

# **collaborative Protection Profile for Dedicated Security Component**



Version: 1.0  
2020-09-10

**National Information Assurance Partnership**

## Revision History

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| Version | Date       | Comment                          |
|---------|------------|----------------------------------|
| 1.0     | 2020-09-10 | First published release version. |
| 1.0x    | 2021-04-06 | Start of first XML version.      |

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# 1 PP introduction

## 1.1 PP Reference Identification

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PP Reference: collaborative Protection Profile for Dedicated Security Component

PP Version: 1.0

PP Date: September 10, 2020

## 1.2 Overview

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The scope of this Protection Profile (PP) is to describe the security functionality of QQQQ products in terms of [\[CC\]](#) and to define functional and assurance requirements for such products. An operating system is software that manages computer hardware and software resources, and provides common services for application programs. The hardware it manages may be physical, virtual or imaginary.

Something

This is going to show some tests:

- Terms with abbrs like ASLR, or API, should be found a linked automatically.
- And components can be refered to by their name: FQQ\_QQQ.1
- And so can requirements: FQQ\_QQQ.1.1 or by their unique identifier:
- Or you can stop them ASLR
- This is how you do a picture:



Figure 1: Niap's Logo

- And this is how you reference it: [Figure 1](#)
- This is how you do an equation with an arbitrary counter:

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \quad (1)$$

- And this is how you reference it: [Eq. 1](#)
- The following content should be included if:
  - the TOE implements ""  
*Some text*
- The following content should be included if:
  - the TOE implements "Widget Thing"  
*Someting dependent on a feature*
- And here's the audit event table for mandatory requirements. [Table t-audit-mandatory](#) for more information.
- Test for an xref to section [Section 3.1 Threats](#)

And this is another sentence (or fragment). I added this sentence and deleted the next one. This uses the plural acronym OSes.

And here's a generic coutner Abc 1: Some Words

And here's the reference to it [Abc 1](#).

## 1.3 Terms

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The following sections list Common Criteria and technology terms used in this document.

### 1.3.1 Common Criteria Terms

|                                   |   |
|-----------------------------------|---|
| Assurance                         | Grounds for confidence that a TOE meets the SFRs <a href="#">[CC]</a> .   |
| Base Protection Profile (Base-PP) | Protection Profile used as a basis to build a PP-Configuration.   |
| Common Criteria (CC)              | Common Criteria for Information Technology Security Evaluation (International Standard ISO/IEC 15408).  |
| Common Criteria Testing           | Within the context of the Common Criteria Evaluation and Validation Scheme (CCEVS), an IT security evaluation facility, accredited by the National Voluntary Laboratory Accreditation Program (NVLAP) and approved by the NIAP Validation Body to conduct |

|   |   |
|---|---|
| Laboratory  | Common Criteria-based evaluations.  |
| Common Evaluation Methodology (CEM)                 | Common Evaluation Methodology for Information Technology Security Evaluation.   |
| Distributed TOE                                     | A TOE composed of multiple components operating as a logical whole.   |
| Operational Environment (OE)                        | Hardware and software that are outside the TOE boundary that support the TOE functionality and security policy.                   |
| Protection Profile (PP)                             | An implementation-independent set of security requirements for a category of products.  |
| Protection Profile Configuration (PP-Configuration) | A comprehensive set of security requirements for a product type that consists of at least one Base-PP and at least one PP-Module. |
| Protection Profile Module (PP-Module)               | An implementation-independent statement of security needs for a TOE type complementary to one or more Base Protection Profiles.   |
| Security Assurance Requirement (SAR)                | A requirement to assure the security of the TOE.  |
| Security Functional Requirement (SFR)               | A requirement for security enforcement by the TOE.  |
| Security Target (ST)                                | A set of implementation-dependent security requirements for a specific product.   |
| TOE Security Functionality (TSF)                    | The security functionality of the product under evaluation.   |
| TOE Summary Specification (TSS)                     | A description of how a TOE satisfies the SFRs in an ST.   |
| Target of Evaluation (TOE)                          | The product under evaluation.   |

### 1.3.2 Technical Terms

|   |  |
|---|--|
| Address Space Layout Randomization (ASLR) | An anti-exploitation feature which loads memory mappings into unpredictable locations. ASLR makes it more difficult for an attacker to redirect control to code that they have introduced into the address space of a process.   |
| Administrator                             | An administrator is responsible for management activities, including setting policies that are applied by the enterprise on the operating system. This administrator could be acting remotely through a management server, from which the system receives configuration policies. An administrator can enforce settings on the system which cannot be overridden by non-administrator users. |
| Application (app)                         | Software that runs on a platform and performs tasks on behalf of the user or owner of the platform, as well as its supporting documentation.   |
| Application Programming Interface (API)   | A specification of routines, data structures, object classes, and variables that allows an application to make use of services provided by another software component, such as a library. APIs are often provided for a set of libraries included with the platform.   |
| Credential                                | Data that establishes the identity of a user, e.g. a cryptographic key or password.  |
| Critical Security Parameters (CSP)        | Information that is either user or system defined and is used to operate a cryptographic module in processing encryption functions including cryptographic keys and authentication data, such as passwords, the disclosure or modification of which can compromise the security of a cryptographic module or the security of the information protected by the module.                        |
| DAR Protection                            | Countermeasures that prevent attackers, even those with physical access, from extracting data from non-volatile storage. Common techniques include data encryption and wiping.   |
| Data Execution Prevention (DEP)           | An anti-exploitation feature of modern operating systems executing on modern computer hardware, which enforces a non-execute permission on pages of memory. DEP prevents pages of memory from containing both data and instructions, which makes it more difficult for an attacker to introduce and execute code.  |

|   |  |
|---|--|
| Developer                                 | An entity that writes OS software. For the purposes of this document, vendors and developers are the same.   |
| General Purpose Operating System          | A class of OSes designed to support a wide-variety of workloads consisting of many concurrent applications or services. Typical characteristics for OSes in this class include support for third-party applications, support for multiple users, and security separation between users and their respective resources. General Purpose Operating Systems also lack the real-time constraint that defines Real Time Operating Systems (RTOS). RTOSes typically power routers, switches, and embedded devices. |
| Host-based Firewall                       | A software-based firewall implementation running on the OS for filtering inbound and outbound network traffic to and from processes running on the OS.   |
| Operating System (OS)                     | Software that manages physical and logical resources and provides services for applications. The terms <i>TOE</i> and <i>OS</i> are interchangeable in this document.  |
| Personally Identifiable Information (PII) | Any information about an individual maintained by an agency, including, but not limited to, education, financial transactions, medical history, and criminal or employment history and information which can be used to distinguish or trace an individual's identity, such as their name, social security number, date and place of birth, mother's maiden name, biometric records, etc., including any other personal information which is linked or linkable to an individual. <a href="#">[OMB]</a>      |
| Sensitive Data                            | Sensitive data may include all user or enterprise data or may be specific application data such as PII, emails, messaging, documents, calendar items, and contacts. Sensitive data must minimally include credentials and keys. Sensitive data shall be identified in the OS's TSS by the ST author.   |
| User                                      | A user is subject to configuration policies applied to the operating system by administrators. On some systems under certain configurations, a normal user can temporarily elevate privileges to that of an administrator. At that time, such a user should be considered an administrator.  |
| Virtual Machine (VM)                      | Blah Blah Blah   |

## 1.4 Compliant Targets of Evaluation

### 1.4.1 TOE Boundary



Replace this image with a diagram of the Target of Evaluation.

