform [<u>CRYPTOGRAPHIC SIGNATURE SERVICES (GENERATION AND VERIFICATION)</u>] in accordance with a specified cryptographic algorithm [RSA keys 2048-bits or greater, ECDSA]	Y

	using NIST curves P256, P384, P-521] that meet the following: [FIPS PUB 186-5].	
	FIPS 186-5 support for both RSA and ECDSA .	
	BoringSSL DRBG- 12533 SD660- DRBG- 2095	

FCS_COP.1 /KeyEst	Devices shall support a key establishment algorithm for the encryption/decryption of user data. This shall list the algorithm used for user data encryption in transit, and algorithms used in other parts of the system.	Supported? (Y/N)
	Each supported algorithm shall be listed along with the key sizes supported. The listing should point to the standard used to implement the algorithm (for example FIPS 197 for AES).	
	FCS_COP.1.1/Symmetric The TSF shall perform [CRYPTOGRAPHIC KEY ESTABLISHMENT] in accordance with a specified cryptographic algorithm [Elliptic curve-based key establishment schemes] and cryptographic key sizes [256 bits] that meet the following: [NIST Special Publication 800-56A Revision 3, "Recommendation for Pair-Wise Key Establishment Schemes Using Discrete Logarithm Cryptography"].	Y
	To support TLS communications, BoringSSL supports ECDH key pair generation. BoringSSL DRBG- 12533 SD660- DRBG- 2095	

FCS_COP.1 /Symmetric	Devices shall support a symmetric algorithm for the encryption/decryption of user data. This shall list the algorithm used for user data encryption, and algorithms used in other parts of the system.	Supported? (Y/N)
	Each supported algorithm shall be listed along with the key sizes supported. The listing should point to the standard used to implement the algorithm (for example FIPS 197 for AES).	
	FCS_COP.1.1/Symmetric The TSF shall perform [SYMMETRIC ENCRYPTION AND DECRYPTION] in accordance with a specified cryptographic algorithm [AES] and cryptographic key sizes [256-bits] that meet the following: [AES as defined in FIPS	Y Refer Security Target

	<p>PUB 197 with CBC (SP800-38A), CCM (SP800-38C), Key Wrap (SP800-38F), GCM (SP800-38D), XTS (SP800-38E) and GCM (SP800-38D) modes].</p>	<p>Table 11</p>
	<p>Multiple modules provide symmetric encryption using AES. These algorithms are all verified as part of the NIST algorithm testing.</p> <p>AP (SoC): 3377 [GPCE]</p> <p>Storage: 3375 [ICE]</p> <p>BoringSSL: 3866 [AES]</p> <p>TZ:3376 [PRNG]</p> <p>Wi-Fi chip: 5663,4748 [AES 128 CCM (Qualcomm Wi-Fi)] C1025 [AES 128 CCM (Broadcom Wi-Fi)]</p>	

<p>FCS_COP.1 /Derivation</p>	<p>Devices shall support a key derivation function.</p> <p>Each supported function shall be listed along with the key sizes supported. The listing should point to the standard used to implement the algorithm (for example NIST SP 800-108 for KBKDF or NIST SP 800-132 for PBKDF2).</p>	<p>Supported? (Y/N)</p>
	<p>FCS_COP.1.1/Derivation The TSF shall perform [<i>DERIVATION FUNCTION</i>] in accordance with a specified cryptographic algorithm [HMAC-SHA2-256 and scrypt, CMAC-AES] and cryptographic key sizes [128 bits, 256 bits] that meet the following: [NIST SP 800-108 (CMAC-AES, HMAC-SHA2-256) and no standard (scrypt)].</p> <p>Multiple modules provide KDF algorithms using NIST SP 800-108. These algorithms are all verified as part of the NIST algorithm testing.</p> <p>Lockscreen settings: A1978 [LockSettings service KBKDF]</p> <p>To derive a key from user input (password/PIN/pattern), the user input (and salt) is processed using scrypt (which contains a</p>	<p>Y Refer Security Target Table 10</p>

	PBKDF2 operation, followed by a series of ROMix operations and then one final PBKDF2). This key is then combined with a hardware-fused key using a KDF function inside the TZ (the output key is not used on its own, only in combination with the hardware-fused key).	
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FCS_COP.1 /Hash	Devices shall support a cryptographic hash algorithm.	Supported? (Y/N)
	Each supported algorithm shall be listed along with the key sizes supported. The listing should point to the standard used to implement the algorithm (for example FIPS 180-4 for SHA).	
	<p>FCS_COP.1.1/Hash The TSF shall perform [<i>CRYPTOGRAPHIC HASHING</i>] in accordance with a specified cryptographic algorithm [<i>SHA2-256, 384 and 512</i>] and cryptographic key sizes [<i>NONE</i>] that meet the following: [<i>FIPS 180-4</i>].</p> <p>Multiple modules provide hash algorithms using SHA2. These algorithms are all verified as part of the NIST algorithm testing.</p> <p>BoringSSL: A1395</p>	Y

FCS_COP.1 /KeyedHash	Devices shall support a message authentication code algorithm.	Supported? (Y/N)
	Each supported algorithm shall be listed along with the key sizes supported. The listing should point to the standard used to implement the algorithm (for example FIPS 198-1 for HMAC).	
	<p>FCS_COP.1.1/KeyedHash The TSF shall perform [<i>KEYED-HASH MESSAGE AUTHENTICATION</i>] in accordance with a specified cryptographic algorithm [<i>HMAC-SHA2-256, 384, 512</i>] and cryptographic key sizes [<i>256, 384 and 512 bits</i>] that meet the following: [<i>FIPS 198-1 and FIPS 180-4</i>].</p> <p>Multiple modules provide keyed hash algorithms using SHA2. These algorithms are all verified as part of the NIST algorithm testing.</p> <p>BoringSSL: A1395</p>	Y

FCS_CKH_EXT.1/Low	Devices shall provide encrypted storage that is not tied to the user credentials. This can require separate apps to explicitly implement the functionality, but it shall be available in the device.	Supported? (Y/N)
	Documentation shall provide: <ul style="list-style-type: none"> ● Description of how DE keys are generated/derived <ul style="list-style-type: none"> ○ Algorithms, key lengths used in the process ● Description of how DE keys are cryptographically tied to hardware-backed keystore 	
	<p>FCS_CKH_EXT.1.1/Low The TSF shall support a key hierarchy for data encryption keys to protect [<i>LOW USER DATA ASSETS</i>].</p>	Y
	<p>FCS_CKH_EXT.1.2/Low The TSF shall ensure that all keys in the key hierarchy are derived and/or generated according to [file encryption keys are generated using AES_CTR DRBG from BoringSSL and are encrypted using a key that is derived from the DUK] ensuring that the key hierarchy uses the DUK and [NO USER CREDENTIALS] directly or indirectly in the derivation of the data encryption key(s) for [<i>LOW USER DATA ASSETS</i>].</p>	
	<p>FCS_CKH_EXT.1.3/Low The TSF shall ensure that all keys in the key hierarchy and all data used in deriving the keys in the hierarchy are protected according to [no other rules].</p>	
	<p>https://source.android.com/docs/security/features/encryption/file-based https://developer.android.com/training/articles/direct-boot.html</p> <p>Android provides a key hierarchy tied to the device root key that allows some data to be encrypted by accessed before the user has successfully authenticated (such as phone calls or alarms).</p> <p>This follows the credentialed encryption key hierarchy but uses a hardcoded password instead of the user's password (after that all data stored for DE storage is handled the same, just using the separate key hierarchy to handle the encryption keys).</p> <p>Use of this requires the app to explicitly take advantage of the DE storage capability.</p>	

<p>FCS_CKH_EXT.1/MediumHigh</p>	<p>Devices shall provide encrypted storage that is tied to the user credentials. By default all user data shall be decrypted after the user authenticates the first time (device boot).</p> <p>Additionally the device shall provide the functionality to keep user data encrypted once the device has been unlocked but the user is not active (the user logged into the device at start-up and then the device has since been screen locked and requires the user to provide credentials again). This additional functionality can require separate apps to explicitly implement the functionality, but it shall be available in the device.</p> <p>Documentation shall provide:</p> <ul style="list-style-type: none"> • Description of how CE keys are generated/derived <ul style="list-style-type: none"> ◦ Algorithms, key lengths used in the process • Description of how CE keys are cryptographically tied to hardware-backed keystore • Description of how CE keys are cryptographically tangled with the user's credentials 	<p>Supported? (Y/N)</p>
	<p>FCS_CKH_EXT.1.1/MediumHigh The TSF shall support a key hierarchy for data encryption keys to protect [<i>MEDIUM AND HIGH USER DATA ASSETS</i>].</p> <p>FCS_CKH_EXT.1.2/MediumHigh The TSF shall ensure that all keys in the key hierarchy are derived and/or generated according to [file and encryption keys are generated using AES_CTR DRBG from BoringSSL and are encrypted using a key that is derived from a combination of the user's credentials and the DUK] ensuring that the key hierarchy uses the DUK and [THE USER CREDENTIALS] directly or indirectly in the derivation of the data encryption key(s) for [<i>MEDIUM AND HIGH USER DATA ASSETS</i>].</p> <p>FCS_CKH_EXT.1.3/MediumHigh The TSF shall ensure that all keys in the key hierarchy and all data used in deriving the keys in the hierarchy are protected according to [no other rules].</p>	<p>Y</p>
	<p>MEDIUM https://source.android.com/docs/security/features/encryption/file-based https://developer.android.com/training/articles/direct-boot.html</p> <p>Android provides a key hierarchy tied to both the user's password and the device root key that protects all data by default such that it is not available until after a successful</p>	

	<p>authentication from the user. This is called Credentialed Encryption (CE).</p> <p>The CE key hierarchy binds the master encryption key to both the user's credential and the root key from the device.</p> <p>If an app does not do anything specific to store data, it will be stored as CE data.</p> <p>HIGH</p> <p>Android provides the ability for an app to be aware of the lock state of the device. This can be obtained through APIs:</p> <p>https://developer.android.com/reference/android/security/keystore/KeyGenParameterSpec.Builder#setUnlockedDeviceRequired(boolean)</p> <p>https://developer.android.com/reference/android/security/keystore/KeyGenParameterSpec.Builder#setUserAuthenticationRequired(boolean)</p> <p>When combined with the app being able to individually encrypt its own files:</p> <p>https://developer.android.com/topic/security/data#java</p> <p>An app can be developed that can maintain that its data is only able to be decrypted for use when the user is active on the device (the device is considered unlocked).</p> <p>This is an app-specific capability, and so requires an app to be developed to utilize this capability.</p>	
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FCS_CKM.4	<p>Devices shall clear plain-text keys when no longer needed.</p> <p>Describe how keys are cleared from memory (both volatile and non-volatile).</p> <p>Note that some of these may not be applicable in all devices (for example there may be no non-volatile flash memory that is not wear-leveled), in which case it is sufficient to specify it is not applicable.</p>	<p>Supported? (Y/N)</p>
	<p>FCS_CKM.4.1 The TSF shall destroy keys from the key hierarchy for Low, Medium, and High cryptographic keys in accordance with a specified cryptographic key destruction method [assignment].</p>	<p>Y</p>

	<ul style="list-style-type: none"> • <u>for non-volatile EEPROM, by a single direct overwrite consisting of a random pattern, using the TSF's RNG, followed by a read-verify;</u> • <u>for non-volatile flash memory, that is not wear-levelled, by [a block erase that erases the reference to memory that stores data as well as the data itself];</u> • <u>for non-volatile flash memory, that is wear-levelled, by [a block erase];</u> • <u>for non-volatile memory other than EEPROM and flash, by a single direct overwrite with a random pattern that is changed before each write];</u> <p>that meets the following: [no standards].</p>	
	<p>The TOE clears sensitive cryptographic material (plaintext keys, authentication data, and other security parameters) from memory when no longer needed. Public keys can remain in memory when the phone is locked, but all crypto-related private keys are evicted from memory upon device lock. No plaintext cryptographic material resides in the TOE's Flash as the TOE encrypts all keys stored in Flash. When performing a full wipe of protected data, the TOE cryptographically erases the protected data by clearing the Data-At-Rest DEK. Because the Android Keystore of the TOE resides within the user data partition, the TOE effectively cryptographically erases those keys when clearing the Data-At-Rest DEK. In turn, the TOE clears the Data-At-Rest DEK and Secure Key Storage SEK through a secure direct overwrite (BLKSECDISCARD ioctl) of the wear-levelled Flash memory containing the key followed by a read-verify.</p>	

User Data Protection

<p>FDP_ACC.1/APP_Update</p> <p>FDP_ACF.1/APP_Update</p> <p>FDP_UPF_EXT.1/APP_Update</p>	<p>All applications delivered via the app store (distribution platform) shall provide a means for applications to be updated.</p> <p>Document the following information about the update process:</p> <ul style="list-style-type: none"> • Frequency of automatic checking with the app store • Method for verifying new updates are available (e.g. versioning such that older versions cannot be installed as an update) • Method for verifying validity of the package (i.e. signature checks) 	<p>Supported? (Y/N)</p>
	<p>FDP_ACC.1.1/APP_Update The TSF shall enforce the [APP_UPDATE POLICY] on [SUBJECTS: THE TSF, OBJECTS: APP, APP_UPDATE_PACKAGE, OPERATIONS: UPDATE_APP].</p> <p>FDP_ACF.1.1/APP_Update The TSF shall enforce the [APP_UPDATE POLICY] to objects based on the following: [SUBJECTS: THE TSF, OBJECTS[ATTRIBUTES]: APP[VERSION_ID, SIGNATURE], APP_UPDATE_PACKAGE[VERSION_ID, SIGNATURE, PACKAGE_SOURCE]].</p> <p>FDP_ACF.1.2/APP_Update The TSF shall enforce the following rules to determine if an operation among controlled subjects and controlled objects is allowed: [</p> <ul style="list-style-type: none"> • THE TSF SHALL ALLOW THE TSF TO UPDATE_APP WITH AN APP_UPDATE_PACKAGE ONLY IF: <ul style="list-style-type: none"> ◦ THE TSF SUCCESSFULLY VERIFIES THE SIGNATURE OF THE APP_UPDATE_PACKAGE AND THE SIGNATURE IS FROM THE SAME APP OR APP DEVELOPER; AND ◦ [the version ID of the App Update Package is not lower than the version ID of the installed App]; • THE TSF SHALL UPDATE_APP IN AS AN ATOMIC UPDATE FUNCTION]. <p>FDP_ACF.1.3/APP_Update The TSF shall explicitly authorize access of subjects to objects based on the following additional rules: [no other rules].</p> <p>FDP_ACF.1.4/APP_Update The TSF shall explicitly deny access of subjects to objects based on the following additional rules: [THE TSF SHALL NOT ALLOW ANY TSF-MEDIATED ACTIONS RELATED TO THE UPDATE_APP OPERATION OR ACCESS TO THE APP DURING ITS UPDATING].</p>	<p>Y</p>

