

**National Information Assurance Partnership**  
**Common Criteria Evaluation and Validation Scheme**



**Validation Report**  
**Google Pixel Phones on Android 10.0**

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# 1 Executive Summary

This report documents the assessment of the National Information Assurance Partnership (NIAP) validation team of the evaluation of Google Pixel Phones on Android 10.0 solution provided by Google LLC. It presents the evaluation results, their justifications, and the conformance results. This Validation Report is not an endorsement of the Target of Evaluation by any agency of the U.S. government, and no warranty is either expressed or implied.

The evaluation was performed by the Gossamer Security Solutions (Gossamer) Common Criteria Testing Laboratory (CCTL) in Catonsville, MD, United States of America, and was completed in February 2020. The information in this report is largely derived from the Evaluation Technical Report (ETR) and associated test reports, all written by Gossamer Security Solutions. The evaluation determined that the product is both Common Criteria Part 2 Extended and Part 3 Conformant, and meets the assurance requirements of the Protection Profile for Mobile Device Fundamentals, Version 3.1, 16 June 2017 and General Purpose Operating Systems Protection Profile/Mobile Device Fundamentals Protection Profile Extended Package (EP) Wireless Local Area Network (WLAN) Clients, Version 1.0, 08 February 2016.

The Target of Evaluation (TOE) is Google Pixel Phones on Android 10.0.

The Target of Evaluation (TOE) identified in this Validation Report has been evaluated at a NIAP approved Common Criteria Testing Laboratory using the Common Methodology for IT Security Evaluation (Version 3.1, Rev 5) for conformance to the Common Criteria for IT Security Evaluation (Version 3.1, Rev 5). This Validation Report applies only to the specific version of the TOE as evaluated. The evaluation has been conducted in accordance with the provisions of the NIAP Common Criteria Evaluation and Validation Scheme and the conclusions of the testing laboratory in the evaluation technical report are consistent with the evidence provided.

The validation team monitored the activities of the evaluation team, provided guidance on technical issues and evaluation processes, and reviewed the individual work units and successive versions of the ETR. The validation team found that the evaluation showed that the product satisfies all of the functional requirements and assurance requirements stated in the Security Target (ST). Therefore, the validation team concludes that the testing laboratory's findings are accurate, the conclusions justified, and the conformance results are correct. The conclusions of the testing laboratory in the evaluation technical report are consistent with the evidence produced.

The technical information included in this report was obtained from the Pixel Phones on Android 10.0 (MDFPP31/WLANCEP10) Security Target, Version 0.3, 2/19/2020 and analysis performed by the Validation Team.

## 2 Identification

The CCEVS is a joint National Security Agency (NSA) and National Institute of Standards and Technology (NIST) effort to establish commercial facilities to perform trusted product

evaluations. Under this program, security evaluations are conducted by commercial testing laboratories called Common Criteria Testing Laboratories (CCTLs) using the Common Evaluation Methodology (CEM) in accordance with National Voluntary Laboratory Assessment Program (NVLAP) accreditation.

The NIAP Validation Body assigns Validators to monitor the CCTLs to ensure quality and consistency across evaluations. Developers of information technology products desiring a security evaluation contract with a CCTL and pay a fee for their product's evaluation. Upon successful completion of the evaluation, the product is added to NIAP's Validated Products List.

Table 1 provides information needed to completely identify the product, including:

- The Target of Evaluation (TOE): the fully qualified identifier of the product as evaluated.
- The Security Target (ST), describing the security features, claims, and assurances of the product.
- The conformance result of the evaluation.
- The Protection Profile to which the product is conformant.
- The organizations and individuals participating in the evaluation.