Figure 2: General TOE

### 1.4.2 TOE Platform

## 1.5 Use Cases

Requirements in this Protection Profile are designed to address the security problems in at least the following use cases. These use cases are intentionally very broad, as many specific use cases exist for an operating system. These use cases may also overlap with one another. An operating system's functionality may even be effectively extended by privileged applications installed onto it. However, these are out of scope of this PP.

### [USE CASE 1] Elephant-own device

This is everything we need to describe in words about this use case.

For a the list of appropriate selections and acceptable assignment values for this configuration, see [F.1 Elephant-own device](#).

# 2 Conformance Claims

## Conformance Statement

An ST must claim exact conformance to this PP, as defined in the CC and CEM addenda for Exact Conformance, Selection-Based SFRs, and Optional SFRs (dated May 2017).

## CC Conformance Claims

This PP is conformant to Parts 2 (extended) and 3 (conformant) of Common Criteria Version 3.1, Revision 5.

## PP Claim

This PP does not claim conformance to any Protection Profile.

## Package Claim

This PP is [Functional Package for Transport Layer Security \(TLS\), version 1.1](#) Conformant and [Functional Package for Secure Shell \(SSH\), version 1.0](#) Conformant .

# 3 Security Problem Description

The security problem is described in terms of the threats that the OS is expected to address, assumptions about the operational environment, and any organizational security policies that the OS is expected to enforce.

## 3.1 Threats

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### T.NETWORK\_ATTACK

An attacker is positioned on a communications channel or elsewhere on the network infrastructure. Attackers may engage in communications with applications and services running on or part of the OS with the intent of compromise. Engagement may consist of altering existing legitimate communications.

### T.NETWORK\_EAVESDROP

An attacker is positioned on a communications channel or elsewhere on the network infrastructure. Attackers may monitor and gain access to data exchanged between applications and services that are running on or part of the OS.

### T.LOCAL\_ATTACK

An attacker may compromise applications running on the OS. The compromised application may provide maliciously formatted input to the OS through a variety of channels including unprivileged system calls and messaging via the file system.

### T.LIMITED\_PHYSICAL\_ACCESS

An attacker may attempt to access data on the OS while having a limited amount of time with the physical device.

## 3.2 Assumptions

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### A.PLATFORM

The OS relies upon a trustworthy computing platform for its execution. This underlying platform is out of scope of this PP.

### A.PROPER\_USER

The user of the OS is not willfully negligent or hostile, and uses the software in compliance with the applied enterprise security policy. At the same time, malicious software could act *as* the user, so requirements which confine malicious subjects are still in scope.

### A.PROPER\_ADMIN

The administrator of the OS is not careless, willfully negligent or hostile, and administers the OS within compliance of the applied enterprise security policy.

# 4 Security Objectives

## 4.1 Security Objectives for the TOE

### O.ACCOUNTABILITY

Conformant OSES ensure that information exists that allows administrators to discover unintentional issues with the configuration and operation of the operating system and discover its cause. Gathering event information and immediately transmitting it to another system can also enable incident response in the event of system compromise.

### O.INTEGRITY

Conformant OSES ensure the integrity of their update packages. OSES are seldom if ever shipped without errors, and the ability to deploy patches and updates with integrity is critical to enterprise network security. Conformant OSES provide execution environment-based mitigations that increase the cost to attackers by adding complexity to the task of compromising systems.

### O.MANAGEMENT

To facilitate management by users and the enterprise, conformant OSES provide consistent and supported interfaces for their security-relevant configuration and maintenance. This includes the deployment of applications and application updates through the use of platform-supported deployment mechanisms and formats, as well as providing mechanisms for configuration and application execution control.

### O.PROTECTED\_STORAGE

To address the issue of loss of confidentiality of credentials in the event of loss of physical control of the storage medium, conformant OSES provide data-at-rest protection for credentials. Conformant OSES also provide access controls which allow users to keep their files private from other users of the same system.

### O.PROTECTED\_COMMS

To address both passive (eavesdropping) and active (packet modification) network attack threats, conformant OSES provide mechanisms to create trusted channels for CSP and sensitive data. Both CSP and sensitive data should not be exposed outside of the platform.

## 4.2 Security Objectives for the Operational Environment

The following security objectives for the operational environment assist the OS in correctly providing its security functionality. These track with the assumptions about the environment.

### OE.PLATFORM

The OS relies on being installed on trusted hardware.

### OE.PROPER\_USER

The user of the OS is not willfully negligent or hostile, and uses the software within compliance of the applied enterprise security policy. Standard user accounts are provisioned in accordance with the least privilege model. Users requiring higher levels of access should have a separate account dedicated for that use.

### OE.PROPER\_ADMIN

The administrator of the OS is not careless, willfully negligent or hostile, and administers the OS within compliance of the applied enterprise security policy.

## 4.3 Security Objectives Rationale

This section describes how the assumptions, threats, and organization security policies map to the security objectives.

Table 1: Security Objectives Rationale

| Threat, Assumption, or OSP | Security Objectives | Rationale  |
|----------------------------|---------------------|--|
| T.NETWORK_ATTACK           | O.PROTECTED_COMMS   | The threat T.NETWORK_ATTACK is countered by O.PROTECTED_COMMS as this provides for integrity of transmitted data.  |
|                            | O.INTEGRITY         | The threat T.NETWORK_ATTACK is countered by O.INTEGRITY as this provides for integrity of software that is installed onto the system from the network.                   |
|                            | O.MANAGEMENT        | The threat T.NETWORK_ATTACK is countered by O.MANAGEMENT as this provides for the ability to configure the OS to defend against network attack.                          |
|                            | O.ACCOUNTABILITY    | The threat T.NETWORK_ATTACK is countered by O.ACCOUNTABILITY as this provides a mechanism for the OS to report behavior that may indicate a network attack has occurred. |
| T.NETWORK_EAVESDROP        | O.PROTECTED_COMMS   | The threat T.NETWORK_EAVESDROP is countered by O.PROTECTED_COMMS as this provides for confidentiality of transmitted data.   |



|                           |                     |  |
|---------------------------|---------------------|--|
|                           | O.MANAGEMENT        | The threat T.NETWORK_EAVESDROP is countered by O.MANAGEMENT as this provides for the ability to configure the OS to protect the confidentiality of its transmitted data. |
| T.LOCAL_ATTACK            | O.INTEGRITY         | The objective O.INTEGRITY protects against the use of mechanisms that weaken the TOE with regard to attack by other software on the platform.                            |
|                           | O.ACCOUNTABILITY    | The objective O.ACCOUNTABILITY protects against local attacks by providing a mechanism to report behavior that may indicate a local attack is occurring or has occurred. |
| T.LIMITED_PHYSICAL_ACCESS | O.PROTECTED_STORAGE | The objective O.PROTECTED_STORAGE protects against unauthorized attempts to access physical storage used by the TOE.   |
| A.PLATFORM                | OE.PLATFORM         | The operational environment objective OE.PLATFORM is realized through A.PLATFORM.  |
| A.PROPER_USER             | OE.PROPER_USER      | The operational environment objective OE.PROPER_USER is realized through A.PROPER_USER.  |
| A.PROPER_ADMIN            | OE.PROPER_ADMIN     | The operational environment objective OE.PROPER_ADMIN is realized through A.PROPER_ADMIN.  |