	<p>FDP_UPF_EXT.1.1/APP_Update The TSF shall be able to check for a [APP] update package every [once a day`1].</p>	
	<p>The Play Store checks for app updates on a daily basis. Based on the user settings, the apps will be automatically updated when the device is not in use or the user will be notified that updates are available. The user can force a check for updates (or when notified start the update immediately).</p> <p>When an app update is available, it will only be installed if the signature is from the same app developer as the currently installed version and that the version ID is not lower than the currently installed version of the app.</p> <p>When an app is being updated, if the app is currently running, the instance will be closed during the update process. If the update fails for any reason, the installation process will roll back to the version that existed at the time of the download.</p>	

<p>FDP_ACC.2 /SSW_Update</p> <p>FDP_ACF.1/ SSW_Update</p> <p>FDP_UPF_EXT.1/SSW_Update</p>	<p>The device shall support system software updates (i.e. OTA updates) and secure how they are downloaded and installed.</p> <p>Document the following information about the update process:</p> <ul style="list-style-type: none"> ● Frequency of automatic checking with the update location ● Method for verifying new updates are available (e.g. versioning such that older versions cannot be installed as an update) ● Method for verifying validity of the package (i.e. signature checks) ● How security is maintained during the update process (i.e. that the system cannot be circumvented during the update process) <p><i>NOTE: The yellow highlight is a modification from GSMA FS.56.</i></p>	<p>Supported? (Y/N)</p>
	<p>FDP_ACC.2.1/SSW_Update The TSF shall enforce the [SSW_UPDATE POLICY] on [SUBJECTS: THE TSF, OBJECTS: THE SSW, SSW_UPDATE_PACKAGE, OPERATIONS: UPDATE_SSW].</p> <p>FDP_ACC.2.2/SSW_Update The TSF shall ensure that all operations between any subject controlled by the TSF and any object controlled by the TSF are covered by an access control SFP.</p>	<p>Y</p>

FDP_ACF.1.1/SSW_Update The TSF shall enforce the [SSW_UPDATE POLICY] to objects based on the following: [SUBJECTS: THE TSF, OBJECTS[ATTRIBUTES]: SSW[VERSION_ID, SIGNATURE], SSW_UPDATE_PACKAGE[VERSION_ID, SIGNATURE, PACKAGE_SOURCE]].

FDP_ACF.1.2/SSW_Update The TSF shall enforce the following rules to determine if an operation among controlled subjects and controlled objects is allowed: [

- THE TSF IS ALLOWED TO PERFORM THE UPDATE_SSW OPERATION IF THE FOLLOWING CONDITIONS HOLD:
 - [the SSW Update Package[version ID] is not lower than the SSW[version ID]]
 - THE SSW_UPDATE_PACKAGE[SIGNATURE] IS VERIFIED BY A DIGITAL SIGNATURE FROM THE TOE MANUFACTURER STORED ON THE DEVICE
 - THE SIGNATURE CHECK AND THE UPDATE_SSW ARE PERFORMED AS AN ATOMIC UPDATE FUNCTION].

FDP_ACF.1.3/SSW_Update The TSF shall explicitly authorize access of subjects to objects based on the following additional rules: [no other rules].

FDP_ACF.1.4/SSW_Update The TSF shall explicitly deny access of subjects to objects based on the following additional rules: [THE TSF SHALL NOT ALLOW ANY TSF-MEDIATED ACTIONS RELATED TO THE UPDATE_SSW FUNCTION DURING ITS UPDATING].

FDP_UPF_EXT.1.1/SSW_Update The TSF shall be able to check for a [SYSTEM SOFTWARE] update package every [once per day, once configured by the administrator] and provide a notification to the user when an update is available. Unlike consumer devices, the device will not perform any updates unless configured to do so by the device administrator.

The device verifies all updates using a public key chaining to the root public key. The SHA-256 hash of the root public key is fused into the SoC during manufacturing.

Once the update has been downloaded the version and signature are checked to ensure the version is not older than the

	<p>current version and that the signature is valid (verified to the hardware hash).</p> <p>https://source.android.com/docs/core/ota/ab</p> <p>If the checks complete successfully the update process begins immediately where the update will be installed on the slot (partition) that is not currently in use (i.e. the one that was not used to boot the device at this time). Once the update has been completely written to the slot, the update process will switch the active slot to the one just updated and restart the device (with user permission). If the reboot is not successful the system will automatically switch back to the previous slot and restart again, returning the device to the previous state.</p> <p>If the checks, write process or reboot fail at any time during this sequence, the system will remain/revert to the OS version that existed prior to the update being downloaded, such that the update process happens completely or not at all.</p> <p>At the discretion of the device administrator, the device checks for updates daily (once every 24 hours). When an update is found the user will be notified of the update with an option to postpone. If the user does not postpone, the update will automatically be installed.</p> <p>Note: The device administrator has full flexibility to manage updates on an asynchronous schedule based on the priorities of their organization. Administrators typically plan updates around season demands, device downtimes, network capacity, etc. Unlike a consumer who updates a single device, the admin must consider the impact of updating hundreds of devices at once.</p>	
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<p>FDP_ACC.2 /Permissions</p> <p>FDP_ACF.1/ Permissions</p> <p>RED ACM-1 ACM-2</p>	<p>Devices shall provide access controls (permissions) to components on the system and provide the user with the opportunity to grant or block access to these components to any application or if permissions are specifically granted by the device (i.e. in the operating system the application has specific privileges already).</p> <p>This is divided into what the user can explicitly control and what the OS controls.</p> <p>Document the following:</p> <ul style="list-style-type: none"> List of user permissions (i.e. camera, microphone, contacts) 	<p>Supported? (Y/N)</p>
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	<ul style="list-style-type: none"> • List of OS permissions (i.e. Device ID, system permissions, sockets/IPC, files) • How permissions are granted (including for pre-installed applications where it is granted without user interaction) • How access is determined (allow/block) • SELinux is the basis for these permissions and controls 	
	<p>FDP_ACC.2.1/Permissions The TSF shall enforce the [PERMISSIONS POLICY] on [</p> <ul style="list-style-type: none"> • <i>SUBJECTS: APPS, PROCESSES;</i> • <i>USER OBJECTS: [camera, microphone, location, contacts, calendar, call log, stored pictures, text messages, the list of installed apps];</i> • <i>MANUFACTURER OBJECTS: DEVICE ID, SYSTEM PERMISSIONS, FILES (INCLUDING INDIVIDUAL APP DATA), [secure sockets, IPC];</i> • <i>OPERATIONS: READ, WRITE, EXECUTE].</i> <p>FDP_ACC.2.2/Permissions The TSF shall ensure that all operations between any subject controlled by the TSF and any object controlled by the TSF are covered by an access control SFP.</p> <p>FDP_ACF.1.1/Permissions The TSF shall enforce the [PERMISSIONS POLICY] to objects based on the following: [</p> <ul style="list-style-type: none"> • <i>[APPS AND PROCESSES] AND THE OPERATIONS ASSOCIATED WITH THE SUBJECT;</i> • <i>THE ACCESS CONTROL LIST ASSOCIATED WITH THE OBJECT BEING REQUESTED].</i> <p>FDP_ACF.1.2/Permissions The TSF shall enforce the following rules to determine if an operation among controlled subjects and controlled objects is allowed: [</p> <ul style="list-style-type: none"> • <i>THE SUBJECT, OR A GROUPING THE SUBJECT IS MAPPED TO, IS EXPLICITLY GRANTED PERMISSION BY THE USER OR TOE MANUFACTURER TO THE USER OBJECT IN THE ACCESS CONTROL LIST].</i> <p>FDP_ACF.1.3/Permissions The TSF shall explicitly authorize access of subjects to objects based on the following additional rules: [</p>	<p>Y</p>

- *THE SUBJECT IS GRANTED PERMISSION BY THE TOE MANUFACTURER TO THE MANUFACTURER OBJECT IN THE ACCESS CONTROL LIST].*

FDP_ACF.1.4/Permissions The TSF shall explicitly deny access of subjects to objects based on the following additional rules: [

- *THE SUBJECT IS EXPLICITLY BLOCKED BY THE USER FROM ACCESSING THE USER OBJECT;*
- *THERE IS NO RULE GRANTING THE SUBJECT ACCESS TO THE USER OR MANUFACTURER OBJECT IN THE ACCESS CONTROL LIST].*

The TOE provides the following categories of system services to applications.

1. Normal - A lower-risk permission that gives an application access to isolated application-level features, with minimal risk to other applications, the system, or the user. The system automatically grants this type of permission to a requesting application at installation, without asking for the user's explicit approval (though the user always has the option to review these permissions before installing).
2. Dangerous - A higher-risk permission that would give a requesting application access to private user data or control over the device that can negatively impact the user. Because this type of permission introduces potential risk, the system cannot automatically grant it to the requesting application. For example, any dangerous permissions requested by an application will be displayed to the user and require confirmation before proceeding or some other approach can be taken to avoid the user automatically allowing the use of such facilities.
3. Signature - A permission that the system is to grant only if the requesting application is signed with the same certificate as the application that declared the permission. If the certificates match, the system automatically grants the permission without notifying the user or asking for the user's explicit approval.
4. SignatureOrSystem - A permission that the system is to grant only to packages in the Android system image or that are signed with the same certificates. Please avoid using this option, as the signature protection level should be sufficient for most needs and works regardless of

exactly where applications are installed. This permission is used for certain special situations where multiple vendors have applications built in to a system image which need to share specific features explicitly because they are being built together.

An example of a normal permission is the ability to vibrate the device: `android.permission.VIBRATE`. This permission allows an application to make the device vibrate, and an application that does not request (or declare) this permission would have its vibration requests ignored.

An example of a dangerous privilege would be access to location services to determine the location of the mobile device: `android.permission.ACCESS_FINE_LOCATION`. The TOE controls access to Dangerous permissions during the running of the application. The TOE prompts the user to review the application's requested permissions (by displaying a description of each permission group, into which individual permissions map, that an application requested access to). If the user approves, then the application is allowed to continue running. If the user disapproves, the devices continues to run, but cannot use the services protected by the denied permissions. Thereafter, the mobile device grants that application during execution access to the set of permissions declared in its Manifest file.

An example of a signature permission is the `android.permission.BIND_VPN_SERVICE` that an application must declare in order to utilize the `VpnService` APIs of the device. Because the permission is a Signature permission, the mobile device only grants this permission to an application (2nd installed app) that requests this permission and that has been signed with the same developer key used to sign the application (1st installed app) declaring the permission (in the case of the example, the Android Framework itself).

An example of a signatureOrSystem permission is the `android.permission.LOCATION_HARDWARE`, which allows an application to use location features in hardware (such as the geofencing API). The device grants this permission to requesting applications that either have been signed with the same developer key used to sign the Android application declaring the permissions or that reside in the "system" directory within Android (which for Android 4.4 and above, are applications residing in the `/system/priv-app/` directory on the read-only system partition). Put another way, the device grants

systemOrSignature permissions by Signature or by virtue of the requesting application being part of the “system image”.

Additionally, Android includes the following flags that layer atop the base categories.

1. privileged - this permission can also be granted to any applications installed as privileged apps on the system image. Please avoid using this option, as the signature protection level should be sufficient for most needs and works regardless of exactly where applications are installed. This permission flag is used for certain special situations where multiple vendors have applications built into a system image which need to share specific features explicitly because they are being built together.
2. system - Old synonym for 'privileged'.
3. development - this permission can also (optionally) be granted to development applications (e.g., to allow additional location reporting during beta testing).
4. appop - this permission is closely associated with an app op for controlling access.
5. pre23 - this permission can be automatically granted to apps that target API levels below API level 23 (Marshmallow/6.0).
6. installer - this permission can be automatically granted to system apps that install packages.
7. verifier - this permission can be automatically granted to system apps that verify packages.
8. preinstalled - this permission can be automatically granted to any application pre-installed on the system image (not just privileged apps) (the TOE does not prompt the user to approve the permission).

For older applications (those targeting Android’s pre-23 API level, i.e., API level 22 [lollipop] and below), the TOE will prompt a user at the time of application installation whether they agree to grant the application access to the requested services. Thereafter (each time the application is run), the TOE will grant the application access to the services specified during install.

For newer applications (those targeting API level 23 or later), the TOE grants individual permissions at application run-time by prompting the user for confirmation of each permissions category requested by the application (and only granting the permission if the user chooses to grant it).