**Table 1: Evaluation Identifiers**

Item	Identifier
<b>Evaluation Scheme</b>	United States NIAP Common Criteria Evaluation and Validation Scheme
<b>TOE</b>	Google Pixel Phones on Android 10.0
<b>Protection Profile</b>	(Specific models identified in Section 8)  Protection Profile for Mobile Device Fundamentals, Version 3.1, 16 June 2017 and General Purpose Operating Systems Protection Profile/Mobile Device Fundamentals Protection Profile Extended Package (EP) Wireless Local Area Network (WLAN) Clients, Version 1.0, 08 February 2016
<b>ST</b>	Pixel Phones on Android 10.0 Security Target, Version 0.3, 2/19/2020
<b>Evaluation Technical Report</b>	Evaluation Technical Report for Pixel Phones on Android 10.0, version 0.2, 2/19/2020
<b>CC Version</b>	Common Criteria for Information Technology Security Evaluation, Version 3.1, rev 5
<b>Conformance Result</b>	CC Part 2 extended, CC Part 3 conformant
<b>Sponsor</b>	Google LLC
<b>Developer</b>	Google LLC
<b>Common Criteria Testing Lab (CCTL)</b>	Gossamer Security Solutions, Inc. Catonsville, MD
<b>CCEVS Validators</b>	Michelle Carlson, Patrick Mallett, Jerome Myers

### 3 Architectural Information

Note: The following architectural description is based on the description presented in the Security Target.

The Target of Evaluation (TOE) is Google Pixel Phones on Android 10.0. The TOE is a mobile device that supports both enterprises and individual users. The TOE provides basic telephony features (make and receive phone calls, send and receive SMS/MMS messages) as well as advanced network connectivity (allowing connections to both 802.11 Wi-Fi and 2G/3G/4G LTE mobile data networks). The TOE supports using client certificates to connect to access points offering WPA2/WPA3 networks with 802.1x/EAP-TLS, or alternatively connecting to cellular base stations when utilizing mobile data.

The TOE provides a rich API to mobile applications and provides users installing an application the option to either approve or reject an application based upon the API access that the application requires (or to grant applications access at runtime). The TOE also provides users with the ability to protect Data-At-Rest with AES encryption, including all user and mobile application data stored in the user's data partition. The TOE uses a key hierarchy that combines a REK with the user's password to provide protection to all user and application cryptographic keys stored in the TOE.

Finally, the TOE can interact with a Mobile Device Management (MDM) system (not part of this evaluation) to allow enterprise control of the configuration and operation of the device so as to ensure adherence to enterprise-wide policies (for example, restricting use of a corporate provided device's camera, forced configuration of maximum login attempts, pulling of audit logs off the TOE, etc.) as well as policies governing enterprise applications and data (in a an employee-owned device [BYOD] scenario). An MDM is made up of two parts: the MDM agent and MDM server. The MDM Agent is installed on the phone as an administrator with elevated permissions (allowing it to change the relevant settings on the phone) while the MDM Server is used to issue the commands to the MDM Agent. Neither portion of the MDM process is considered part of the TOE, and therefore not being directly evaluated.

The TOE includes several different levels of execution including (from lowest to highest): hardware, a Trusted Execution Environment, Android's Linux kernel, and Android's user space, which provides APIs allowing applications to leverage the cryptographic functionality of the device.

#### 3.1 TOE Evaluated Configuration

Detail regarding the evaluated configuration is provided in Section 8 below.

#### 3.2 TOE Architecture

The TOE's physical boundary is the physical perimeter of its enclosure. The software of the device is Android 10 running on a Qualcomm Snapdragon processor (Snapdragon 670, 845 or 855). The TOE does not include the user applications that run on top of the operating system, but does include controls that limit application behavior. Further, the device provides

support for downloadable MDM agents to be installed to limit or permit different functionality of the device. There is no built-in MDM agent pre-installed on the device.

The TOE communicates and interacts with 802.11-2012 Access Points and mobile data networks to establish network connectivity, and through that connectivity interacts with MDM servers that allow administrative control of the TOE.

## 4 Security Policy

This section summarizes the security functionality of the TOE:

1. Security audit
2. Cryptographic support
3. User data protection
4. Identification and authentication
5. Security management
6. Protection of the TSF
7. TOE access
8. Trusted path/channels

### 4.1 Security audit

The TOE implements a security log and logcat that are each stored in a circular memory buffer. An MDM agent can read/fetch the security logs, can retrieve logcat logs, and then handle appropriately (potentially storing the log to Flash or transmitting its contents to the MDM server). These log methods meet the logging requirements outlined by FAU\_GEN.1 in MDFPPv3.1.