# 5 Security Requirements

This chapter describes the security requirements which have to be fulfilled by the product under evaluation. Those requirements comprise functional components from Part 2 and assurance components from Part 3 of [CC]. The following conventions are used for the completion of operations:

- **Refinement** operation (denoted by **bold text** or ~~strikethrough text~~): is used to add details to a requirement (including replacing an assignment with a more restrictive selection) or to remove part of the requirement that is made irrelevant through the completion of another operation, and thus further restricts a requirement.
- **Selection** (denoted by *italicized text*): is used to select one or more options provided by the [CC] in stating a requirement.
- **Assignment** operation (denoted by *italicized text*): is used to assign a specific value to an unspecified parameter, such as the length of a password. Showing the value in square brackets indicates assignment.
- **Iteration** operation: is indicated by appending the SFR name with a slash and unique identifier suggesting the purpose of the operation, e.g. "/EXAMPLE1."

## 5.1 Security Functional Requirements

### 5.1.1 Cryptographic Support (FCS)

#### FCS\_CKM.1/AK Cryptographic Key Generation (Asymmetric Keys)

sel-exp-ak-rsa-2048 sel-exp-ak-rsa-3072 sel-exp-ak-eccn-P256 sel-exp-ak-eccn-P384 sel-exp-ak-eccn-P521 sel-exp-ak-ecc-bpP256r1 sel-exp-ak-ecc-bpP384r1 sel-exp-ak-ecc-bpP512r1 sel-exp-ak-dsa-1024-160 sel-exp-ak-dsa-2048-224 sel-exp-ak-dsa-2048-256 sel-exp-ak-dsa-3027-256 sel-fcs-ckm-ak-ak5  
FCS\_CKM.1.1/AK

The TSF shall generate **asymmetric** cryptographic keys using the methods defined by the following rows in Table 2: [selection: AK1, AK2, AK3, AK4, AK5].

**Table 2: Supported Methods for Asymmetric Key Generation**

| Identifier | Key Type   | Key Sizes  | List of Standards                      |
|------------|------------|--|--|
| AK1        | RSA        | [selection: 2048 bit, 3072-bit]  | FIPS PUB 186-4 (Section B.3)           |
| AK2        | ECC-N      | [selection: 256 (P-256), 384 (P-384), 521 (P-521)]   | FIPS PUB 186-4 (Section B.4 & D.1.2)   |
| AK3        | ECC-B      | [selection: 256 (brainpoolP256r1), 384 (brainpoolP384r1), 512 (brainpoolP512r1)]                               | RFC5639 (Section 3) (Brainpool Curves) |
| AK4        | DSA        | DSA Bit lengths of p and q respectively (L, N) [selection: (1024, 160), (2048, 224), (2048, 256), (3027, 256)] | FIPS 186-4 Appendix B.1                |
| AK5        | Curve25519 | 256 bits   | RFC 7748                               |

**Application Note:** This requirement is included for the purposes of encryption and decryption operations only. To support ITE protected communications requirement for the transfer of encrypted data, this requirement mandates implementation compliance to FIPS 186-4 only. Implementations according to FIPS 186-2 or FIPS 186-3 will not be accepted.

This requirement must be claimed by the TOE if at least one of FCS\_CKM.1 or FCS\_CKM.1/KEK chooses a selection related to generation of asymmetric keys.

#### Evaluation Activities ▼

[FCS\\_CKM.1/AK:](#)

#### FCS\_CKM.1/SK Cryptographic Key Generation (Symmetric Encryption Key)

FCS\_CKM.1.1/SK

The TSF shall generate **symmetric** cryptographic keys using the methods defined by the following rows in Table 3: [selection: RSK, DSK, PBK].

**Table 3: Supported Methods for Symmetric Key Generation**

| Identifier | Key Type | Cryptographic Key Generation Algorithm | Key Sizes | List of Standards |
|------------|----------|--|-----------|-------------------|
|------------|----------|--|-----------|-------------------|

|     |  |   |   |  |
|-----|--|---|---|--|
| RSK | <b>[selection:</b> <i>symmetric key, submask, authorization value</i> ]        | Direct Generation from a Random Bit Generator as specified in <a href="#">FCS_RBG_EXT.1</a>   | <b>[selection:</b> <i>128, 192, 256, 512</i> ] bits                           | NIST SP 800-133 (Section 7.1) with ISO 18031 as an approved RBG in addition to those in NIST SP 800-133 (Section 5). |
| DSK | <b>[selection:</b> <i>Key Type from Table 16: Key Derivation Functions</i> ]   | Derived from a Key Derivation Function as specified in <a href="#">FCS_CKM_EXT.5</a><br><b>[selection:</b> <i>Key Derivation Algorithm from Table 16: Key Derivation Function</i> ] | <b>[selection:</b> <i>key sizes from Table 16: Key Derivation Functions</i> ] | <b>[selection:</b> <i>List of Standards from Table 16: Key Derivation Functions</i> ]                                |
| PBK | <b>[selection:</b> <i>submask, authentication token, authorization value</i> ] | Derived from a Password Based Key Derivation Function as specified in FCS_COP.1/PBKDF   | <b>[selection:</b> <i>key sizes as specified in FCS_COP.1/PBKDF</i> ]         | <b>[selection:</b> <i>standards as specified in FCS_COP.1/PBKDF</i> ]  |

**Application Note:** The intent of this requirement is to ensure that attackers cannot recover SKs with less than a full exhaust of the key space. This requirement explains SK generation regardless of how the DSC uses it or when it generates it. The encryption of user data that is not keying material, authentication tokens, or authorization values is outside the scope of this cPP. This cPP assumes that the DSC lacks the required resources to perform bulk encryption/decryption services at a suitable rate for users. The host may use the SK for encrypting user data outside the boundaries of the DSC. On the other hand, the DSC may use the SK on behalf of the user to perform keyed hashes. In this case, all the requirements for generating, controlling access and use, and destroying the key while under the protection of the DSC apply.

The selection of key size 512 bits is for the case of XTS-AES using AES-256. In the case of XTS-AES for both AES-128 and AES-256, the developer is expected to ensure that the full key is generated using direct generation from the RBG as in NIST SP 800-133 section.

The ST author selects at least one algorithm from the RSK row if the ST supports creating keys directly from the output of the RBG without further conditioning, at least one algorithm from the DSK row should be selected if the ST supports key derivation functions which are usually seeded from RBG and then further conditioned to the appropriate key size, and at least one algorithm from the PBK row should be selected if the ST supports keys derived from passwords.

If DSK is selected, the selection-based SFR [FCS\\_CKM\\_EXT.5](#) must be claimed by the TOE.

If PBK is selected, the selection-based SFR FCS\_COP.1/PBKDF must be claimed by the TOE.