	<p>The Android 13 (Level 33) API (details found here https://developer.android.com/reference/packages) provides services to mobile applications.</p> <p>These permissions can be tested using an application built using code that can be found at https://github.com/android/security-certification-resources/tree/master/niap-cc/Permissions.</p> <p>While Android provides a large number of individual permissions, they are generally grouped into categories or features that provide similar functionality.</p> <p>Below what the user can directly manage through the UI as permissions, Android uses SELinux in enforcing mode for Mandatory Access Control (and all permission policies are implemented as SELinux policies, just exposed in a more user-friendly way). The SELinux policies can be found on the device using the command:</p> <pre style="text-align: center;">adb pull /sys/fs/selinux/policy</pre> <p>This is the compiled policy file that is enforced on the device and contains all the settings.</p> <p>AOSP defines a number of highly dangerous SELinux controls (DAC_OVERRIDE, NET_ADMIN and SYS_ADMIN) and associates them to services that require those controls. These can be found in the AOSP source in the private and public folders.</p>	
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FDP_ACC.1 /UserDataAsset sset	Data stored on the device is protected with different classifications (DE/CE).	Supported? (Y/N)
FDP_ACF.1/ UserDataAs set	Describe how user data is protected and how it is classified on the system. DE/CE is sufficient to meet the Low/Medium differences. Explain how High can be implemented.	
	<p>FDP_ACC.1.1/UserDataAsset The TSF shall enforce the [USER DATA ASSET DECRYPTION POLICY] on [</p> <ul style="list-style-type: none"> ● SUBJECTS: THE TSF; ● OBJECTS: INTERNAL STORAGE (ALL SAVED USER DATA ASSETS), [no other storage]; ● OPERATIONS: DECRYPT]. <p>FDP_ACF.1.1/UserDataAsset The TSF shall enforce the [USER DATA ASSET DECRYPTION POLICY] to objects based on the following: [SUBJECTS: THE TSF, OBJECTS: USER</p>	Y

DATA ASSETS, ATTRIBUTES: SENSITIVE LEVEL OF OBJECTS, LOW, MEDIUM, HIGH].

FDP_ACF.1.2/UserDataAsset The TSF shall enforce the following rules to determine if an operation among controlled subjects and controlled objects is allowed: [

- *THE TSF IS ALLOWED TO DECRYPT LOW USER DATA ASSETS IF AND ONLY IF THE TOE IS SUCCESSFULLY POWERED ON; AND*
- *THE TSF IS ALLOWED TO DECRYPT MEDIUM USER DATA ASSETS IF AND ONLY IF THE TOE IS SUCCESSFULLY POWERED ON AND THE USER IS SUCCESSFULLY AUTHENTICATED DURING THE FIRST AUTHENTICATION AFTER POWER ON; AND*
- *THE TSF IS ALLOWED TO DECRYPT HIGH USER DATA ASSETS IF AND ONLY IF THE TOE IS SUCCESSFULLY POWERED ON, THE USER IS SUCCESSFULLY AUTHENTICATED AND THE SCREEN OF THE TOE IS NOT LOCKED].*

FDP_ACF.1.3/UserDataAsset The TSF shall explicitly authorize access of subjects to objects based on the following additional rules: *[NO ADDITIONAL RULES]*.

FDP_ACF.1.4/UserDataAsset The TSF shall explicitly deny access of subjects to objects based on the following additional rules: *[NO ADDITIONAL RULES]*.

The device provides different classes of storage for all user data. By default all user data is protected with a key that is derived from the user's password (this is considered Medium protection). The device only supports internal storage.

For Low data, an application must be explicitly developed to take advantage of this feature which will allow data saved by the app as DE data to be available on reboot before the user has authenticated.

For High data, an application must be explicitly developed to be aware of the lock status of the device to be able to close and lock its data. Android APIs provide the ability to hook into the notification of the lock status to enable this functionality.

In all cases, keys that are stored on the device are entangled with the hardware root key (in the case of Low, this is combined with a hardcoded device key to take the place of the user's password). This ensures that data cannot be ported to another device and decrypted as only the device where the data is

	encrypted will have access to the hardware key used to generate the encryption key.	
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Identification and Authentication

<p>FIA_UAU.1</p>	<p>When authentication is enabled, some actions may be performed before a successful login.</p>	<p>Supported? (Y/N)</p>
<p>FIA_UID.1</p>	<p>Document what actions are allowed before a successful login. Access to stored data shall not be allowed (i.e. access to CE data)</p>	
<p>FIA_UAU.1.1 The TSF shall allow [</p> <ul style="list-style-type: none"> ● Take screen shots (stored internally) ● Make emergency calls ● Receive calls ● Take pictures (stored internally) - unless the camera was disabled ● Turn the TOE off ● Restart the TOE ● Place TOE into lockdown mode ● Enable Airplane mode ● Change the state of Wi-Fi, Bluetooth, Mobile Data (cellular data) ● Change Battery Saver mode ● Adjust screen brightness ● See notifications (note that some notifications identify actions, for example to view a screenshot; however, selecting those notifications highlights the password prompt and require the password to access that data) ● Configure sound, vibrate, or mute ● Set the volume (up and down) for ringtone ● Change keyboard input method ● Change live captions ● Access notification widgets (without authentication): <ul style="list-style-type: none"> ○ Flashlight toggle ○ Do not disturb toggle ○ Auto rotate toggle ○ Sound (on, mute, vibrate) ○ Night light filter toggle <p>] on behalf of the user to be performed before the user is authenticated.</p> <p>FIA_UAU.1.2 The TSF shall require the user to be successfully authenticated before allowing any other TSF-mediated actions on behalf of that user.</p> <p>FIA_UID.1.1 The TSF shall allow [</p> <ul style="list-style-type: none"> ● Take screen shots (stored internally) ● Make emergency calls ● Receive calls 		<p>Y</p>

- Take pictures (stored internally) - unless the camera was disabled
- Turn the TOE off
- Restart the TOE
- Place TOE into lockdown mode
- Enable Airplane mode
- Change the state of Wi-Fi, Bluetooth, Mobile Data (cellular data)
- Change Battery Saver mode
- Adjust screen brightness
- See notifications (note that some notifications identify actions, for example to view a screenshot; however, selecting those notifications highlights the password prompt and require the password to access that data)
- Configure sound, vibrate, or mute
- Set the volume (up and down) for ringtone
- Change keyboard input method
- Change live captions
- Access notification widgets (without authentication):
 - Flashlight toggle
 - Do not disturb toggle
 - Auto rotate toggle
 - Sound (on, mute, vibrate)
 - Night light filter toggle

] on behalf of the user to be performed before the user is identified.

FIA_UID.1.2 The TSF shall require each user to be successfully identified before allowing any other TSF-mediated actions on behalf of that user.

The following actions can be taken before the user has authenticated to the device:

- Take screen shots (stored internally)
- Make emergency calls
- Receive calls
- Take pictures (stored internally) - unless the camera was disabled
- Turn the TOE off
- Restart the TOE
- Place TOE into lockdown mode
- Enable Airplane mode
- Change the state of Wi-Fi, Bluetooth, Mobile Data (cellular data)
- Change Battery Saver mode
- Adjust screen brightness
- See notifications (note that some notifications identify actions, for example to view a screenshot; however, selecting those notifications highlights the password prompt and require the password to access that data)

	<ul style="list-style-type: none"> ● Configure sound, vibrate, or mute ● Set the volume (up and down) for ringtone ● Change keyboard input method ● Change live captions ● Access notification widgets (without authentication): <ul style="list-style-type: none"> ○ Flashlight toggle ○ Do not disturb toggle ○ Auto rotate toggle ○ Sound (on, mute, vibrate) ○ Night light filter toggle <p>All other actions require the user to be authenticated.</p>	
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FIA_UAU.5/Local	<p>Multiple methods of authentication may be supported.</p> <p>Describe the methods of authentication that are provided including any biometric modalities or external devices that may be supported.</p> <p>Describe the ordering for how multiple methods may be used at one time (for example if fingerprint is enabled, how does the device decide whether to ask for the fingerprint or PIN).</p>	Supported? (Y/N)
	<p>FIA_UAU.5.1/Local The TSF shall provide [<i>PASSWORD, PIN</i> and pattern] to support user authentication.</p> <p>FIA_UAU.5.2/Local The TSF shall authenticate any user's claimed identity according to the [following rules]:</p> <p>To authenticate unlocking the device immediately after boot (first unlock after reboot):</p> <ul style="list-style-type: none"> ● User passwords are required after reboot to unlock the user's Credential encrypted (CE files) and keystore keys. <p>To authenticate unlocking the device after device lock (not following a reboot):</p> <ul style="list-style-type: none"> ● The TOE verifies user credentials (password or fingerprint) via the gatekeeper or fingerprint trusted application (running inside the Trusted Execution Environment/TrustZone, TZ), which compares the entered credential to a derived value or template. <p>To change protected settings or issue certain commands:</p> <ul style="list-style-type: none"> ● The TOE requires password after a reboot, when changing settings (Screen lock), and when factory resetting. 	Y

].	
	<p>The device supports the use of a password, PIN and pattern</p> <p>When the device is first started (or restarted), until after a password, pattern or PIN has been entered first cannot access the device fully.</p>	

FIA_UAU.5/Peer

This is for functionality that is provided with the device from the developer and does not include apps that may be downloaded by the user after purchase.

<p>FIA_UAU.5/Peer</p>	<p>When connecting to a peer device or a service, the user shall successfully authenticate before the connection is allowed.</p> <p>Document the methods for connecting to:</p> <ul style="list-style-type: none"> ● peer-to-peer device connections <ul style="list-style-type: none"> ○ Bluetooth pairing methods are handled in FTP_ITC_EXT.1/BT and not necessary here ● Other services <ul style="list-style-type: none"> ○ For example backup/sync services using a trusted server ○ Screen mirroring/sharing <p>For other services, specify what is allowed after the successful pairing</p>	<p>Supported? (Y/N)</p>
	<p>FIA_UAU.5.1/Peer The TSF shall provide support to use [[QR codes, using a common user account to a remote service on both devices] for to support user authentication to peer devices before allowing any actions on behalf of the user.</p> <p>FIA_UAU.5.2/Peer The TSF shall authenticate any user's peer device's claimed identity according to the [QR codes can provide Wi-Fi information, NFC labels can provide pairing information for Bluetooth connections, Accounts on the device can be used to sign in to remote services].</p>	<p>Y</p>
	<p>The device provides the following ways to authenticate connections to peer devices/services:</p> <ul style="list-style-type: none"> ● QR codes - these can be used to add Wi-Fi information to connect to an AP <ul style="list-style-type: none"> ○ Note that QR codes can be read automatically by the camera, but by default are handed to the web browser and are not tied to the device itself 	

	<ul style="list-style-type: none"> Apps can register accounts (seen in Settings -> Passwords & accounts) that can be used to connect to remote services (such as a mail server or other cloud service). These require the user to enter a valid username/password combination on the device that matches an account on the service being connected to. 	
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FIA_UAU.6	The user needs to be re-authenticated to perform specific actions (this is specifically after the initial authentication to unlock the device after a bootup/startup).	Supported? (Y/N)
	Document what actions require authentication: <ul style="list-style-type: none"> Unlocking the device after it has become locked (mandatory) Change of authentication data (any change) (mandatory) Other conditions? 	
	FIA_UAU.6.1 The TSF shall re-authenticate the user under the conditions [<ul style="list-style-type: none"> <i>ATTEMPTED CHANGE OF ANY USER AUTHENTICATION FACTOR;</i> <i>ATTEMPTED UNLOCKING OF A LOCKED TOE;</i> <i>[no other conditions].</i> 	Y
<p>The device requires the user to enter their password or supply their biometric in order to unlock the device. Additionally the device requires the user to confirm their current password when accessing the</p> <p style="text-align: center;">Settings -> Security -> Screen lock</p> <p>menu in the user interface. Only after entering their current user password can the user then elect to change their password.</p>		

FIA_UAU.7	The user should see only limited feedback during authentication is in progress	Supported? (Y/N)
	Describe what feedback is provided to the user during authentication, such as password/PIN display (how long before masking).	
	FIA_UAU.7.1 The TSF shall provide only [<i>BRIEF FEEDBACK ABOUT THE ENTERED CREDENTIALS</i>] to the user while the authentication is in progress.	
The device allows the user to enter the user's password from the lock screen. The device will display the most recently entered		

	character of the password briefly or until the user enters the next character in the password, at which point the device obscures the character by replacing the character with a dot symbol.	
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FIA_SOS.1	The user shall be able to set credentials of a minimum strength	Supported? (Y/N)
	Document the minimum/maximum requirements for password/PIN/pattern settings for the user and specify the character set used for a password.	
	<p>FIA_SOS.1.1 The TSF shall provide a mechanism to verify that secrets meet [</p> <ul style="list-style-type: none"> • <i>FOR PASSWORD AND PIN: LENGTH 4 OR MORE FROM A DEFINED CHARACTER SET;</i> • <i>FOR PATTERNS: CONSISTS OF AT LEAST 4 FROM A SET OF AT LEAST 9 AVAILABLE POINTS, WHERE EACH POINT SHALL ONLY BE USED ONCE].</i> <p>The minimum length for any password or PIN is 4 characters/numbers. Passwords consist of basic Latin characters (upper and lower case, numbers, and the following special characters:</p> <p style="text-align: center;">! @ # \$ % ^ & * () [= + - _ ` ~ \] } { ' " ; : / ? . > , <</p> <p>The maximum length for a password or PIN is 16 characters/numbers.</p> <p>For a pattern the user must trace a pattern that touches at least 4 individual points from the 9 available.</p>	Y

FIA_AFL.1	When repeated authentication attempts are detected, the device should deter continued attempts. This includes all available authentication methods.	Supported? (Y/N)
	Document what actions are taken when some number of attempts have been detected (between 3-10).	
	<p>FIA_AFL.1.1 The TSF shall detect when [<i>AN INTEGER BETWEEN 3 AND 10</i>] unsuccessful authentication attempts occur related to [<i>Password, PIN, Pattern</i>].</p> <p>FIA_AFL.1.2 When the defined number of unsuccessful authentication attempts has been [<i>MET</i>], the TSF shall [</p>	Y