### 4.2 Cryptographic support

The TOE includes multiple cryptographic libraries with CAVP certified algorithms for a wide range of cryptographic functions including the following: asymmetric key generation and establishment, symmetric key generation, encryption/decryption, cryptographic hashing and keyed-hash message authentication. These functions are supported with suitable random bit generation, key derivation, salt generation, initialization vector generation, secure key storage, and key and protected data destruction. These primitive cryptographic functions are used to implement security protocols such as TLS, EAP-TLS, IPsec, and HTTPS and to encrypt the media (including the generation and protection of data and key encryption keys) used by the TOE. Many of these cryptographic functions are also accessible as services to applications running on the TOE allowing application developers to ensure their application meets the required criteria to remain compliant to MDFPP standards.

### 4.3 User data protection

The TOE controls access to system services by hosted applications, including protection of the Trust Anchor Database. Additionally, the TOE protects user and other sensitive data using encryption so that even if a device is physically lost, the data remains protected. The

TOE's evaluated configuration supports Android Enterprise profiles to provide additional separation between application and application data belonging to the Enterprise profile.

#### **4.4 Identification and authentication**

The TOE supports a number of features related to identification and authentication. From a user perspective, except for FCC mandated (making phone calls to an emergency number) or non-sensitive functions (e.g., choosing the keyboard input method or taking screen shots), a password (i.e., Password Authentication Factor) must be correctly entered to unlock the TOE. Also, even when unlocked, the TOE requires the user re-enter the password to change the password. Passwords are obscured when entered so they cannot be read from the TOE's display and the frequency of entering passwords is limited and when a configured number of failures occurs, the TOE will be wiped to protect its contents. Passwords can be constructed using upper and lower cases characters, numbers, and special characters and passwords up to 16 characters are supported.

The TOE can also serve as an 802.1X supplicant and can both use X.509v3 and validate certificates for EAP-TLS, TLS, and HTTPS exchanges.

#### **4.5 Security management**

The TOE provides all the interfaces necessary to manage the security functions identified throughout this Security Target as well as other functions commonly found in mobile devices. Many of the available functions are available to users of the TOE while many are restricted to administrators operating through a Mobile Device Management solution once the TOE has been enrolled. Once the TOE has been enrolled and then un-enrolled, it will remove Enterprise applications and remove MDM policies.

#### **4.6 Protection of the TSF**

The TOE implements a number of features to protect itself to ensure the reliability and integrity of its security features. It protects particularly sensitive data such as cryptographic keys so that they are not accessible or exportable through the use of the application processor's hardware. The TOE disallows all read access to the Root Encryption Key and retains all keys derived from the REK within its the Trusted Execution Environment (TEE). Application software can only use keys derived from the REK by reference and receive the result.

The TOE also provides its own timing mechanism to ensure that reliable time information is available (e.g., for log accountability). It enforces read, write, and execute memory page protections, uses address space layout randomization, and stack-based buffer overflow protections to minimize the potential to exploit application flaws. It also protects itself from modification by applications as well as to isolate the address spaces of applications from one another to protect those applications.

The TOE includes functions to perform self-tests and software/firmware integrity checking so that it might detect when it is failing or may be corrupt. If any of the self-tests fail, the TOE will not go into an operational mode. It also includes mechanisms (i.e., verification of



the digital signature of each new image) so that the TOE itself can be updated while ensuring that the updates will not introduce malicious or other unexpected changes in the TOE. Digital signature checking also extends to verifying applications prior to their installation as all applications must have signatures (even if self-signed).

#### **4.7 TOE access**

The TOE can be locked, obscuring its display, by the user or after a configured interval of inactivity. The TOE also has the capability to display an administrator specified (using the TOE's MDM API) advisory message (banner) when the user unlocks the TOE for the first use after reboot.

The TOE is also able to attempt to connect to wireless networks as configured.

#### **4.8 Trusted path/channels**

The TOE supports the use of IEEE 802.11-2012, 802.1X, and EAP-TLS and TLS, HTTPS to secure communications channels between itself and other trusted network devices.