This requirement must be claimed by the TOE if at least one of FCS\_CKM.1 or [FCS\\_CKM.1/KEK](#) chooses a selection related to generation of symmetric keys.

## Evaluation Activities ▼

[FCS\\_CKM.1/SK:](#)

### FCS\_CKM.1/KEK Cryptographic Key Generation (Key Encryption Key)

FCS\_CKM.1.1/KEK

The TSF shall generate key encryption keys in accordance with a specified cryptographic key generation algorithm corresponding to **[selection:**

- *Asymmetric KEs generated in accordance with [FCS\\_CKM.1/AK](#) identifier AK1,*
- *Symmetric KEs generated in accordance with [FCS\\_CKM.1/SK](#),*
- *Derived KEs generated in accordance with [FCS\\_CKM\\_EXT.5](#)*

**] and specified cryptographic key sizes [assignment: cryptographic key sizes] that meet the following: [assignment: list of standards].**

**Application Note:** KEs protect KEs and Symmetric Keys (SKs). DSCs should use key strengths commensurate with protecting the chosen symmetric encryption key strengths.

If Asymmetric KEs generated in accordance with [FCS\\_CKM.1/AK](#) is selected, the selection-based SFR [FCS\\_CKM.1/AK](#) must be claimed by the TOE.

If Symmetric KEs generated in accordance with [FCS\\_CKM.1/SK](#) is selected, the selection-based SFR [FCS\\_CKM.1/SK](#) must be claimed by the TOE.

If Derived KEKs generated in accordance with [FCS\\_CKM\\_EXT.5](#) is selected, the selection-based SFR [FCS\\_CKM\\_EXT.5](#) must be claimed by the TOE.

## Evaluation Activities ▼

[FCS\\_CKM.1/KEK](#):  
Test test test

## FCS\_CKM.2 Cryptographic Key Establishment

FCS\_CKM.2.1

The TSF shall establish cryptographic keys in accordance with a specified cryptographic key establishment method: **[selection:**

- *RSA-based key establishment schemes that meet the following: NIST Special Publication 800-56B Revision 2, "Recommendation for Pair-Wise Key Establishment Schemes Using Integer Factorization Cryptography",*
- *RSA-based key establishment schemes that meet the following: RSAES-PKCS1-v1\_5 as specified in Section 7.2 of RFC 8017, "Public-Key Cryptography Standards (PKCS) #1: RSA Cryptography Specifications Version 2.2",*
- *Elliptic curve-based key establishment schemes that meet the following:*  
**[selection:**
  - *NIST Special Publication 800-56A Revision 3, "Recommendation for Pair-Wise Key Establishment Schemes Using Discrete Logarithm Cryptography",*
  - *RFC 7748, "Elliptic Curves for Security"***],**
- *Finite field-based key establishment schemes that meet the following: NIST Special Publication 800-56A Revision 3, "Recommendation for Pair-Wise Key Establishment Schemes Using Discrete Logarithm Cryptography",*
- *Elliptic Curve Integrated Encryption Scheme (ECIES) that meets the following: [selection:*
  - *ANSI X9.63 - Public Key Cryptography for the Financial Services Industry Key Agreement and Key Transport Using Elliptic Curve Cryptography,*
  - *IEEE 1363a - Standard Specification for Public-Key Cryptography - Amendment 1: Additional Techniques,*
  - *ISO/IEC 18033-2 - Information Technology - Security Techniques - Encryption Algorithms - Part 2: Asymmetric Ciphers,*
  - *SECG SEC1 - Standards for Efficient Cryptography Group Elliptic Curve Cryptography, section 5.1 Elliptic Curve Integrated Encryption Scheme***]**

**] that meets the following: [assignment: list of standards].**

**Application Note:** This is a refinement of the SFR [FCS\\_CKM.2](#) to deal with key establishment rather than key distribution.

The ST author selects all key establishment schemes used for the selected cryptographic protocols.

The RSA-based key establishment schemes are described in Section 8 of NIST SP 800-56B Revision 2 [NIST-RSA]; however, Section 8 relies on implementation of other sections in SP 800-56B Revision 2.

The elliptic curves used for the key establishment scheme correlate with the curves specified in [FCS\\_CKM.1/AK](#).

The selections in this SFR must be consistent with those for [FCS\\_COP.1/KAT](#).

## Evaluation Activities ▼

[FCS\\_CKM.2](#):

## FCS\_CKM\_EXT.5 Cryptographic Key Derivation

FCS\_CKM\_EXT.5.1

The TSF shall generate cryptographic keys using the Key Derivation Functions defined by the following rows of [Table 4](#): **[selection: KeyDrv1, KeyDrv2, KeyDrv3, KeyDrv4, KeyDrv5, KeyDrv6, KeyDrv7, KeyDrv8]**.

**Table 4: Key Derivation Functions**

| Identifier | Key Type   | Input Parameters                                 | Key Derivation Algorithm   | Key Sizes                             | List of Stan  |
|------------|--|--|--|---------------------------------------|---|
| KeyDrv1    | <b>[selection: symmetric key, initialization</b> | Direct Generation from a Random Bit Generator as | KDF in Counter Mode using <b>[selection: CMAC-AES-128, CMAC-</b> | <b>[selection: 128, 192, 256]bits</b> | NIST SP 800 (Section 5.1) in Counter M <b>[selection: ]</b> |