	<ul style="list-style-type: none"> Require a 30 second delay after 5 unsuccessful non-biometric attempts, and then again after 10 total attempts Additional attempts past 11 will have at least a 30 second delay on every attempt (eventually growing to a day between attempts)]. 	
	<p>The device maintains in persistent storage the number of failed authentication attempts since the last login.</p> <p>The Gatekeeper code for calculating the delay is here (written below based on the number of attempts taken).</p> <pre> [0, 4] -> 0 5 -> 30 [6, 10] -> 0 [11, 29] -> 30 [30, 139] -> 30 * (2^((x - 30)/10)) [140, inf] -> 1 day </pre> <p>Every 5 consecutive failed attempts the device will force the user to wait for a period of time before further attempts (starting at 30 seconds and then doubling in time). Every 10 attempts it also requires the device to reboot to perform further attempts.</p> <p>Upon successful authentication the failure count is reset to 0.</p>	

Security Management

FMT_MSA.1 /Permissions	The user shall be able to manage the user permissions on the available objects. The default policy if no permission is assigned should be restrictive.	Supported? (Y/N)
FMT_MSA.3 /Permissions	Document what the user can do in setting permissions for access (approve/reject persistently or temporarily, etc)	
	<p>FMT_MSA.1.1/Permissions The TSF shall enforce the [PERMISSIONS POLICY] to restrict the ability to [approve persistently, approve temporarily, reject persistently, reject temporarily, modify] the security attributes [LIST OF USER OBJECTS] to [THE CURRENT USER FOR THEIR OWN PERMISSIONS].</p> <p>FMT_MSA.3.1/Permissions The TSF shall enforce the [PERMISSIONS POLICY] to provide [RESTRICTIVE] default values for security attributes that are used to enforce the SFP.</p>	

	<p>FMT_MSA.3.2/Permissions The TSF shall allow the [CURRENT USER FOR THEIR OWN PERMISSIONS] to specify alternative initial values to override the default values when an object or information is created.</p>	
	<p>The user can manage the permissions for an application based on 9 different groups of permissions.</p> <p>Applications that are preloaded (or that are part of the system) are assigned permissions by Google to ensure the functionality of the device (but are not assigned more permissions than are necessary for the function of the app).</p> <p>Apps that are installed by the user are assigned no permissions during the installation. The permissions that are needed by the app (some apps may not require any permissions) will be requested on first use. At that time the user can choose to allow continued access, allow access only for that time, or to reject granting access to the permissions. If the user granted access only once, the user will continue to be prompted every time the app is run to allow access to that permission.</p> <p>Permissions for an app can be modified after they have initially been set through</p> <p style="text-align: center;">Settings -> Apps -> <app in question></p> <p>Here the user can choose to change the permissions that have been granted (or rejected).</p>	

<p>FMT_SMF.1/Authentication</p>	<p>The user shall be able to specify and later change their authentication credentials</p>	<p>Supported? (Y/N)</p>
	<p>Document how the user can set and change the password/PIN/pattern</p>	
	<p>FMT_SMF.1.1/Authentication The TSF shall be capable of performing the following management functions: [</p> <ul style="list-style-type: none"> • entering an initial or changing (including removal of) the KAF]. 	
	<p>The user can change their authentication credentials through</p> <p style="text-align: center;">Settings -> Security & privacy -> Device lock</p> <p>From here the user can choose Screen lock .Unlock to change their credentials (set, remove, modify, etc).</p>	

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FMT_SMF.1/Permissions	The user shall be able to manage the permissions provided to apps and some system services	Supported? (Y/N)
	<ul style="list-style-type: none"> Document how the user can view, grant and revoke permissions for any app 	
	<p>FMT_SMF.1.1/Permissions The TSF shall be capable of performing the following management functions: [</p> <ul style="list-style-type: none"> <u>VIEW PERMISSIONS GRANTED TO AN APP; AND</u> <u>GRANT/REVOKE PERMISSION TO/FROM AN APP OR PROCESS TO HAVE READ AND/OR WRITE ACCESS TO A USER OBJECT</u>]. <p>See FMT_MSA.1/3 answers</p>	

FMT_SMF.1/UserControls	The user shall be able to manage various settings on the device	Supported? (Y/N)
	<ul style="list-style-type: none"> Document the settings for accessibility service, notifications Document how the user can set the default USB mode when connecting to a computer Removable media encryption 	
	<p>FMT_SMF.1.1/UserControls The TSF shall be capable of performing the following management functions: [</p> <ul style="list-style-type: none"> <i>GRANT/REVOKE PERMISSION TO/FROM AN APP OR PROCESS TO HAVE ACCESS TO ACCESSIBILITY SERVICE; AND</i> <i>GRANT/REVOKE PERMISSION TO/FROM AN APP OR PROCESS TO HAVE ACCESS TO DEVICE NOTIFICATION; AND</i> <i>[charge only mode by default, file transfer mode] WHEN THE TOE IS CONNECTED VIA THE WIRED CHARGING INTERFACE TO ANOTHER DEVICE; AND</i> <i>[no support for removable media]; and</i> <i>[no other functions]</i>]. <p>The user can manage apps that can access the accessibility service through:</p> <p>Settings -> Accessibility</p>	

	<p>The user can manage the notifications (which apps can provide notifications, access to read notifications, whether they can be seen on the lock screen) through:</p> <p style="text-align: center;">Settings -> Notifications</p> <p>The user can manage USB connectivity to another device (such as a PC) through the USB preferences. By default, the selection is to not transfer data over the connection. This option becomes available when the device is connected to another device, at which point these settings can be adjusted for the connection.</p> <p>The device does not support removable media</p>	
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FMT_SMF.1 /Privacy	The user shall be able to change the alias used as an identifier for ads and developers	Supported? (Y/N)
	Document how the user can change the alias (or disable it).	
	<p>FMT_SMF.1/Privacy The TSF shall be capable of performing the following management functions: [</p> <ul style="list-style-type: none"> • change or reset the privacy aliases; • block the creation/use of a unique ID for advertising (no personalized tracking)]. <p>The user can access the advertising controls in:</p> <p style="text-align: center;">Settings -> Security & privacy -> More privacy settings -> Ads</p> <p>Here the user can reset the advertising ID or delete it completely. If the ID is deleted then personalized tracking can be disabled.</p> <p>The user generally does not have access to identifiers that have been requested by an app. Some apps may provide this information internally, but this is a developer choice. If the user wants to reset the identifier (or delete it), they can delete the app (or clear all storage for the app, which would remove all associated app data). This will delete the local identifier such that the user would be able to have a new identifier created the next time the app is run.</p>	

	The user shall be able to manage applications on the device (update/uninstall)	Supported? (Y/N)
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FMT_SMF.1 /APP_Update	Describe how application updates can be initiated and how apps (including pre-installed) can be uninstalled.	
	<p>FMT_SMF.1.1/APP_Update The TSF shall be capable of performing the following management functions: [assignment:</p> <ul style="list-style-type: none"> • SPECIFY TO <i>[notify the user without downloading, automatically install]</i> WHEN AN AUTOMATIC CHECK TO THE ADP HAS FOUND AN UPDATE; AND • INITIATE AN IMMEDIATE CHECK FOR UPDATE; AND • INITIATE AN UPDATE OF THE APP (IF AVAILABLE); AND • DISPLAY THE VERSION NUMBER OF THE APP; AND • UNINSTALL DOWNLOADED APPS (INCLUDING APPS DOWNLOADED AS PART OF THE SETUP PROCESS)]. 	Y
	<p>Through the Play Store the user can manage the apps they download to the device. The Play Store allows the user to install apps, check for updates, and uninstall apps. The Play Store checks for updates to the installed apps roughly once per day to see if there are new versions to be installed. In general the apps will be updated automatically, though if there are permission changes to the new version, the user will be required to approve the installation of the new version.</p> <p>The user can check the version number of any app on the device through:</p> <p style="text-align: center;">Settings -> Apps -> <app in question></p> <p>The app version will be displayed at the bottom of the information.</p> <p>The user can also uninstall any app (that can be uninstalled) in the same Settings page by clicking the Uninstall button for the app.</p>	

FMT_SMF.1 /SSW_Update	The user shall be able to check for system software updates Describe how the user can check for new system software updates and how they can be installed.	Supported? (Y/N)
	<p>FMT_SMF.1.1/SSW_Update The TSF shall be capable of performing the following management functions: [assignment:</p> <ul style="list-style-type: none"> • SPECIFY TO <i>[notify the user without downloading, automatically install]</i> WHEN AN AUTOMATIC CHECK 	Y

	<p><i>TO THE TRUSTWORTHY UPDATE SOURCE HAS FOUND AN UPDATE; AND</i></p> <ul style="list-style-type: none"> ● <i>INITIATE AN IMMEDIATE CHECK FOR UPDATE; AND</i> ● <i>INITIATE AN UPDATE OF THE SYSTEM SOFTWARE (IF AVAILABLE); AND</i> ● <i>PROVIDE THE STATUS OF THE UPDATE PROCESS AND THE RESULTS OF THE UPDATE; AND</i> ● <i>[delay temporarily] AUTOMATIC INSTALLATION OF SYSTEM SOFTWARE UPDATES; AND</i> ● <i>DISPLAY THE VERSION NUMBER OF THE SYSTEM SOFTWARE].</i> 	
	<p>Zebra Android OS updates (OSU) are primarily managed by the customer’s device administrators. The OSU can be deployed via several update methodologies.</p> <ul style="list-style-type: none"> ● Fully automatic update ● Managed update ● Manage automatic update ● Semi-automatic update ● Manual <p>Fully automatic behaves much like a consumer device. User is notified of an update and can temporarily postpone. Device administrators can put the device in this mode and updates will be deployed on Zebra’s schedule.</p> <p>Managed updates (including automatic) are exposed via an Enterprise Mobility Management (EMM) tool, by which the administrator can decide when and how their devices receive updates.</p> <p>Semi-automatic updates allow device administrators the ability to control when and how updates are applied, but are required to perform manual steps, like selecting files, and installing dependencies.</p> <p>Manual updates require administrators to leverage downloading files and Android recovery to update their devices. This is not something done on a mass scale.</p> <p>The device settings provide information about what version(s) a device may have installed. (i.e., Android OS version, LG build version, etc)</p>	

Privacy

FPR_PSE.1	Advertisers and app developers shall be provided a unique device identifier that can be modified by the user.	Supported? (Y/N)
	Describe how the unique identifier is provided and how this can be changed by the user.	
	<p>FPR_PSE.1.1/Advertisers The TSF shall ensure that [AD NETWORKS] are unable to determine-access the real-user name Device ID bound to [THE TOE (HARDWARE PLATFORM)] according to the Permissions Policy.</p> <p>FPR_PSE.1.2/Advertisers The TSF shall be able to provide [AT LEAST ONE UNIQUE] alias(es) of the real-user name Device ID to [AD NETWORKS].</p> <p>FPR_PSE.1.3/Advertisers The TSF shall [DETERMINE AN ALIAS FOR A DEVICE ID]-and verify that it conforms to the [assignment: alias metric].</p> <p>FPR_PSE.1.1/APP_Dev The TSF shall ensure that [APP DEVELOPERS] are unable to determine-access the real-user name Device ID bound to [THE TOE (HARDWARE PLATFORM)] according to the Permissions Policy.</p> <p>FPR_PSE.1.2/APP_Dev The TSF shall be able to provide [AT LEAST ONE UNIQUE] alias(es) of the real-user name Device ID to [EACH APP DEVELOPER].</p> <p>FPR_PSE.1.3/APP_Dev The TSF shall [PROVIDE AN ALIAS FOR A DEVICE ID]-and verify that it conforms to the [assignment: alias metric] upon request by the App developer.</p>	
	<p>The device provides a single identifier for advertisers to use. This identifier is not tied to the hardware (it is not derived from any hardware identifiers) and is randomly generated. Advertisers are not able to access unique hardware identifiers through the access control permissions on access to them (such as the IMEI).</p> <p>The advertiser identifier string can be seen by the user in:</p> <p style="padding-left: 40px;">Settings -> Security & privacy -> More privacy settings -> Ads</p> <p>App developers can have unique identifiers generated for them by the system to enable identification of the device tied to the user within their services. The unique identifier for the app is</p>	

	<p>randomly generated and not tied to the hardware unique identifiers in any way.</p> <p>Each app developer can request an identifier (a developer with multiple apps may utilize the same identifier across all apps, that is a developer choice).</p> <p>An app developer can use the API randomUUID to request a random identifier.</p>	
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Protection of the TSF

<p>FPT_PHP.3</p>	<p>OEMs and ODMs shall provide a hardware-backed key store implemented within a SEE, Secure Element or equivalent solution. Plaintext private key material shall not exist outside of the hardware-backed key store.</p>	<p>Supported? (Y/N)</p>
<p>FPT_PHP.3.1 The TSF shall resist <u>[to:</u></p> <ul style="list-style-type: none"> • <i>READ OR MODIFY THE DUK; AND</i> • <i>READ OR MODIFY [no keys (keys are not stored unencrypted)]; AND</i> • <i>MODIFY [hashes of keys] USED TO VERIFY THE INTEGRITY OF THE TSF IN FPT_TST.1; AND</i> • <i>MODIFY [hashes of keys] USED TO VERIFY THE INTEGRITY AND AUTHENTICITY OF UPDATES TO THE TSF IN FCS_COP.1/ASYMMETRIC; AND</i> • <i>READ OR MODIFY [no other keys];</i> <p>to the [HARDWARE BASED SECURE ENVIRONMENT OF THE TSF] by responding automatically such that the SFRs are always enforced it is impossible to read or modify this data and/or key(s).</p>	<p>Provide documentation on the hardware-backed credential storage capabilities of the device, as well as the specific configurations.</p>	
	<p>See the Tables in the KMD for information about keys and where they are stored</p> <p>The device provides multiple hardware-based storage locations for keys to maintain confidentiality and integrity.</p> <p>The DUK (listed as the REK in the KMD) is stored in one-time fuses in the AP itself. These are never read directly by anything outside a security subsystem included in the AP.</p> <p>The DUK is used in the TZ, but not directly. The TZ requests actions related to the key to be performed (such as to encrypt or decrypt another key) to the AP subsystem which then performs the action and returns the encrypted result.</p> <p>This ensures that the DUK cannot be accessed outside the AP hardware. Direct reading of the DUK would require knowing the physical location within the AP and non-destructively being able to read the individual fuses.</p>	