## **5 Assumptions & Clarification of Scope**

### ***Assumptions***

The Security Problem Definition, including the assumptions, may be found in the following documents:

- Protection Profile for Mobile Device Fundamentals, Version 3.1, 16 June 2017;
- General Purpose Operating Systems Protection Profile/Mobile Device Fundamentals Protection Profile Extended Package (EP) Wireless Local Area Network (WLAN) Clients, Version 1.0, 08 February 2016

That information has not been reproduced here and the MDFPP31/WLAN CEP10 should be consulted if there is interest in that material.

The scope of this evaluation was limited to the functionality and assurances covered in the MDFPP31/WLAN CEP10 as described for this TOE in the Security Target. Other functionality included in the product was not assessed as part of this evaluation. All other functionality provided by the devices needs to be assessed separately, and no further conclusions can be drawn about their effectiveness.

### ***Clarification of scope***

All evaluations (and all products) have limitations, as well as potential misconceptions that need clarification. This text covers some of the more important limitations and clarifications of this evaluation. Note that:

- As with any evaluation, this evaluation only shows that the evaluated configuration meets the security claims made with a certain level of assurance (the assurance

- activities specified in the Protection Profile for Mobile Device Fundamentals, Extended Package for WLAN Clients and performed by the evaluation team).
- This evaluation covers only the specific device models and software as identified in this document, and not any earlier or later versions released or in process.
  - This evaluation did not specifically search for, nor attempt to exploit, vulnerabilities that were not “obvious” or vulnerabilities to objectives not claimed in the ST. The CEM defines an “obvious” vulnerability as one that is easily exploited with a minimum of understanding of the TOE, technical sophistication and resources.
  - The functionality evaluated is scoped exclusively to the security functional requirements specified in the MDFPP31/WLANCEP10 and applicable Technical Decisions. Any additional security related functional capabilities of the TOE were not covered by this evaluation. Specifically, the TOE does not include the user applications that run on top of the operating system but does include controls that limit application behavior.

## 6 Documentation

The following document was available with the TOE for evaluation:

- Google Pixel Phones on Android 10 Administrator Guidance Documentation, Version 1.1, 1/30/2020

Only the administrator guide listed above and the specific sections of the other documents referenced by that guide should be trusted for the installation, administration, and use of this product in its evaluated configuration.”

## 7 IT Product Testing

This section describes the testing efforts of the developer and the Evaluation Team. It is derived from information contained in the Assurance Activity Report (MDFPP31/WLANCEP10) for Pixel Phones on Android 10.0, Version 0.2, 2/19/2020 (AAR).

### 7.1 Developer Testing

No evidence of developer testing is required in the assurance activities for this product.

### 7.2 Evaluation Team Independent Testing

The evaluation team verified the product according to a Common Criteria Certification document and ran the tests specified in the MDFPP31/WLANCEP10 including the tests associated with optional requirements. The specific test configurations and test tools utilized may be found in the AAR section 3.4.

## 8 Evaluated Configuration

The evaluated configuration consists of the following phones including hardware and software, when configured in accordance with the documentation specified in section 6. The Target of Evaluation (TOE) is Pixel 4, 3a, and 3. Google manufacturers each phone in two sizes, a normal size and a larger “XL” size. The regular and XL variants of each phone have functionally equivalent hardware but differ in non-security relevant ways (e.g., screen size, overall size, number of speakers).

The evaluated configuration consists of the following models and versions:

Product	Model #	Kernel	Android OS version	Security Patch Level
Google Pixel 4 (flame)	G020I/M/N	4.14.150	Android 10.0	March 5, 2020
Google Pixel 4 XL (coral)	G020P/Q/J	4.14.150	Android 10.0	March 5, 2020
Google Pixel 3a (sargo)	G020E/F/G/H	4.9.200	Android 10.0	March 5, 2020
Google Pixel 3a XL (bonito)	G020A/B/C	4.9.200	Android 10.0	March 5, 2020
Google Pixel 3 (blueline)	G103A/B	4.9.200	Android 10.0	March 5, 2020
Google Pixel 3 XL (crosshatch)	G103C/D	4.9.200	Android 10.0	March 5, 2020

## 9 Results of the Evaluation

The results of the assurance requirements are generally described in this section and are presented in detail in the proprietary ETR. The reader of this document can assume that all assurance activities and work units received a passing verdict.