|         |   |   |   |                                       |   |
|---------|---|---|---|---------------------------------------|---|
|         | vector, authentication token, authorization value, HMAC key, KMAC key]  | specified in <a href="#">FCS_RBG_EXT.1</a>  | AES-192, CMAC-AES-256, HMAC-SHA-1, HMAC-SHA-256, HMAC-SHA-512]as the PRF  |                                       | CMAC, NIST CMAC, ISO-HMAC, HMAC, ISO-FIPS-SHA]  |
| KeyDrv2 | <b>[selection:</b> symmetric key, initialization vector, authentication token, authorization value, HMAC key, KMAC key] | Direct Generation from a Random Bit Generator as specified in <a href="#">FCS_RBG_EXT.1</a> | KDF in Feedback Mode using <b>[selection:</b> CMAC-AES-128, CMAC-AES-192, CMAC-AES-256, HMAC-SHA-1, HMAC-SHA-256, HMAC-SHA-512]as the PRF   | <b>[selection:</b> 128, 192, 256]bits | NIST SP 800-56B Rev. 1 (Section 5.2) in Feedback Mode<br><b>[selection:</b> CMAC, NIST CMAC, ISO-HMAC, HMAC, ISO-FIPS-SHA]  |
| KeyDrv3 | <b>[selection:</b> symmetric key, initialization vector, authentication token, authorization value, HMAC key, KMAC key] | Direct Generation from a Random Bit Generator as specified in <a href="#">FCS_RBG_EXT.1</a> | KDF in Double Pipeline Iteration Mode using <b>[selection:</b> CMAC-AES-128, CMAC-AES-192, CMAC-AES-256, HMAC-SHA-1, HMAC-SHA-256, HMAC-SHA-512]as the PRF  | <b>[selection:</b> 128, 192, 256]bits | NIST SP 800-56B Rev. 1 (Section 5.3) in n Double Pipeline Iteration Mode)<br><b>[selection:</b> CMAC, NIST CMAC, ISO-HMAC, HMAC, ISO-FIPS-SHA]  |
| KeyDrv4 | <b>[selection:</b> symmetric key, initialization vector, authentication token, authorization value, HMAC key, KMAC key] | Intermediary keys   | <b>[selection:</b> exclusive OR (XOR), SHA256, SHA-512]   | <b>[selection:</b> 128, 192, 256]bits | <b>[selection:</b> HASH, FIPS   |
| KeyDrv5 | <b>[selection:</b> symmetric key, initialization vector, authentication token, authorization value, HMAC key, KMAC key] | Concatenated keys   | KDF in <b>[selection:</b> Counter Mode, Feedback Mode, Double Pipeline Iteration Mode] using <b>[selection:</b> CMAC-AES-128, CMAC-AES-192, CMAC-AES-256, HMAC-SHA-1, HMAC-SHA-256, HMAC-SHA-512]as the PRF | <b>[selection:</b> 128, 192, 256]bits | NIST SP 800-56B Rev. 1 (Section 5.1) (KDF in Counter Mode) (Section 5.2) in Feedback Mode); (Section 5.3) in Double-Pipeline Iteration Mode)<br><b>[selection:</b> CMAC, NIST CMAC, ISO-HMAC, HMAC, ISO-FIPS-SHA] |
| KeyDrv6 | <b>[selection:</b> symmetric key, initialization vector, authentication token, authorization value, HMAC key, KMAC key] | Two keys  | <b>[selection:</b> AES-CCM, AES-GCM, AES-CBC, AES-KWP, AES-KW, CAM-CBC, CAM-CCM, CAM-GCM] from FCS_COP.1/SKC Symmetric Key table  | <b>[selection:</b> 128, 192, 256]bits | [selection: s of Standards FCS_COP.1/ Symmetric k table]  |
| KeyDrv7 | <b>[selection:</b> symmetric key, secret IV, seed]  | Shared secret, salt, output length, fixed information                                       | <b>[selection:</b> hash function from <a href="#">FCS_COP.1/Hash</a> , keyed hash from <a href="#">FCS_COP.1/HMAC</a> ]   | <b>[selection:</b> 128, 192, 256]bits | (NIST-KDRV <b>[selection:</b> List of Stand in <a href="#">FCS_COP.1/</a> and <a href="#">FCS_COP.1/</a>  |
| KeyDrv8 | <b>[selection:</b> symmetric  | Shared secret, salt, IV, output   | <b>[selection:</b> keyed hash from  | <b>[selection:</b> 128, 192,          | (NIST-KDRV <b>[selection:</b> s   |

**Application Note:** Note that Camellia algorithms do not support 192-bit key sizes.

The interface referenced in the requirement could take different forms, the most likely of which is an application programming interface to an OS kernel. There may be various levels of abstraction. For Authorization Factor Submasks, the key size to be used in the HMAC falls into a range between L1 and L2 defined in ISO/IEC 10118 for the appropriate hash function (for example for SHA-256 L1 = 512, L2 =256) where L2 = k = L1.

General note: in order to use a NIST SP 800-108 conformant method of key derivation, the TOE is permitted to implement this with keys as derived as indicated in Key Derivation Functions table above, and with the algorithms as indicated in the same table.

NIST SP 800-131A Rev 1 allows the use of SHA-1 in these use cases.

KeyDrv5, KeyDrv6, and the XOR option in KeyDrv4 will create an “inverted key hierarchy” in which the TSF will combine two or more keys to create a third key. These same KDFs may also use a submask key as input, which could be an authorization factor or derived from a PBKDF. In these cases the ST author must explicitly declare this option and should present a reasonable argument that the entropy of the inputs to the KDFs will result in full entropy of the expected output.

If keys are combined, the ST author shall describe which method of combination is used in order to justify that the effective entropy of each factor is preserved.

The documentation of the product’s encryption key management should be detailed enough that, after reading, the evaluator will thoroughly understand the product’s key management and how it meets the requirements to ensure the keys are adequately protected. This documentation should include an essay and diagrams. This documentation is not required to be part of the TSS; it can be submitted as a separate document and marked as developer proprietary.

SP 800-56C specifies a two-step key derivation procedure that employs an extraction-thenexpansion technique for deriving keying material from a shared secret generated during a key establishment scheme. The Randomness Extraction step as described in Section 5 of SP 800-56C is followed by Key Expansion using the key derivation functions defined in SP 800-108.

This requirement must be claimed by the TOE if at least one of [FCS\\_CKM.1/KEK](#), [FCS\\_CKM.1/SK](#), or [FCS\\_COP.1/KeyEnc](#) chooses a selection related to key derivation.

If at least one of KeyDrv4, KeyDrv5, or KeyDrv6 is selected AND password-based key derivation is used to create at least one of the inputs, the selection-based SFR [FCS\\_COP.1/PBKDF](#) must also be claimed.

Evaluation Activities

[FCS\\_CKM\\_EXT.5:](#)

FCS\_COP.1/Hash Cryptographic Operation (Hashing)

FCS\_COP.1.1/Hash

The TSF shall perform [*cryptographic hashing*] in accordance with a specified cryptographic algorithm [**selection:** *SHA-1, SHA-224, SHA-256, SHA-384, SHA-512, SHA3-224, SHA3-256, SHA3-384, SHA3-512*] that meets the following: [**selection:** *ISO/IEC 10118-3:2018, FIPS 180-4*].

**Application Note:** The hash selection should be consistent with the overall strength of the algorithm used for signature generation. For example, the DSC should choose SHA-256 for 2048-bit RSA or ECC with P-256, SHA-384 for 3072-bit RSA, 4096-bit RSA, or ECC with P-384, and SHA-512 for ECC with P-521. The ST author selects the standard based on the algorithms selected.

SHA-1 may be used for the following applications: generating and verifying hash-based message authentication codes (HMACs), key derivation functions (KDFs), and random bit/number generation (In certain cases, SHA-1 may also be used for verifying old digital signatures and time stamps, provided that this is explicitly allowed by the application domain).

Evaluation Activities

[FCS\\_COP.1/Hash:](#)

Nothing to see here.

FCS\_COP.1/HMAC Cryptographic Operation (Keyed Hash)



The TSF shall perform [*keyed hash message authentication*] in accordance with a specified cryptographic algorithm [**selection:** *HMAC-SHA-1, HMAC-SHA-256, HMAC-SHA-384, HMAC-SHA-512, KMAC128, KMAC256*] and cryptographic key sizes [**assignment:** *key size (in bits)*] that meet the following: [**selection:** *ISO/IEC 9797-2:2011 Section 7 “MAC Algorithm 2”, [NIST-KDV] section 4 “KMAC”*].

**Application Note:** The HMAC key size falls into a range between L1 and L2 defined in ISO/IEC 10118 for the appropriate hash function (for example for SHA-256 L1 = 512, L2 = 256) where  $L2 \leq k \leq L1$ .