	<p>Android provides the Keystore to securely store all keys inside the TZ. All keys will be encrypted with a key tied to the DUK, and where appropriate, the user's password (some keys are only protected by the DUK, such as Wi-Fi keys, so they are accessible before the user has authenticated, and is determined by the app/process storing the key). Not all keys are stored and may be derived as needed (such as those tied to the user's credentials).</p> <p>All boot keys have SHA-256 hashes fused into the AP to verify the signatures on the boot images. The kernel signing key is embedded into the Android bootloader (which is signed with a boot key). The dm-verity key that protects the /system and /vendor partitions is stored in the kernel image (protected by the kernel signing key which is protected by the bootloader signing key hash). The OTA key is similarly stored in the kernel image (for recovery mode) and in the /system partition (for normal OTA updates).</p>	
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FPT_FLS.1	A failure in the system software update shall not expose user data.	Supported? (Y/N)
	Describe how a failure of the update process is managed. For example, an automatic rollback, or some other process which would allow the user to restore the system but which would not expose any encrypted user data.	
	FPT_FLS.1.1 The TSF shall preserve a secure state when the following types of failures occur: [<i>FAILURE OF THE UPDATE_THE_TOE_SOFTWARE_OPERATION_IN FDP_ACF.1/SSW_UPDATE</i>].	Y
	<p>All user data on the device is encrypted. Except for data that is not encrypted with the user's credentials (DE data), user data cannot be decrypted without a successful user authentication. So a failure to update the system software cannot unlock the user data as the new system would not be able to properly start (the failure).</p> <p>The device maintains two boot slots for the system. Only one is active at a time, and the alternate slot is used to update the device. If the update process fails at any point (such as during the write operation or upon reboot the system cannot successfully start and the user authenticates), the system will revert to the original boot slot and return to the previous version of Android (the version running at the time the update was downloaded).</p>	

FPT_TST.1	<p>During the device start-up process, the integrity of the system software shall be verified.</p>	<p>Supported? (Y/N)</p>
	<p>Different tests are allowed for different types of checks. For example:</p> <ul style="list-style-type: none"> • Cryptographic algorithms can run self-tests (RBG can verify output) • Bootloader and other system checks using hash trees, signatures (or hashes) 	
	<p>FPT_TST.1.1 The TSF shall run a suite of self-tests and integrity verification [DURING INITIAL START-UP] to demonstrate the correct operation of [cryptographic checks on the algorithm tests in BoringSSL, integrity test of BoringSSL and entropy health checks from SP800-90B on the hardware noise source] BY SELF TESTS AND THE BOOTLOADER, MAIN OS KERNEL [SEE, executable code stored in /system and /vendor partitions] BY INTEGRITY, WHERE INTEGRITY IS VERIFIED BY [a hash of an asymmetric key].</p> <p>FPT_TST.1.2 The TSF shall provide authorised users with the capability to verify the integrity [NO DATA].</p> <p>FPT_TST.1.3 The TSF shall provide authorised users with the capability to verify the integrity of [NONE].</p>	<p>Y</p>
	<p>The device runs a number of self-tests on specific components to ensure they are properly functioning during the start-up. Failure of these tests will cause the boot sequence to halt and a Boot Failure message will be shown.</p> <p>The tests run are:</p> <ul style="list-style-type: none"> • Algorithm tests on BoringSSL (AES, SHA, HMAC, DRBG, ECDSA, RSA ECDH) • Self-test on BoringSSL (module integrity after load) • Entropy health tests (from the SoC) based on SP 800-90B <p>These tests are run every time the component is started. For example, each time BoringSSL is loaded into memory it will perform the algorithm and self tests. The entropy health tests are started when the device powers on and are then run continuously thereafter.</p>	

	<p>The device verifies the integrity of the following components during the start-up:</p> <ul style="list-style-type: none"> • Bootloader • OS kernel • TZ • Executable code stored in /system and /vendor partitions <p>All these are verified by checking the signature using the hash of an asymmetric key that is fused into the SoC during manufacturing. The code stored in the /system and /vendor partitions is checked using dm-verity, where the tree is verified to the hash.</p> <p>Dm-verity can correct some errors automatically (depends on the size of the error). Other than errors that can be corrected automatically, any failure of a match will cause the device to halt the boot process.</p>	
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FPT_RCV.2	<p>The device shall support a maintenance mode to enable recovery from malicious/persistent software.</p>	Supported? (Y/N)
	<p>Describe the process by which malicious software may be removed automatically (where possible), and if this isn't possible, how the user may do so (for example, safe boot, manually re-installing the system software or a factory reset)</p>	
	<p>FPT_RCV.2.1 When automated recovery from [<i>DETECTION OF A MALEVOLENT PERSISTENT PRESENCE BY FPT_TST.1 OR AN UPDATE FAILURE BY FDP_ACF.1/SSW_UPDATE</i>] is not possible, the TSF shall enter a maintenance mode where the ability to return to a secure state is provided.</p> <p>FPT_RCV.2.2 For [<i>DETECTION OF A MALEVOLENT PERSISTENT PRESENCE BY FPT_TST.1 OR AN UPDATE FAILURE BY FDP_ACF.1/SSW_UPDATE</i>], the TSF shall ensure the return of the TOE to a secure state using automated procedures.</p>	
	<p>For detection of issues in the /system and /vendor partitions (such as an attempt to write malicious code or make other malicious changes to code stored there), most errors will be automatically corrected by the dm-verity check during the start-up (the error will be detected and corrected automatically).</p> <p>For larger failures, such as changes to other code on the system (i.e. not in the /system or /vendor partitions), the device will boot into a recovery state where-in the user can manually reload known-good firmware onto the device.</p>	

Trusted Path/Channels

FTP_ITC_EXT.1/BT	The device shall support at least Bluetooth Core Specification v4.1	Supported? (Y/N)
	Document the Bluetooth support on the device Describe the process for regenerating ECDH key pairs with paired devices	
	<p>FTP_ITC_EXT.1.1/BT The TSF shall use [<i>BLUETOOTH® CORE SPECIFICATION THAT CONFORMS TO [v5.2 [15]]</i>] to provide a communication channel between itself and another trusted IT product that is logically distinct from other communication channels and provides assured identification of its end points and protection of the channel data from modification or disclosure.</p> <p>FTP_ITC_EXT.1.2/BT The TSF shall permit [<i>the TSF, another trusted IT product</i>] to initiate communication via the trusted channel.</p> <p>FTP_ITC_EXT.1.3/BT The TSF shall initiate communication via the trusted channel for [<i>CONNECTIONS TO BLUETOOTH DEVICES</i>].</p> <p>FTP_ITC_EXT.1.4/BT The protocol used by the communications channel shall support the following requirements: [</p> <ul style="list-style-type: none"> • <i>REQUIRE EXPLICIT USER AUTHORISATION BEFORE PAIRING; AND</i> • <i>USE SECURE SIMPLE PAIRING AND SECURE CONNECTIONS FOR PAIRING; AND</i> • <i>NOT ALLOW MORE THAN ONE BLUETOOTH CONNECTION TO THE SAME BLUETOOTH DEVICE ADDRESS; AND</i> • <i>GENERATE NEW ECDH PUBLIC/PRIVATE KEY PAIRS EVERY [on every connection between the devices].</i> 	Y
	<p>The device has been qualified according to the Bluetooth 5.0 specification. Pairing is not allowed without explicit authorization from the user (this cannot be programmatically entered but must be input directly from the user).</p> <p>If the device is already paired with a peer, a second peer attempting to connect with the same BD_ADDR will be rejected (so a device that has been made to look like the first peer will be blocked from connecting while the original device is already connected).</p>	

	Each time the device is connected to a peer over Bluetooth a new ECDH key pair will be created for the connection.	
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FTP_ITC_EXT.1/HTTPS	The device shall support TLS 1.2 or higher	
FTP_ITC_EXT.1/TLS	Document the following: <ul style="list-style-type: none"> versions of TLS that are supported (1.2 & 1.3 expected) IETF RFC 5280 support for certificate revocation checking What happens if a certificate is determined to be invalid What TLS ciphersuites are supported (for apps/websites to use) 	Supported? (Y/N)
	<p>FTP_ITC_EXT.1.1/HTTPS The TSF shall use <i>[HTTPS THAT CONFORMS TO IETF RFC 2818 [5]]</i> to provide a communication channel between itself and another trusted IT product that is logically distinct from other communication channels and provides assured identification of its end points and protection of the channel data from modification or disclosure.</p> <p>FTP_ITC_EXT.1.2/HTTPS The TSF shall permit <i>[THE TSF]</i> to initiate communication via the trusted channel.</p> <p>FTP_ITC_EXT.1.3/HTTPS The TSF shall initiate communication via the trusted channel for <i>[COMMUNICATION WITH A TRUSTED IT PRODUCT]</i>.</p> <p>FTP_ITC_EXT.1.4/HTTPS The protocol used by the communications channel shall support the following requirements: <i>[USE TLS AS SPECIFIED IN FTP_ITC_EXT.1/TLS TO IMPLEMENT HTTPS]</i>.</p> <p>FTP_ITC_EXT.1.1/TLS The TSF shall use <i>[TLS THAT CONFORMS TO [TLS v1.2 [6], TLS v1.3 [10]]</i> to provide a communication channel between itself and another trusted IT product that is logically distinct from other communication channels and provides assured identification of its end points and protection of the channel data from modification or disclosure.</p> <p>FTP_ITC_EXT.1.2/TLS The TSF shall permit <i>[the TSF]</i> to initiate communication via the trusted channel.</p>	Y

FTP_ITC_EXT.1.3/TLS The TSF shall initiate communication via the trusted channel for [COMMUNICATION WITH A TRUSTED IT PRODUCT].

FTP_ITC_EXT.1.4/TLS The protocol used by the communications channel shall support the following requirements: [

- SUPPORT X.509V3 CERTIFICATES FOR MUTUAL AUTHENTICATION; AND
- DETERMINE VALIDITY OF THE PEER CERTIFICATE BY CERTIFICATE PATH, EXPIRATION DATE AND REVOCATION STATUS ACCORDING TO IETF RFC 5280 [7]; AND
- NOTIFY THE TSF AND [not establish the connection] IF THE PEER CERTIFICATE IS DEEMED INVALID; AND
- SUPPORTS THE FOLLOWING CIPHER SUITES [
 - TLS_RSA_WITH_AES_256_GCM_SHA384 (IETF RFC 5288 [8]),
 - TLS_ECDHE_RSA_WITH_AES_128_GCM_SHA256 (IETF RFC 5289 [9]),
 - TLS_ECDHE_RSA_WITH_AES_256_GCM_SHA384 (IETF RFC 5289 [9]),
 - TLS_ECDHE_ECDSA_WITH_AES_128_GCM_SHA256 (IETF RFC 5289 [9]),
 - TLS_ECDHE_ECDSA_WITH_AES_256_GCM_SHA384 (IETF RFC 5289 [9]),
 - TLS_AES_128_GCM_SHA256 as defined in RFC 8446
 - TLS_AES_256_GCM_SHA384 as defined in RFC 8446
 - TLS_CHACHA20_POLY1305_SHA256 as defined in RFC 8446]

].

The device supports TLS v1.2 and TLS v1.3 ([TLS v1.3 is the default](#)). TLS is available directly via Android APIs (such as for an app to communicate to a server) or through HTTPS connections (such as when using a web browser).

The device supports mutual authentication using certificates, and can check the validity of the peer certificate according to RFC 5280.

Android supports the ability for an app to check the certificate revocation status using [OCSP](#). The app must implement the

	<p>APIs to enable the check and determine the action to take if the certificate is found to be revoked (Android does not perform any action based on the information itself other than notify the app requesting the check of the state).</p> <p>The device does not act as a server so TLS connections must be initiated by the device (a request from a server to switch to a TLS connection will cause the device to start one) as opposed to accepting incoming connections that are not responses to a request originating from the device.</p> <p>The following ciphersuites are supported:</p> <ul style="list-style-type: none"> ● TLS_RSA_WITH_AES_256_GCM_SHA384 as defined in RFC 5288, ● TLS_ECDHE_RSA_WITH_AES_128_GCM_SHA256 as defined in RFC 5289, ● TLS_ECDHE_RSA_WITH_AES_256_GCM_SHA384 as defined in RFC 5289, ● TLS_ECDHE_ECDSA_WITH_AES_128_GCM_SHA256 as defined in RFC 5289, ● TLS_ECDHE_ECDSA_WITH_AES_256_GCM_SHA384 as defined in RFC 5289 ● TLS_AES_128_GCM_SHA256 as defined in RFC 8446 ● TLS_AES_256_GCM_SHA384 as defined in RFC 8446 ● TLS_CHACHA20_POLY1305_SHA256 as defined in RFC 8446 	
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FTP_ITC_EXT.1/WLAN	<p>The device shall support IEEE 802.11-2012, 802.1X & EAP-TLS connectivity</p>	<p>Supported? (Y/N)</p>
	<p>Document the Wi-Fi support on the device including</p> <ul style="list-style-type: none"> ● Key lengths supported ● TLS 1.2 or higher support ● IETF RFC 5280 support for certificate revocation checking ● What happens if a certificate is determined to be invalid ● What TLS ciphersuites are supported ● MAC address randomization process (frequency) 	
	<p>FTP_ITC_EXT.1.1/WLAN The TSF shall use [<i>WLAN THAT CONFORMS TO 802.11-2012 [16]</i>] to provide a communication channel between itself and another trusted IT product that is logically distinct from other communication channels and provides assured identification of its end points and protection of the channel data from modification or disclosure.</p> <p>FTP_ITC_EXT.1.2/WLAN The TSF shall permit [<i>the TSF</i>] to initiate communication via the trusted channel.</p>	<p>Based on the Wi-Fi chip this needs to be updated.</p>

FTP_ITC_EXT.1.3/WLAN The TSF shall initiate communication via the trusted channel for [COMMUNICATION WITH THE TRUSTED IT PRODUCT THROUGH WLAN CHANNEL].