A verdict for an assurance component is determined by the resulting verdicts assigned to the corresponding evaluator action elements. The evaluation was conducted based upon CC version 3.1 rev 5 and CEM version 3.1 rev 5. The evaluation determined the Google Pixel Phones on Android 10.0 TOE to be Part 2 extended, and to meet the SARs contained in the MDFPP31/WLANCEP10.

### 9.1 Evaluation of the Security Target (ASE)

The evaluation team applied each ASE CEM work unit. The ST evaluation ensured the ST contains a description of the environment in terms of policies and assumptions, a statement of security requirements claimed to be met by the Google Pixel Phones on Android 10.0 products that are consistent with the Common Criteria, and product security function descriptions that support the requirements.

The validator reviewed the work of the evaluation team, and found that sufficient evidence and justification was provided by the evaluation team to confirm that the evaluation was conducted in accordance with the requirements of the CEM, and that the conclusion reached by the evaluation team was justified.

### 9.2 Evaluation of the Development (ADV)

The evaluation team applied each ADV CEM work unit. The evaluation team assessed the design documentation and found it adequate to aid in understanding how the TSF provides

the security functions. The design documentation consists of a functional specification contained in the Security target and Guidance documents. Additionally, the evaluator performed the assurance activities specified in the MDFPP31/WLANCEP10 related to the examination of the information contained in the TSS.

The validator reviewed the work of the evaluation team, and found that sufficient evidence and justification was provided by the evaluation team to confirm that the evaluation was conducted in accordance with the requirements of the CEM, and that the conclusion reached by the evaluation team was justified.

### **9.3 Evaluation of the Guidance Documents (AGD)**

The evaluation team applied each AGD CEM work unit. The evaluation team ensured the adequacy of the user guidance in describing how to use the operational TOE. Additionally, the evaluation team ensured the adequacy of the administrator guidance in describing how to securely administer the TOE. All of the guides were assessed during the design and testing phases of the evaluation to ensure they were complete.

The validator reviewed the work of the evaluation team, and found that sufficient evidence and justification was provided by the evaluation team to confirm that the evaluation was conducted in accordance with the requirements of the CEM, and that the conclusion reached by the evaluation team was justified.

### **9.4 Evaluation of the Life Cycle Support Activities (ALC)**

The evaluation team applied each ALC CEM work unit. The evaluation team found that the TOE was identified.

The validator reviewed the work of the evaluation team, and found that sufficient evidence and justification was provided by the evaluation team to confirm that the evaluation was conducted in accordance with the requirements of the CEM, and that the conclusion reached by the evaluation team was justified.

### **9.5 Evaluation of the Test Documentation and the Test Activity (ATE)**

The evaluation team applied each ATE CEM work unit. The evaluation team ran the set of tests specified by the assurance activities in the MDFPP31/WLANCEP10 and recorded the results in a Test Report, summarized in the AAR.

The validator reviewed the work of the evaluation team, and found that sufficient evidence and justification was provided by the evaluation team to confirm that the evaluation was conducted in accordance with the requirements of the CEM, and that the conclusion reached by the evaluation team was justified.

### **9.6 Vulnerability Assessment Activity (VAN)**

The evaluation team applied each AVA CEM work unit. The vulnerability analysis is in the Detailed Test Report (DTR) prepared by the evaluator. The vulnerability analysis includes

a public search for vulnerabilities. The public search for vulnerabilities conducted on January 9, 2020 did not uncover any residual vulnerability.

The evaluator searched the National Vulnerability Database (<https://web.nvd.nist.gov/vuln/search>) and Vulnerability Notes Database (<http://www.kb.cert.org/vuls/>) with the following search terms: "Google", "Pixel 3", "Pixel 3 XL", "Pixel 3a", "Pixel 3a XL", "Pixel 4", "Pixel 4 XL", "Google, LLC", "Android", "Android Q", "Android 10", "BoringSSL", "System Call Policy Engine", "Android LockSettings service KBKDF", "QTI Crypto Engine Core", "QTI Inline Crypto Engine", and "QTI Random Number Generator".