## Evaluation Activities ▼

[FCS\\_COP.1/HMAC:](#)

## FCS\_COP.1/KeyEnc Cryptographic Operation (Key Encryption)

FCS\_COP.1.1/KeyEnc

The TSF shall perform [*key encryption and decryption*] using the methods defined in the following rows of [Table 5](#): [**selection:** *SE1, AE1, SE2, XOR*]

**Table 5: Supported Methods for Key Encryption Operation**

| Identifier | Cryptographic Algorithm   | Key Sizes                                       | List of Standards                 |
|------------|---|---|-----------------------------------|
| SE1        | Symmetric [ <b>selection:</b> <i>AES-CCM, AES-GCM, AES-CBC, AES-CTR, AES-KWP, AESKW</i> ] | [ <b>selection:</b> <i>128, 192, 256</i> ] bits | See FCS_COP.1/SKC                 |
| AE1        | Asymmetric KTS-OAEP   | [ <b>selection:</b> <i>2048, 3072</i> ] bits    | See FCS_COP.1/SKC                 |
| SE2        | Symmetric [ <b>selection:</b> <i>CAM-CBC, CAM-CCM, CAM-GCM</i> ]                          | [ <b>selection:</b> <i>128, 256</i> ] bits      | See FCS_COP.1/KAT                 |
| XOR        | Exclusive OR operation  | [ <b>selection:</b> <i>128, 192, 256</i> ] bits | See <a href="#">FCS_CKM_EXT.5</a> |

**Application Note:** A TOE will use this requirement to specify how the Key Encryption Key (KEK) wraps a symmetric encryption key. A TOE will always need this requirement in order to capture the last stage of the key chain in which the Key Encryption Key (KEK) wraps the symmetric encryption key.

If XOR is selected, the selection-based SFR [FCS\\_CKM\\_EXT.5](#) must be claimed by the TOE.

## Evaluation Activities ▼

[FCS\\_COP.1/KeyEnc:](#)

## FCS\_RBG\_EXT.1 Random Bit Generation

FCS\_RBG\_EXT.1.1

The TSF shall perform all deterministic random bit generation services in accordance with ISO/IEC 18031:2011 using [**selection:** *Hash\_DRBG (any), HMAC\_DRBG (any), CTR\_DRBG (AES)*].

FCS\_RBG\_EXT.1.2

The deterministic RBG shall be seeded by at least one entropy source in accordance with NIST SP 800-90B that accumulates entropy from [**selection:** *number of software-based sources*] software-based noise source, [**assignment:** *number of hardware-based sources*] hardware-based noise source] with a minimum of [**selection:** *128, 192, 256*] bits of entropy at least equal to the greatest security strength, according to ISO/IEC 18031:2011, of the keys and CSPs that it will generate.

**Application Note:** ISO/IEC 18031:2011 contains three different methods of generating random numbers. Each of these in turn depends on underlying cryptographic primitives (hash functions/ciphers). This cPP allows SHA-1, SHA-224, SHA-256, SHA-384, and SHA-512 for Hash\_DRBG or HMAC\_DRBG and only AES-based implementations for CTR\_DRBG.

## 5.1.2 TOE Security Functional Requirements Rationale

The following rationale provides justification for each security objective for the TOE, showing that the SFRs are suitable to meet and achieve the security objectives:

| OBJECTIVE           | ADDRESSED BY  | RATIONALE                         |
|---------------------|---|-----------------------------------|
| O.ACCOUNTABILITY    | FAU_GEN.1   | 'cause<br>FAU_GEN.1<br>is awesome |
|                     | FTP_ITC_EXT.1   | Cause FTP<br>reasons              |
| O.INTEGRITY         | FPT_SBOP_EXT.1  | For reasons                       |
|                     | FPT_ASLR_EXT.1  | ASLR For<br>reasons               |
|                     | FPT_TUD_EXT.1   | For reasons                       |
|                     | FPT_TUD_EXT.2   | For reasons                       |
|                     | FCS_COP.1/HASH  | For reasons                       |
|                     | FCS_COP.1/SIGN  | For reasons                       |
|                     | FCS_COP.1/KEYHMAC   | For reasons                       |
|                     | FPT_ACF_EXT.1   | For reasons                       |
|                     | FPT_SRP_EXT.1   | For reasons                       |
|                     | FIA_X509_EXT.1  | For reasons                       |
|                     | FPT_TST_EXT.1   | For reasons                       |
|                     | FTP_ITC_EXT.1   | For reasons                       |
|                     | FPT_W^X_EXT.1   | For reasons                       |
|                     | FIA_AFL.1   | For reasons                       |
|                     | FIA_UAU.5   | For reasons                       |
| O.MANAGEMENT        | FMT_MOF_EXT.1   | For reasons                       |
|                     | FMT_SMF_EXT.1   | For reasons                       |
|                     | FTA_TAB.1   | For reasons                       |
|                     | FTP_TRP.1   | For reasons                       |
| O.PROTECTED_STORAGE | FCS_STO_EXT.1, <a href="#">FCS_RBG_EXT.1</a> , FCS_COP.1/ENCRYPT,<br>FDP_ACF_EXT.1  | Rationale for<br>a big chunk      |
| O.PROTECTED_COMMS   | <a href="#">FCS_RBG_EXT.1</a> , FCS_CKM.1, <a href="#">FCS_CKM.2</a> , FCS_CKM_EXT.4,<br>FCS_COP.1/ENCRYPT, FCS_COP.1/HASH, FCS_COP.1/SIGN,<br><a href="#">FCS_COP.1/HMAC</a> , FDP_IFC_EXT.1, FIA_X509_EXT.1,<br>FIA_X509_EXT.2, FTP_ITC_EXT.1 | Rationale for<br>a big chunk      |

## 5.2 Security Assurance Requirements

The Security Objectives in [Section 4 Security Objectives](#) were constructed to address threats identified in [Section 3.1 Threats](#). The Security Functional Requirements (SFRs) in [Section 5.1 Security Functional Requirements](#) are a formal instantiation of the Security Objectives. The PP identifies the Security Assurance Requirements (SARs) to frame the extent to which the evaluator assesses the documentation applicable for the evaluation and performs independent testing.

This section lists the set of SARs from CC part 3 that are required in evaluations against this PP. Individual Assurance Activities to be performed are specified both in [Section 5.1 Security Functional Requirements](#) as well as in this section.

The general model for evaluation of OSs against STs written to conform to this PP is as follows:

After the ST has been approved for evaluation, the TSEF will obtain the OS, supporting environmental IT, and the administrative/user guides for the OS. The ITSEF is expected to perform actions mandated by the Common Evaluation Methodology (CEM) for the ASE and ALC SARs. The ITSEF also performs the Assurance Activities contained within [Section 5.1 Security Functional Requirements](#), which are intended to be an interpretation of the other CEM assurance requirements as they apply to the specific technology instantiated in the OS. The Assurance Activities that are captured in [Section 5.1 Security Functional Requirements](#) also provide clarification as to what the developer needs to provide to demonstrate the OS is compliant with the PP.

### 5.2.1 Class ASE: Security Target

As per ASE activities defined in [\[CEM\]](#).

### 5.2.2 Class ADV: Development

The information about the OS is contained in the guidance documentation available to the end user as well as the TSS portion of the ST. The OS developer must concur with the description of the product that is contained in the TSS as it relates to the functional requirements. The Assurance Activities contained in [Section 5.1 Security Functional Requirements](#) should provide the ST authors with sufficient information to determine the appropriate content for the TSS section.