FTP_ITC_EXT.1.4/WLAN The protocol used by the communications channel shall support the following requirements: [

- GENERATE SYMMETRIC KEYS ACCORDING TO [PRF-384 with key length 128 bit, PRF-704 with key length 256 bit]; AND
- USES [TLS V1.2 [6]]; AND
- SUPPORTS THE FOLLOWING CIPHER SUITES [selection:
 - TLS RSA WITH AES 256 GCM SHA384 (IETF RFC 5288 [8]).
 - TLS ECDHE RSA WITH AES 128 GCM SHA256 (IETF RFC 5289 [9]).
 - TLS ECDHE RSA WITH AES 256 GCM SHA384 (IETF RFC 5289 [9]).
 - TLS ECDHE ECDSA WITH AES 128 GCM SHA256 (IETF RFC 5289 [9]).
 - TLS ECDHE ECDSA WITH AES 256 GCM SHA384 (IETF RFC 5289 [9]).
- RANDOMLY GENERATE A NEW MAC ADDRESS EACH TIME IT CONNECTS TO A DIFFERENT ACCESS POINT].

The device has been certified to meet the requirements for the Wi-Fi Alliance.

The device supports PRF-384 and PRF-704 key generation and TLS v1.2.

The following cipher suites are supported:

- TLS_RSA_WITH_AES_256_GCM_SHA384 as defined in RFC 5288,
- TLS_ECDHE_ECDSA_WITH_AES_128_GCM_SHA256 as defined in RFC 5289,
- TLS_ECDHE_ECDSA_WITH_AES_256_GCM_SHA384 as defined in RFC 5289,
- TLS_ECDHE_RSA_WITH_AES_128_GCM_SHA256 as defined in RFC 5289,
- TLS_ECDHE_RSA_WITH_AES_256_GCM_SHA384 as defined in RFC 5289

TS 103 732-2 SFRs

Identification and Authentication

FIA_MBE_EXT.1	The user must be able to enroll their biometric sample to create an authentication template.	Supported? (Y/N)
	Document the process for enrolling the user's biometric.	
	FIA_MBE_EXT.1.1 The TSF shall provide a mechanism to enrol an authenticated user to the biometric system.	N
Zebra devices doesn't support		

FIA_MBV_EXT.1	Biometric authentication sensors shall meet minimum requirements for use.	Supported? (Y/N)
	Document the FAR/FRR information for each biometric modality available.	
	FIA_MBV_EXT.1.1 The TSF shall provide a biometric verification mechanism using [].	N
FIA_MBV_EXT.1.2 The TSF shall provide a biometric verification mechanism with the [FAR] not exceeding []and [FRR] not exceeding [].		
Zebra devices doesn't support		

Management

FMT_SMF.1/BAF	The user must be able to manage their biometric templates.	Supported? (Y/N)
	Document what the user can do in terms of managing enrolled biometrics.	
	FMT_SMF.1/BAF The TSF shall be capable of performing the following management functions: [<ul style="list-style-type: none"> • ENROL THE INITIAL []; AND • RE-ENROL OR CHANGE THE []. 	N
Zebra devices doesn't support		

TS 103 732-4 SFRs

Applications

FAP_LFC.1	The developer shall describe how preloaded apps included in the system image are updated.	Supported? (Y/N)
	The developer can provide a list of the apps along with how they are updated.	
	FAP_LFC.1.1 The TSF shall ensure that preloaded applications are updated by <i>[using an ADP and system software updates (to the version maintained in firmware)]</i> .	Update this based on the store being used
	Some preloaded applications are only updated as part of the system software updates but most are provided as apps in the Play Store and can be updated as any application update.	
FAP_LFC.2	The developer shall specify what happens when a preloaded app is uninstalled and the app reverts back to the one included in the current system image.	Supported? (Y/N)
	The developer shall explain the actions that are taken automatically and what the user may be able to do with the app once it has been uninstalled.	
	FAP_LFC.2.1 When a preloaded app update is uninstalled, the TSF shall warn the user the preloaded app will revert to the version in the system image and allow the following actions: <i>[disable the app, none]</i> .	
	Some preloaded apps may be able to be disabled (along with uninstalling any app updates). This depends on the app (some are critical to the device and so cannot be disabled). When the app is not able to be disabled the user is warned about uninstalling the updates and then continuing to use the app from that point.	
FAP_LFC.3	The developer shall specify the ADP(s) where preinstalled apps are linked to for updates.	Supported? (Y/N)
	The developer should provide information about the ADP(s) where preinstalled apps will download updates from (updates should not be downloaded from a location that is not an ADP)..	
	FAP_LFC.3.1 The TSF shall ensure that preinstalled applications are only updated from the ADP(s) of the TOE manufacturer and/or OS developer.	Y
	All preinstalled GMS apps are installed through the Play Store and so use the Play Store for all updates. Preinstalled Zebra apps will be updated by Admin.	
FAP_LFC.4	The developer shall specify the ADP(s) where preinstalled apps are downloaded from during the installation process.	Supported? (Y/N)
	The developer should provide information about the allowed ADP(s) where apps may be downloaded from. The apps do not have to be specified.	

	FAP_LFC.4.1 The TSF shall ensure that preinstalled applications are only downloaded from the ADP(s) of the TOE manufacturer and/or OS developer.	Y
	All preinstalled apps are installed from the Play Store.	

FAP_PRM.1	The developer shall specify the permissions that are restricted to only preloaded and vendor-owned preinstalled apps.	Supported? (Y/N)
	The developer provides a list of system permissions that are restricted to only these apps so that any other app cannot successfully request access to the specified permission.	
FAP_PRM.1.1	The TSF shall restrict the ability of applications to request [permissions categorized as signature (and can only be assigned to an application that is signed by the platform signing key)] to only preloaded applications and preinstalled applications created by the TOE developer.	Y
	Permissions that are categorized at a Protection level of “signature” can only be assigned to apps that are signed by the platform signing key. These permissions are not accessible by any apps that are not signed with this key and so cannot be requested.	
	More information about the specific permissions available (and what permissions are categorized as signature) can be found at: https://developer.android.com/reference/android/Manifest.permission	

Application Risk ← Lab will take care of it. Lab has script to validate.

FPA_RSK.1	No sensitive data should be stored outside of the app container or system credential storage facilities.	Supported? (Y/N)
	Output from a script that checks for proper usage and a report on any apps that could not provide a clear answer from the evaluator.	
FPA_RSK.1.1	The applications on the TOE shall only store data within their own storage context.	
	FPA_RSK.1.2 The applications on the TOE shall only store keys using the TSF-provided key storage.	

FPA_RSK.2	The app does not rely on symmetric cryptography with hardcoded keys as a sole method of encryption.	Supported? (Y/N)
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	Output from a script that checks for proper usage and a report on any apps that could not provide a clear answer from the evaluator.	
	FPA_RSK.2.1 The applications on the TOE shall use appropriate cryptographic primitives to support the algorithms in use.	
	FPA_RSK.2.2 The applications on the TOE shall not use deprecated cryptographic modes or algorithms.	

FPA_RSK.3	The app uses cryptographic primitives that are appropriate for the particular use-case, configured with parameters that adhere to industry best practices.	Supported? (Y/N)
	Output from a script that checks for proper usage and a report on any apps that could not provide a clear answer from the evaluator.	
	FPA_RSK.3.1 The applications on the TOE shall not have hardcoded symmetric keys as the method of internal data protection.	

FPA_RSK.4	Data is encrypted on the network using TLS. The secure channel is used consistently throughout the app.	Supported? (Y/N)
	Output from a script that checks for proper usage and a report on any apps that could not provide a clear answer from the evaluator.	
	FPA_RSK.4.1 The applications on the TOE shall not have hardcoded unencrypted URLs for network communications.	

FPA_RSK.5	The TLS settings are in line with current best practices, or as close as possible if the mobile operating system does not support the recommended standards.	Supported? (Y/N)
	Output from a script that checks for proper usage and a report on any apps that could not provide a clear answer from the evaluator.	
	FPA_RSK.5.1 The applications on the TOE shall use the trusted channels provided by FTP_ITC_EXT.1/HTTPS or FTP_ITC_EXT.1/TLS.	

FPA_RSK.6	The app verifies the X.509 certificate of the remote endpoint when the secure channel is established.	Supported? (Y/N)
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	Output from a script that checks for proper usage and a report on any apps that could not provide a clear answer from the evaluator.	
	FPA_RSK.6.1 The applications on the TOE shall validate the X.509 server certificate according to the following rules: <ul style="list-style-type: none"> • The certificate path must terminate with a certificate in the TOE trust anchor; • The TOE shall use the main OS-provided method to verify the certificate. 	

FPA_RSK.7	All inputs from external sources and the user are validated and if necessary sanitized. This includes data received via the UI, IPC mechanisms such as intents, custom URLs, and network sources.	Supported? (Y/N)
	Output from a script that checks for proper usage and a report on any apps that could not provide a clear answer from the evaluator.	
	FPA_RSK.7.1 The applications on the TOE shall sanitize all input from external sources via any available interface.	

FPA_RSK.8	The app does not export sensitive functionality via custom URL schemes, unless these mechanisms are properly protected.	Supported? (Y/N)
	Apps by a common app developer may be acceptable in some circumstances.	
	Output from a script that checks for proper usage and a report on any apps that could not provide a clear answer from the evaluator.	
	FPA_RSK.8.1 The applications on the TOE shall not support unauthorized direct access to data from external apps.	

FPA_RSK.9	The app is signed and provisioned with a valid certificate for the platform.	Supported? (Y/N)
	Output from a script that checks for proper usage and a report on any apps that could not provide a clear answer from the evaluator.	
	FPA_RSK.9.1 The applications on the TOE shall be signed with certificates with a signature format valid for the platform.	

FPA_RSK.1 0	The app has been built in release mode, with settings appropriate for a release build (e.g. non-debuggable).	Supported? (Y/N)
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	Output from a script that checks for proper usage and a report on any apps that could not provide a clear answer from the evaluator.	
	FPA_RSK.10.1 The applications on the TOE shall not have any debug functionality enabled.	

APA_LST.1	Enumerating the preloaded and preinstalled applications with system permissions is necessary to ensure how apps are separate from the OS.	Supported? (Y/N)
	The developer shall list the preloaded apps and any preinstalled apps (ones that are downloaded during the install) that are assigned system permissions.	
	APA_LST.1.1D The developer shall provide a list of all preloaded and preinstalled applications with system permissions included on the consumer mobile device at the completion of the initial CMD setup.	Y
	APA_LST.1.1C The list of preloaded applications shall include all applications contained within the system software.	
	APA_LST.1.2C The list of preinstalled applications shall include all applications installed on the consumer mobile device at the completion of the initial CMD setup that have been assigned system permissions.	
APA_LST.1.1E The evaluator shall confirm that the information provided meets all requirements for content and presentation of evidence.		
	Generate list of built-in apps, including permissions	

TS 103 732-5 SFRs

Bootloader - User data protection

FDP_ULK.1	If the bootloader is able to be unlocked, user data shall be protected (though wipe).	Supported? (Y/N)
	Describe whether the bootloader can be unlocked, and if so, how the device is wiped when the bootloader state changes. (Locking does not require a wipe, only unlocking)	
	FDP_ULK.1.1 The TSF shall ensure that [<i>changing the bootloader to an unlocked state will wipe all user data</i>].	Y
	When the bootloader is unlocked the device will be wiped of all user data. Bootloaders on Zebra devices are protected with OTP which will not be available to outside zebra.	

FDP_BBY.1	Any boot modes must continue to enforce user data security (no bypass)	Supported? (Y/N)
	Describe protections that ensure that alternative boot modes don't bypass the security functions.	
	FPT_BBY.1.1 The TSF shall be enforced in any alternative boot modes.	There should not be any boot modes that can bypass the encryption
	There are no boot modes that can bypass the data security.	

Bootloader - Protection of the TSF

FPT_BLP.1	The bootloader must run in the least privileged mode (ARM EL1 for example) possible.	Supported? (Y/N)
	Provide documentation about the boot process and the modes the bootloader runs in, with particular focus on the last stage.	
	If the bootloader is completely removed from memory after loading the OS, then that is sufficient to meet this.	
	FPT_BLP.1.1 The bootloader shall be configured to run in the least privileged mode of the processor.	Y
The bootloader initially loads at EL3 (the first stage of the bootloader), but once it has completed the loading process moves to EL1 to proceed with the boot process.		

FPT_PRT.1	The partition configuration protection shall be specified to ensure that the system is properly defined.	Supported? (Y/N)
	Provide information about how the integrity of the partition configuration is ensured.	
FPT_PRT.1.1	The TSF shall protect the integrity of the partition configuration to prevent changes outside of the system image update process.	Y
	The integrity of the partition table is maintained using dm-verity.	