The validator reviewed the work of the evaluation team, and found that sufficient evidence and justification was provided by the evaluation team to confirm that the evaluation was conducted in accordance with the requirements of the CEM, and that the conclusion reached by the evaluation team was justified.

## 9.7 Summary of Evaluation Results

The evaluation team's assessment of the evaluation evidence demonstrates that the claims in the ST are met. Additionally, the evaluation team's testing also demonstrated the accuracy of the claims in the ST.

The validation team's assessment of the evidence provided by the evaluation team is that it demonstrates that the evaluation team followed the procedures defined in the CEM, and correctly verified that the product meets the claims in the ST.

## 10 Validator Comments/Recommendations

The validation team notes that the evaluated configuration is dependent upon the TOE being configured per the evaluated configuration instructions in the Google Pixel Phones on Android 10 Administrator Guidance Documentation, Version 1.1, 1/30/2020 document. No versions of the TOE and software, either earlier or later were evaluated. Please note that the functionality evaluated is scoped exclusively to the security functional requirements specified in the Security Target. Other functionality included in the product was not assessed as part of this evaluation. Other functionality provided by devices in the operational environment, such as the syslog server, need to be assessed separately and no further conclusions can be drawn about their effectiveness.

## 11 Annexes

Not applicable

## 12 Security Target

The Security Target is identified as: *Pixel Phones on Android 10.0 (MDFPP31/WLANCEP10) Security Target, Version 0.3, 2/19/2020.*

## 13 Glossary

The following definitions are used throughout this document:

- **Common Criteria Testing Laboratory (CCTL).** An IT security evaluation facility accredited by the National Voluntary Laboratory Accreditation Program (NVLAP) and approved by the CCEVS Validation Body to conduct Common Criteria-based evaluations.
- **Conformance.** The ability to demonstrate in an unambiguous way that a given implementation is correct with respect to the formal model.
- **Evaluation.** The assessment of an IT product against the Common Criteria using the Common Criteria Evaluation Methodology to determine whether or not the claims made are justified; or the assessment of a protection profile against the Common Criteria using the Common Evaluation Methodology to determine if the Profile is complete, consistent, technically sound and hence suitable for use as a statement of requirements for one or more TOEs that may be evaluated.
- **Evaluation Evidence.** Any tangible resource (information) required from the sponsor or developer by the evaluator to perform one or more evaluation activities.
- **Feature.** Part of a product that is either included with the product or can be ordered separately.
- **Target of Evaluation (TOE).** A group of IT products configured as an IT system, or an IT product, and associated documentation that is the subject of a security evaluation under the CC.
- **Validation.** The process carried out by the CCEVS Validation Body leading to the issue of a Common Criteria certificate.
- **Validation Body.** A governmental organization responsible for carrying out validation and for overseeing the day-to-day operation of the NIAP Common Criteria Evaluation and Validation Scheme.

## 14 Bibliography

The Validation Team used the following documents to produce this Validation Report:

- [1] Common Criteria for Information Technology Security Evaluation: Part 1: Introduction and General Model, Version 3.1, Revision 5, September 2017.
- [2] Common Criteria for Information Technology Security Evaluation Part 2: Security functional components, Version 3.1, Revision 5, September 2017.
- [3] Common Criteria for Information Technology Security Evaluation Part 3: Security assurance components, Version 3.1 Revision 5, September 2017.
- [4] Protection Profile for Mobile Device Fundamentals, Version 3.1, 16 June 2017

- [5] General Purpose Operating Systems Protection Profile/Mobile Device Fundamentals Protection Profile Extended Package (EP) Wireless Local Area Network (WLAN) Clients, Version 1.0, 08 February 2016.
- [6] Pixel Phones on Android 10.0 (MDFPP31/WLAN CEP10) Security Target, Version 0.3, 2/19/2020 (ST).
- [7] Assurance Activity Report (MDFPP31/WLAN CEP10) for Pixel Phones on Android 10.0, Version 0.2, 2/19/2020 (AAR).
- [8] Detailed Test Report (MDFPP31/WLAN CEP10) for Pixel Phones on Android 10.0, Version 0.2, 2/19/2020 (DTR).
- [9] Evaluation Technical Report for Pixel Phones on Android 10.0, Version 0.2, 2/20/2020 (ETR)