## ADV\_FSP.1 Basic Functional Specification (ADV\_FSP.1)

The functional specification describes the TSFIs. It is not necessary to have a formal or complete specification of these interfaces. Additionally, because OSs conforming to this PP will necessarily have interfaces to the Operational Environment that are not directly invocable by OS users, there is little point specifying that such interfaces be described in and of themselves since only indirect testing of such interfaces may be possible. For this PP, the activities for this family should focus on understanding the interfaces presented in the TSS in response to the functional requirements and the interfaces presented in the AGD documentation. No additional “functional specification” documentation is necessary to satisfy the assurance activities specified. The interfaces that need to be evaluated are characterized through the information needed to perform the assurance activities listed, rather than as an independent, abstract list.

### Developer action elements:

ADV\_FSP.1.1D

The developer shall provide a functional specification.

### Content and presentation elements:

ADV\_FSP.1.2C

The developer shall provide a tracing from the functional specification to the SFRs.

**Application Note:** As indicated in the introduction to this section, the functional specification is comprised of the information contained in the AGD\_OPE and AGD\_PRE documentation. The developer may reference a website accessible to application developers and the evaluator. The assurance activities in the functional requirements point to evidence that should exist in the documentation and TSS section; since these are directly associated with the SFRs, the tracing in element [ADV\\_FSP.1.2D](#) is implicitly already done and no additional documentation is necessary.

ADV\_FSP.1.3C

The functional specification shall describe the purpose and method of use for each SFR-enforcing and SFR-supporting TSFI.

ADV\_FSP.1.4C

The functional specification shall identify all parameters associated with each SFR-enforcing and SFR-supporting TSFI.

ADV\_FSP.1.5C

The functional specification shall provide rationale for the implicit categorization of interfaces as SFR-non-interfering.

ADV\_FSP.1.6C

The tracing shall demonstrate that the SFRs trace to TSFIs in the functional specification.

### Evaluator action elements:

ADV\_FSP.1.7E

The evaluator shall confirm that the information provided meets all requirements for content and presentation of evidence.

ADV\_FSP.1.8E

The evaluator shall determine that the functional specification is an accurate and complete instantiation of the SFRs.

### Evaluation Activities ▼

#### *ADV\_FSP.1:*

*There are no specific assurance activities associated with these SARs, except ensuring the information is provided. The functional specification documentation is provided to support the evaluation activities described in [Section 5.1 Security Functional Requirements](#), and other activities described for AGD, ATE, and AVA SARs. The requirements on the content of the functional specification information is implicitly assessed by virtue of the other assurance activities being performed; if the evaluator is unable to perform an activity because there is insufficient interface information, then an adequate functional specification has not been provided.*

## 5.2.3 Class AGD: Guidance Documentation

The guidance documents will be provided with the ST. Guidance must include a description of how the IT personnel verifies that the Operational Environment can fulfill its role for the security functionality. The documentation should be in an informal style and readable by the IT personnel. Guidance must be provided for every operational environment that the product supports as claimed in the ST. This guidance includes instructions to successfully install the TSF in that environment; and Instructions to manage the security of the TSF as a product and as a component of the larger operational environment. Guidance pertaining to particular security functionality is also provided; requirements on such guidance are contained in the assurance activities specified with each requirement.

## AGD\_OPE.1 Operational User Guidance (AGD\_OPE.1)

### Developer action elements:

The developer shall provide operational user guidance.

**Application Note:** The operational user guidance does not have to be contained in a single document. Guidance to users, administrators and application developers can be spread among documents or web pages. Rather than repeat information here, the developer should review the assurance activities for this component to ascertain the specifics of the guidance that the evaluator will be checking for. This will provide the necessary information for the preparation of acceptable guidance.

#### Content and presentation elements:

AGD\_OPE.1.2C

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.

**Application Note:** User and administrator are to be considered in the definition of user role.

AGD\_OPE.1.3C

The operational user guidance shall describe, for each user role, how to use the available interfaces provided by the OS in a secure manner.

AGD\_OPE.1.4C

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.

**Application Note:** This portion of the operational user guidance should be presented in the form of a checklist that can be quickly executed by IT personnel (or end-users, when necessary) and suitable for use in compliance activities. When possible, this guidance is to be expressed in the eXtensible Configuration Checklist Description Format (XCCDF) to support security automation. Minimally, it should be presented in a structured format which includes a title for each configuration item, instructions for achieving the secure configuration, and any relevant rationale.

AGD\_OPE.1.5C

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.

AGD\_OPE.1.6C

The operational user guidance shall identify all possible modes of operation of the OS (including operation following failure or operational error), their consequences, and implications for maintaining secure operation.

AGD\_OPE.1.7C

The operational user guidance shall, for each user role, describe the security measures to be followed in order to fulfill the security objectives for the operational environment as described in the ST.

AGD\_OPE.1.8C

The operational user guidance shall be clear and reasonable.

#### Evaluator action elements:

AGD\_OPE.1.9E

The evaluator shall confirm that the information provided meets all requirements for content and presentation of evidence.

#### Evaluation Activities ▼

##### **AGD\_OPE.1:**

*Some of the contents of the operational guidance are verified by the assurance activities in [Section 5.1 Security Functional Requirements](#) and evaluation of the OS according to the [\[CEM\]](#). The following additional information is also required. If cryptographic functions are provided by the OS, the operational guidance shall contain instructions for configuring the cryptographic engine associated with the evaluated configuration of the OS. It shall provide a warning to the administrator that use of other cryptographic engines was not evaluated nor tested during the CC evaluation of the OS. The documentation must describe the process for verifying updates to the OS by verifying a digital signature - this may be done by the OS or the underlying platform. The evaluator will verify that this process includes the following steps: Instructions for obtaining the update itself. This should include instructions for making the update accessible to the OS (e.g., placement in a specific directory). Instructions for initiating the update process, as well as discerning whether the process was successful or unsuccessful. This includes generation of the hash/digital signature. The OS will likely contain security functionality that does not fall in the scope of evaluation under this PP. The operational guidance shall make it clear to an administrator which security functionality is covered by the evaluation activities.*

#### Developer action elements:

AGD\_PRE.1.1D

The developer shall provide the OS, including its preparative procedures.

**Application Note:** As with the operational guidance, the developer should look to the assurance activities to determine the required content with respect to preparative procedures.

#### Content and presentation elements:

AGD\_PRE.1.2C

The preparative procedures shall describe all the steps necessary for secure acceptance of the delivered OS in accordance with the developer's delivery procedures.

AGD\_PRE.1.3C

The preparative procedures shall describe all the steps necessary for secure installation of the OS and for the secure preparation of the operational environment in accordance with the security objectives for the operational environment as described in the ST.

#### Evaluator action elements:

AGD\_PRE.1.4E

The evaluator shall confirm that the information provided meets all requirements for content and presentation of evidence.

AGD\_PRE.1.5E

The evaluator shall apply the preparative procedures to confirm that the OS can be prepared securely for operation.