FPT_PRT.2	Bootable partitions must be documented, including all settings used on bootable partitions.	Supported? (Y/N)
	Document the partitions of the device. Include both fstab (or equivalent partition table from the device) for all mounted partitions and any additional information for partitions that may not be mounted by the OS but are used for special operations.	
	FPT_PRT.2.1 The TOE has the following partitions marked as bootable: the main OS and [recovery] .	The fstab for the device should be linked here. If any partitions are different than those of default Android, those differences need to be added here.
	FPT_PRT.2.2 The TSF enforces restrictions on writing data, code execution and system permissions through the use of partition flags during the mounting of partitions for use by the TOE.	
fstab file for the device Android partition table descriptions		

FPT_ROL.1	Bootloaders must enforce rollback protection for firmware on the device. Tamper-evident storage must support the rollback implementation.	Supported? (Y/N)
	Provide documentation about how rollback protection is implemented and which components support it (and any conditions under which rollback may be bypassed and an earlier version installed).	
	FPT_ROL.1.1 The TSF shall permit rollback of the system software and [no other software/firmware] under [[the case where the bootloader has been unlocked]] conditions.	Y

	<p>Bootloader is protected by secure boot anti-rollback. Zebra devices allows to downgrade system images but with forced data wipe. Any downgrade in SPL level will trigger automatic data wipe.</p> <p>Zebra devices followed Android AVB rollback protection mechanism with SPL level will trigger automatic data wipe to meet enterprise scenarios</p>	
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Root of Trust - Protection of the TSF

FPT_INI.1	The device provides a method for verifying the integrity of the device during the boot process (a Root of Trust).	Supported?
	Document what the Root of Trust is, how it provides support for the initialization and what happens when an error is detected.	(Y/N)
FPT_INI.1.1	<p>The TOE shall provide an initialization function which is self-protected for integrity and authenticity.</p> <p>FPT_INI.1.2 The TOE initialization function shall ensure that certain properties hold on certain elements immediately before establishing the TSF in a secure initial state, as specified in FPT_INI.1.2 Table.</p> <p>ID1 [INTEGRITY] [ROOT OF TRUST] ID2 [PREVENTION OF DOWNGRADE TO PREVIOUS VERSIONS] [ELEMENTS AS SPECIFIED IN FPT_ROL.1.1]</p> <p>FPT_INI.1.3 The TOE initialization function shall detect and respond to errors and failures during initialization such that the TOE [<i>is halted</i>].</p> <p>FPT_INI.1.4 The TOE initialization function shall only interact with the TSF in [verifying the validity of the vmbeta partition by providing the hash of the public key used to sign the partition] during initialization.</p>	Y
	The device utilizes Android Verified Boot 2.0 to ensure the integrity of the system as it loads on the device. The trust of the boot sequence is derived from the public signature key hash which is set into One Time Programmable (OTP) eFuses in the SoC. This hash is used to verify that the signature provided as part of the vmbeta partition is valid (and hence that the partition can be trusted).	

	The vmbeta partition includes information that is used to verify the integrity of the other partitions used to load Android as well as the rollback counter to protect against rollback attacks.	
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FPT_RDI.1	The integrity of the stored Root of Trust data is monitored.	Supported? (Y/N)
	Explain how the data used by the Root of Trust is monitored for integrity.	
	FPT_RDI.1.1 The TSF shall monitor Root of Trust data stored in containers controlled by the TSF for integrity errors. The Root of Trust is added to the device during manufacturing by setting One Time Programmable (OTP) values. This sets the Root of Trust to be immutable as the values cannot be changed once set by this process.	Y

GSMA Requirements (FS.56)

Cryptographic Support

FCS_STG_EXT.1	Developers must provide a keystore that is tied to the hardware outside the main OS.	Supported? (Y/N)
	Provide documentation of how the keys are protected in a key store outside the main OS and how this is tied specifically to the hardware.	
	FCS_STG_EXT.1.1 The TSF shall provide [<i>hardware-based</i> secure cryptographic key storage. NOTE: Hardware-based => TEE/TZ or similar Hardware isolated => eSE, SPU or similar	Y
	FCS_STG_EXT.1.2 The TSF shall utilize the provided secure cryptographic key storage for protecting the key hierarchy. <i>These are used for the Android keystore depending on the specific request of the calling application as to where to store the key (hardware-based).</i>	

Identification and Authentication

FIA_SAR.1	Biometric authentication shall meet minimum requirements to detect spoof attempts.	Supported? (Y/N)
	Document the SAR (or IAPMR) information for each biometric modality available.	
	FIA_SAR.1.1 The TSF shall provide a biometric verification mechanism with the SAR no exceeding [].	N
	<i>Zebra devices doesn't support</i>	

Privacy

FPR_ANO.2	The OTA client shall not access user data that is not necessary to perform an update.	Supported? (Y/N)
	Document what data is needed by the OTA client (such as IMEI or email to be authorized to access the update) and how the permissions on the device protect the client from user data. Since the client will have high permissions, showing how the user data is protected from the OTA client (or the client is prevented from accessing the data) is to be shown.	
	FPR_ANO.2.1 The TSF shall ensure that [THE SYSTEM SOFTWARE OTA CLIENT] is unable to determine the real user data bound to [the TOE (HARDWARE PLATFORM)].	Y

	<p>FPR_ANO.2.2 The TSF shall provide [SYSTEM SOFTWARE UPDATES] to [THE USER] without soliciting any reference to the real user data.</p> <p>The Zebra FOTA client undergoes a privacy review with each Android release. This review (performed by Zebra security team) ensures that the client does not export PII. The only information collected by the client relates to the status of the update process so this can be tracked (installation rates). This data does not include unique identifiers of the device, only the status of the update process (stage, success, failure, etc).</p> <p>Additionally the client is not provided privileges which would provide it access to user/app data.</p>	
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Protection of the TSF

FPT_EAT_EXT.1	<p>Access to telephony commands (such as AT commands or other terminal listeners) via USB or other external interfaces must be disabled at ship time.</p> <p>This is intended to cover commands such as those entered via the dialer to provide various device information and not access to the modem itself (such as programmatic access).</p>	Supported? (Y/N)
	<p>Document how telephony commands can be accessed (both locally through the interfaces and remotely, if possible, from external devices).</p>	
	<p>FPT_EAT_EXT.1.1 The TSF shall only allow access to AT modem commands from [<i>the user interface</i>].</p> <p>FPT_EAT_EXT.1.2 The TSF shall prompt for approval of AT modem commands sent to the device from outside the user interface [<i>is not applicable</i>].</p>	N
	<p>The AOSP does not provide external or remote access to AT commands, they can only be entered directly through the user interface on the device (i.e. the phone dialer app). All access to these commands is disabled as part of the production build process for the telephony system.</p>	

FPT_LNW_EXT.1	<p>Root or system owned processes do not expose any listening network sockets externally or on loopback interfaces. Disabling a listening socket must not require an OTA.</p>	Supported? (Y/N)
	<p>Document the network sockets that are available after the boot has completed from the device. Both loopback and external open ports must be documented.</p>	
	<p>FPT_LNW_EXT.1.1 The TSF shall ensure that no listening network sockets to the external or loopback IP networks are</p>	Y

	<p>associated with processes with system permissions on the device.</p> <p>FPT_LNW_EXT.1.2 The TSF shall ensure that [<i>no network sockets and associated processes</i>] exposed to the external or loopback IP networks have no system permission on the device.</p> <p><i>No network sockets or processes that are exposed to the network have system permissions.</i></p>	
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Consolidated Life Cycle Requirements

The requirements here are consolidated from both the TS 103 732-1 & 5 SARs along with the GSMA requirements. The only SAR that is not included here is from TS 103 732-4 (this one makes more sense to keep with the Preloaded Apps requirements as it is a new, extended SAR)..

The **highlighted text** are changes from what is included in the TS 103-732 SARs (the GSMA requirements).

ADV: Development

ADV_ARC.1	Security Architecture Description	
	<p>The architecture of the security system (not the entire mobile device) needs to be described. This is especially important where the developer has added functionality to the device on top of what AOSP provides.</p> <p>As AOSP is open source, a lot of this just comes from that. The key is how the hardware chosen fits in.</p>	
	<p>ADV_ARC.1.1D The developer shall design and implement the TOE so that the security features of the TSF cannot be bypassed.</p> <p>ADV_ARC.1.2D The developer shall design and implement the TSF so that it is able to protect itself from tampering by untrusted active entities.</p> <p>ADV_ARC.1.3D The developer shall provide a security architecture description of the TSF.</p> <p>ADV_ARC.1.1C The security architecture description shall be at a level of detail commensurate with the description of the SFR-enforcing abstractions described in the TOE design document.</p>	<p>The Android Security page should provide most of the architecture requirements. How the functionality of the hardware is implemented</p>

	<p>ADV_ARC.1.2C The security architecture description shall describe the security domains maintained by the TSF consistently with the SFRs.</p> <p>ADV_ARC.1.3C The security architecture description shall describe how the TSF initialisation process is secure.</p> <p>ADV_ARC.1.4C The security architecture description shall demonstrate that the TSF protects itself from tampering.</p> <p>ADV_ARC.1.5C The security architecture description shall demonstrate that the TSF prevents bypass of the SFR-enforcing functionality.</p> <p>ADV_ARC.1.1E The evaluator shall confirm that the information provided meets all requirements for content and presentation of evidence. Boot arguments/commands that may be passed to the kernel from the boot process shall be documented.</p>	<p>d within the AOSP framework needs to be specified (what hardware, whether anything new had to be done).</p>
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<p>ADV_FSP.2</p>	<p>This is the functional specification. The interfaces for the security functions need to be described sufficiently for the evaluation to understand how they are implemented.</p> <p>For the GSMA requirements, boot arguments/commands that may be passed to the kernel from the boot process shall be documented as part of the functional specification.</p> <p>The focus here is on commands that can be provided outside of the normal programmed commands, so commands from the user that may be passed.</p> <p>This is a modification to the ADV_FSP.2 documentation that is already required as part of the evaluation.</p> <p>As part of the functional specification, the interface between the bootloader and the kernel shall be considered as a TSFI. Boot arguments or commands that may be passed from the bootloader to the kernel outside those that are provided as part of the TOE configuration (such as arguments that may be passed by the user through an external connection to the device) shall be documented and reviewed.</p>	
	<p>ADV_FSP.2.1D The developer shall provide a functional specification.</p>	<p>The Android Security</p>

	<p>ADV_FSP.2.2D The developer shall provide a tracing from the functional specification to the SFRs.</p> <p>ADV_FSP.2.1C The functional specification shall completely represent the TSF.</p> <p>ADV_FSP.2.2C The functional specification shall describe the purpose and method of use for all TSFI.</p> <p>ADV_FSP.2.3C The functional specification shall identify and describe all parameters associated with each TSFI.</p> <p>ADV_FSP.2.4C For each SFR-enforcing TSFI, the functional specification shall describe the SFR-enforcing actions associated with the TSFI.</p> <p>ADV_FSP.2.5C For each SFR-enforcing TSFI, the functional specification shall describe direct error messages resulting from processing associated with the SFR-enforcing actions.</p> <p>ADV_FSP.2.6C The tracing shall demonstrate that the SFRs trace to TSFIs in the functional specification.</p> <p>ADV_FSP.2.1E The evaluator shall confirm that the information provided meets all requirements for content and presentation of evidence.</p> <p>ADV_FSP.2.2E The evaluator shall determine that the functional specification is an accurate and complete instantiation of the SFRs.</p>	<p>page should provide most of the interface requirements. Any specific changes (such as kernel changes, hardware, etc) is needed in addition.</p>
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<p>ADV_TDS.1</p>	<p>TOE Design is about how the product is broken down into the components that provide the security functionality.</p> <p>The breakdown here is into one level, so what subsystems provide what functionality. These may be broad.</p> <p>As AOSP is open source, most of this is already covered, but how the hardware ties into the security functionality needs to be described.</p>	
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	<p>ADV_TDS.1.1D The developer shall provide the design of the TOE.</p> <p>ADV_TDS.1.2D The developer shall provide a mapping from the TSFI of the functional specification to the lowest level of decomposition available in the TOE design.</p> <p>ADV_TDS.1.1C The design shall describe the structure of the TOE in terms of subsystems.</p> <p>ADV_TDS.1.2C The design shall identify all subsystems of the TSF.</p> <p>ADV_TDS.1.3C The design shall provide the behaviour summary of each SFR-supporting or SFR-non-interfering TSF subsystem.</p> <p>ADV_TDS.1.4C The design shall summarise the SFR-enforcing behaviour of the SFR-enforcing subsystems.</p> <p>ADV_TDS.1.5C The design shall provide a description of the interactions among SFR-enforcing subsystems of the TSF, and between the SFR-enforcing subsystems of the TSF and other subsystems of the TSF.</p> <p>ADV_TDS.1.6C The mapping shall demonstrate that all TSFIs trace to the behaviour described in the TOE design that they invoke.</p> <p>ADV_TDS.1.1E The evaluator shall confirm that the information provided meets all requirements for content and presentation of evidence.</p> <p>ADV_TDS.1.2E The evaluator shall determine that the design is an accurate and complete instantiation of all security functional requirements.</p>	<p>The Android Security page should provide most of the requirements and that it is open source.</p>
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AGD: Guidance documents

<p>AGD_OPE.1</p>	<p>Operational Guidance for the TOE. Provide a user guide.</p>	
	<p>An online user guide for the device is sufficient to meet this requirement as long as all the security functions are described.</p>	
	<p>AGD_OPE.1.1D The developer shall provide operational user guidance.</p>	

	<p>AGD_OPE.1.1C The operational user guidance shall describe, for each user role, the user-accessible functions and privileges that should be controlled in a secure processing environment, including appropriate warnings.</p> <p>AGD_OPE.1.2C The operational user guidance shall describe, for each user role, how to use the available interfaces provided by the TOE in a secure manner.</p> <p>AGD_OPE.1.3C The operational user guidance shall describe, for each user role, the available functions and interfaces, in particular all security parameters under the control of the user, indicating secure values as appropriate.</p> <p>AGD_OPE.1.4C The operational user guidance shall, for each user role, clearly present each type of security-relevant event relative to the user-accessible functions that need to be performed, including changing the security characteristics of entities under the control of the TSF.</p> <p>AGD_OPE.1.5C The operational user guidance shall identify all possible modes of operation of the TOE (including operation following failure or operational error), their consequences and implications for maintaining secure operation.</p> <p>AGD_OPE.1.6C The operational user guidance shall, for each user role, describe the security measures to be followed in order to fulfil the security objectives for the operational environment as described in the ST.</p> <p>AGD_OPE.1.7C The operational user guidance shall be clear and reasonable.</p> <p>AGD_OPE.1.1E The evaluator shall confirm that the information provided meets all requirements for content and presentation of evidence.</p>	
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<p>AGD_PRE.1</p>	<p>Setup Guidance for the TOE. Provide a user guide that walks through the initial configuration of the device.</p>	
	<p>An online user guide for the device is sufficient to meet this requirement as long as all the security functions are described.</p>	
	<p>AGD_PRE.1.1D The developer shall provide the TOE including its preparative procedures.</p> <p>AGD_PRE.1.1C The preparative procedures shall describe all the steps necessary for secure acceptance of the delivered TOE in accordance with the developer's delivery procedures.</p> <p>AGD_PRE.1.2C The preparative procedures shall describe all the steps necessary for secure installation of the TOE and for the secure preparation of the operational environment in accordance</p>	

	<p>with the security objectives for the operational environment as described in the ST.</p> <p>AGD_PRE.1.1E The evaluator shall confirm that the information provided meets all requirements for content and presentation of evidence.</p> <p>AGD_PRE.1.2E The evaluator shall apply the preparative procedures to confirm that the TOE can be prepared securely for operation.</p>	
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ALC: Life-cycle support

<p>ALC_CMC.2</p>	<p>The source code must be stored in a Configuration Management system. Source code is stored on Zebra hosted Gerrit server.</p> <p>Any third party code shall be added to the developer’s CM system. No third party code is present apart from Google and Qualcomm</p> <p>The process for importing third party code and then maintaining that code shall be described.</p> <p>ALC_CMC.2.1D The developer shall provide the TOE and a reference for the TOE.</p> <p>ALC_CMC.2.2D The developer shall provide the CM documentation.</p> <p>ALC_CMC.2.3D The developer shall use a CM system.</p> <p>ALC_CMC.2.4D The developer shall provide guidance for importing and updating external software components into the CM system.</p> <p>ALC_CMC.2.1C The TOE shall be labelled with its unique reference.</p> <p>ALC_CMC.2.2C The CM documentation shall describe the method used to uniquely identify the configuration items.</p> <p>ALC_CMC.2.3C The CM system shall uniquely identify all configuration items.</p>	<p>AOSP is stored in git, but this requires describing how the code is managed internally for creating the image that goes on the device.</p> <p>The process for accessing code not created internally</p>
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	<p>ALC_CMC.2.4C The CM documentation shall describe the method used to identify external software components and how those components are updated.</p> <p>ALC_CMC.2.1E The evaluator shall confirm that the information provided meets all requirements for content and presentation of evidence.</p>	<p>needs to be specified. The simplest part here is to state that external code is brought into the internal CM system, but if not, then how they are pulled when compiled is needed.</p>
<ol style="list-style-type: none"> 1. User must have qualcomm and Code Linario Organisation (CLO) account registered with Zebra email to download proprietary code. 2. Download CLO first to a Zebra server. 3. Create pure branch in Gerrit and push the downloaded code. 4. Apply combined TAG to each commit for tracking. 5. Publish the pure branch and tag details. 		

<p>ALC_CMS.2</p>	<p>Configuration Management scope requires that all components be defined.</p> <p>Any third party software components shall be documented where applicable.</p>	
	<p>This is a basic SBOM requirement. Having an SBOM will satisfy this, but is not required.</p> <p>For external software components, the original maintainer of the software shall be specified in addition.</p>	
	<p>ALC_CMS.2.1D The developer shall provide a configuration list for the TOE.</p> <p>ALC_CMS.2.1C The configuration list shall include the following: the TOE itself; the evaluation evidence required by the SARs; and the parts that comprise the TOE including any external software components.</p> <p>ALC_CMS.2.2C The configuration list shall uniquely identify the configuration items.</p> <p>ALC_CMS.2.3C For each TSF relevant configuration item, the configuration list shall indicate the developer of the item.</p>	

	<p>ALC_CMS.2.1E The evaluator shall confirm that the information provided meets all requirements for content and presentation of evidence.</p>	
	<p>ALC_CMS.2.2E The evaluator shall confirm that for external software components, the developer shall include the source and original maintainer of the component.</p>	
	<p>All external components that are included in the device are tracked in the CM system and included as part of the SBOM for the device. The source of all external components is maintained as part of that inclusion into the internal CM system.</p>	

<p>ALC_DEL.1</p>	<p>Delivery procedures. This focuses on how the device gets from manufacturing to a user (or at least delivered to someone to sell it).</p>	
	<p>The primary focus here is on ensuring that the product can be ensured to be the same thing that came from manufacturing, basically no tampering</p>	
	<p>ALC_DEL.1.1D The developer shall document and provide procedures for delivery of the TOE or parts of it to the consumer.</p> <p>ALC_DEL.1.2D The developer shall use the delivery procedures. Content and presentation elements:</p> <p>ALC_DEL.1.1C The delivery documentation shall describe all procedures that are necessary to maintain security when distributing versions of the TOE to the consumer.</p> <p>ALC_DEL.1.1E The evaluator shall confirm that the information provided meets all requirements for content and presentation of evidence.</p>	

<p>ALC_DVS_EXT.1</p>	<p>The developer shall describe the process for generating the signing keys and unique identifiers on the device (ones that are fixed).</p>	
	<p>The developer needs to provide documentation about how the identifiers are generated and put on the device. This includes how these are secured while in the factory and cleared when not needed.</p>	
	<p>The developer must also describe how signing keys are generated, stored and protected. This includes how they are used (procedures for ensuring rogue builds cannot be created).</p>	

Here the term keybox is used to identify the location on the device where the unique keys for the device will be stored. This can be in various hardware layers below the OS (the SEE).

Note that the highlighted sections are where these are changes from the PP. Other sections without changes are not included.

ALC_DVS_EXT.1.1D The developer shall produce and provide development security documentation on the generation, and protection and use of signing keys and device-unique identifiers.

ALC_DVS_EXT.1.2D The developer shall produce and provide development security documentation on the acquisition or generation of device unique identifiers.

ALC_DVS_EXT.1.3D The developer shall produce and provide development security documentation on the provisioning of data or keys that may be used by a Root of Trust.

ALC_DVS_EXT.1.1C The development security documentation shall describe all the physical, procedural, personnel, and other security measures that are necessary to protect the confidentiality and integrity of the following manufacturing components: keys used to sign the publicly released system software and its updates.

ALC_DVS_EXT.1.2C The development security documentation shall describe the procedures for selecting the proper signing keys used for a device and to ensure the use of the proper keys in the build process.

The Zebra OEM keys are placed in secure location and only build process has access to the secure location during build and same is practiced across all platforms.

ALC_DVS_EXT.1.3C The development security documentation shall describe all the physical, procedural, personnel, and other security measures that are necessary to protect the confidentiality and integrity of the following manufacturing components: unique, non-modifiable identifiers (such as IMEI, attestation keys or Device Unique Keys) and how they are properly acquired/created and provisioned for each device.

ALC_DVS_EXT.1.4C The development security documentation shall describe all the physical, procedural, personnel, and other

	<p>security measures that are necessary to protect the confidentiality and integrity of the following manufacturing components: data and keys provisioned to the device for a Root of Trust for the device.</p> <p>ALC_DVS_EXT.1.1E The evaluator shall confirm that the information provided meets all requirements for content and presentation of evidence.</p> <p>ALC_DVS_EXT.1.2E The evaluator shall review the provided evidence that the security measures are being applied.</p>	
	<p>Signing Key Generation</p> <ol style="list-style-type: none"> 1. Developer requests a signing key by creating a JIRA request. 2. The private key infrastructure (PKI) is an off-line system on which keys are generated based on the request which contains the attributes needed for the key. 3. SCM has created a private/public key pair to secure the transfer of keys from the PKI into the build system. The public key is stored in the PKI and it is used to encrypt a GPG container 4. The GPG container is pushed to a network connected machine and a Jenkins job, which uploads the GPG containers launched to store the key to a secure location in the build system. 	

<p>ALC_FLR.3</p>	<p>The developer shall have a process for receiving information about flaws and then provide patches for those flaws to the impacted devices. In addition this includes a defined period and frequency of updates to the device (including both OS updates and regular security patches).</p>	
	<p>The developer needs to provide documentation about the flaw remediation/patching process. This can include public sites/information along with the support information for the device under evaluation.</p> <p><i>Note that the highlighted sections are where these are changes from the PP.</i></p>	
	<p>ALC_FLR.3.1D The developer shall document and provide flaw remediation procedures addressed to TOE manufacturers.</p> <p>ALC_FLR.3.2D The developer shall establish a procedure for accepting and acting upon all reports of security flaws and requests for corrections to those flaws.</p>	

ALC_FLR.3.3D The developer shall provide flaw remediation guidance addressed to TOE users.

ALC_FLR.3.4D The developer shall provide public guidance related to the duration period, frequency and type of updates that will be released to support the TOE.

ALC_FLR.3.5D The developer shall provide a public vulnerability disclosure program to provide security bulletins about the flaws that have been remediated.

ALC_FLR.3.6D The developer shall establish procedures for ensuring that no known security vulnerabilities rated as High and Critical (e.g. as classified in public databases) are included in the TOE at public release.

ALC_FLR.3.1C The flaw remediation procedures documentation shall describe the procedures used to track all reported security flaws in each release of the TOE.

ALC_FLR.3.2C The flaw remediation procedures shall require that a description of the nature and effect of each security flaw be provided, as well as the status of finding a correction to that flaw.

ALC_FLR.3.3C The flaw remediation procedures shall require that corrective actions be identified for each of the security flaws.

ALC_FLR.3.4C The flaw remediation procedures documentation shall describe the methods used to provide flaw information, corrections and guidance on corrective actions to TOE users. ~~The flaw remediation procedures documentation shall also define the planned minimum length of time after release of the TOE that these methods will be used to maintain the TOE.~~

ALC_FLR.3.5C The flaw remediation procedures shall describe a means by which the developer receives from TOE users reports and enquiries of suspected security flaws in the TOE.

ALC_FLR.3.6C The flaw remediation procedures shall include a procedure requiring timely response and the automatic distribution of security flaw reports and the associated corrections to registered users who might be affected by the security flaw.

	<p>ALC_FLR.3.7C The procedures for processing reported security flaws shall ensure that any reported flaws are remediated and the remediation procedures issued to TOE users.</p> <p>ALC_FLR.3.8C The procedures for processing reported security flaws shall provide safeguards that any corrections to these security flaws do not introduce any new flaws.</p> <p>ALC_FLR.3.9C The flaw remediation guidance shall describe a means by which TOE users report to the developer any suspected security flaws in the TOE.</p> <p>ALC_FLR.3.10C The flaw remediation guidance shall describe a means by which TOE users may register with the developer, to be eligible to receive security flaw reports and corrections.</p> <p>ALC_FLR.3.11C The flaw remediation guidance shall identify the specific points of contact for all reports and enquiries about security issues involving the TOE.</p> <p>ALC_FLR.3.12C The flaw remediation procedures documentation shall define the planned minimum duration after release of the TOE that these methods will be used to maintain the TOE.</p> <p>ALC_FLR.3.13C The flaw remediation procedures documentation shall define the types of updates (such as security/maintenance or operating system) and the frequency of these updates being provided for the TOE.</p> <p>ALC_FLR.3.14C The flaw remediation procedures documentation shall describe the process for publicly releasing security flaw remediation information, including the location(s) where this will be publicly available.</p> <p>ALC_FLR.3.15C The flaw remediation procedures documentation shall describe the process for verifying known security flaws are not propagated into a new (not yet released) TOE.</p> <p>ALC_FLR.3.1E The evaluator shall confirm that the information provided meets all requirements for content and presentation of evidence.</p>	
	<p>The device has a defined lifecycle as can be seen here with Android OS updates provided through Android version 14 (A14). Monthly security patches provided until the end of Google</p>	

support of A14 and quarterly patches until the end of product service.

Zebra supports a bug filing system for the Android OS outlined here: <https://hackerone.com/bug-bounty-programs>. This allows developers or users to search for, file, and vote on bugs that need to be fixed. This helps to ensure that all bugs that affect large numbers of people get pushed up in priority to be fixed.

Zebra's LifeGuard program integrates the appropriate patches to meet the Android Security Patch Level (SPL) for the month that is claimed. The release will typically include patches from Google/Android, SOC vendor patches, Zebra features and patch fixes.

Google posts [Android Security Bulletins](#) every month about the patches that have been released with each monthly patch. Monthly patches are distributed automatically to the devices.

As the release placed on a device at launch is an iteration of the Android release cycle (generally this would be a new version of Android, such as 12 to 13), the process of patching the OS is ongoing and continued as part of the release process. When a new device is released, all patches up to that date will be included with the device. This will be the same as for a device that will receive that OS release as an OTA update.

Google partners with component vendors to ensure support for the chipsets, including patches related to security updates for the duration of the support period for the device. Google works in partnership with creating patches and testing, and then rolls these out to Android. Note that Google provides patches for components that may not be used by Google but by Zebra and other OEMS as well.

All software used by Google is maintained inside an internal git repository. Google has added many layers to incorporate review cycles and commenting on top of git. All actions taken in the repository (and all the layers on top) are tied to Google corporate accounts, and access controls ensure that engineers can only make changes to code for which they have responsibility. While other engineers may suggest changes, these must be approved by the engineers specifically responsible for the software to be merged in.

AVA: Vulnerability assessment

<p>AVA_VAN.2</p>	<p>Vulnerability Analysis is handled by the lab and is based on the product design information along with publicly available information (such as CVE reports).</p>	
	<p>There is nothing to fill in for this section, it is here for completeness.</p>	
	<p>AVA_VAN.2.1D The developer shall provide the TOE for testing.</p> <p>AVA_VAN.2.1C The TOE shall be suitable for testing.</p> <p>AVA_VAN.2.1E The evaluator shall confirm that the information provided meets all requirements for content and presentation of evidence.</p> <p>AVA_VAN.2.2E The evaluator shall perform a search of public domain sources to identify potential vulnerabilities in the TOE.</p> <p>AVA_VAN.2.3E The evaluator shall perform an independent vulnerability analysis of the TOE using the guidance documentation, functional specification, TOE design and security architecture description to identify potential vulnerabilities in the TOE.</p> <p>AVA_VAN.2.4E The evaluator shall conduct penetration testing, based on the identified potential vulnerabilities, to determine that the TOE is resistant to attacks performed by an attacker possessing Basic attack potential.</p>	