#### Evaluation Activities ▼

##### **AGD\_PRE.1:**

*As indicated in the introduction above, there are significant expectations with respect to the documentation—especially when configuring the operational environment to support OS functional requirements. The evaluator shall check to ensure that the guidance provided for the OS adequately addresses all platforms claimed for the OS in the ST.*

### 5.2.4 Class ALC: Life-cycle Support

At the assurance level provided for OSs conformant to this PP, life-cycle support is limited to end-user-visible aspects of the life-cycle, rather than an examination of the OS vendor's development and configuration management process. This is not meant to diminish the critical role that a developer's practices play in contributing to the overall trustworthiness of a product; rather, it is a reflection on the information to be made available for evaluation at this assurance level.

#### ALC\_CMC.1 Labeling of the TOE (ALC\_CMC.1)

This component is targeted at identifying the OS such that it can be distinguished from other products or versions from the same vendor and can be easily specified when being procured by an end user.

#### Developer action elements:

ALC\_CMC.1.1D

The developer shall provide the OS and a reference for the OS.

#### Content and presentation elements:

ALC\_CMC.1.2C

The OS shall be labeled with a unique reference.

**Application Note:** Unique reference information includes:

- OS Name
- OS Version
- OS Description
- Software Identification (SWID) tags, if available

#### Evaluator action elements:

ALC\_CMC.1.3E

The evaluator shall confirm that the information provided meets all requirements for content and presentation of evidence.

#### Evaluation Activities ▼

##### **ALC\_CMC.1:**

*The evaluator will check the ST to ensure that it contains an identifier (such as a product name/version number) that specifically identifies the version that meets the requirements of the ST. Further, the evaluator will check the AGD guidance and OS samples received for testing to ensure that the version number is consistent with that in the ST. If the vendor maintains a web site advertising the OS, the evaluator will examine the information on the web site to ensure that the information in the ST is sufficient to distinguish the product.*

## ALC\_CMS.1 TOE CM Coverage (ALC\_CMS.1)

Given the scope of the OS and its associated evaluation evidence requirements, this component's assurance activities are covered by the assurance activities listed for [ALC\\_CMC.1](#).

### Developer action elements:

ALC\_CMS.1.1D

The developer shall provide a configuration list for the OS.

### Content and presentation elements:

ALC\_CMS.1.2C

The configuration list shall include the following: the OS itself; and the evaluation evidence required by the SARs.

ALC\_CMS.1.3C

The configuration list shall uniquely identify the configuration items.

### Evaluator action elements:

ALC\_CMS.1.4E

The evaluator shall confirm that the information provided meets all requirements for content and presentation of evidence.

## Evaluation Activities ▼

### [ALC\\_CMS.1:](#)

*The "evaluation evidence required by the SARs" in this PP is limited to the information in the ST coupled with the guidance provided to administrators and users under the AGD requirements. By ensuring that the OS is specifically identified and that this identification is consistent in the ST and in the AGD guidance (as done in the assurance activity for [ALC\\_CMC.1](#)), the evaluator implicitly confirms the information required by this component. Life-cycle support is targeted aspects of the developer's life-cycle and instructions to providers of applications for the developer's devices, rather than an in-depth examination of the TSF manufacturer's development and configuration management process. This is not meant to diminish the critical role that a developer's practices play in contributing to the overall trustworthiness of a product; rather, it's a reflection on the information to be made available for evaluation.*

*The evaluator will ensure that the developer has identified (in guidance documentation for application developers concerning the targeted platform) one or more development environments appropriate for use in developing applications for the developer's platform. For each of these development environments, the developer shall provide information on how to configure the environment to ensure that buffer overflow protection mechanisms in the environment(s) are invoked (e.g., compiler and linker flags). The evaluator will ensure that this documentation also includes an indication of whether such protections are on by default, or have to be specifically enabled. The evaluator will ensure that the TSF is uniquely identified (with respect to other products from the TSF vendor), and that documentation provided by the developer in association with the requirements in the ST is associated with the TSF using this unique identification.*

## ALC\_TSU\_EXT.1 Timely Security Updates

This component requires the OS developer, in conjunction with any other necessary parties, to provide information as to how the end-user devices are updated to address security issues in a timely manner. The documentation describes the process of providing updates to the public from the time a security flaw is reported/discovered, to the time an update is released. This description includes the parties involved (e.g., the developer, carriers(s)) and the steps that are performed (e.g., developer testing, carrier testing), including worst case time periods, before an update is made available to the public.

### Developer action elements:

ALC\_TSU\_EXT.1.1D

The developer shall provide a description in the TSS of how timely security updates are made to the OS.

ALC\_TSU\_EXT.1.2D

The developer shall provide a description in the TSS of how users are notified when updates change security properties or the configuration of the product.

### Content and presentation elements:

ALC\_TSU\_EXT.1.3C

The description shall include the process for creating and deploying security updates for the OS software.

ALC\_TSU\_EXT.1.4C

The description shall include the mechanisms publicly available for reporting security issues pertaining to the OS.

**Note:** The reporting mechanism could include web sites, email addresses, as well as a means to protect the sensitive nature of the report (e.g., public keys that could be used to encrypt the details of a proof-of-concept exploit).

#### Evaluator action elements:

ALC\_TSU\_EXT.1.5E

The evaluator shall confirm that the information provided meets all requirements for content and presentation of evidence.

#### Evaluation Activities ▼

##### **ALC\_TSU\_EXT.1:**

*The evaluator will verify that the TSS contains a description of the timely security update process used by the developer to create and deploy security updates. The evaluator will verify that this description addresses the entire application. The evaluator will also verify that, in addition to the OS developer's process, any third-party processes are also addressed in the description. The evaluator will also verify that each mechanism for deployment of security updates is described.*

*The evaluator will verify that, for each deployment mechanism described for the update process, the TSS lists a time between public disclosure of a vulnerability and public availability of the security update to the OS patching this vulnerability, to include any third-party or carrier delays in deployment. The evaluator will verify that this time is expressed in a number or range of days. The evaluator will verify that this description includes the publicly available mechanisms (including either an email address or website) for reporting security issues related to the OS. The evaluator shall verify that the description of this mechanism includes a method for protecting the report either using a public key for encrypting email or a trusted channel for a website.*

### 5.2.5 Class ATE: Tests

Testing is specified for functional aspects of the system as well as aspects that take advantage of design or implementation weaknesses. The former is done through the ATE\_IND family, while the latter is through the AVA\_VAN family. At the assurance level specified in this PP, testing is based on advertised functionality and interfaces with dependency on the availability of design information. One of the primary outputs of the evaluation process is the test report as specified in the following requirements.

#### **ATE\_IND.1 Independent Testing - Conformance (ATE\_IND.1)**

Testing is performed to confirm the functionality described in the TSS as well as the administrative (including configuration and operational) documentation provided. The focus of the testing is to confirm that the requirements specified in [Section 5.1 Security Functional Requirements](#) being met, although some additional testing is specified for SARs in [Section 5.2 Security Assurance Requirements](#). The Assurance Activities identify the additional testing activities associated with these components. The evaluator produces a test report documenting the plan for and results of testing, as well as coverage arguments focused on the platform/OS combinations that are claiming conformance to this PP. Given the scope of the OS and its associated evaluation evidence requirements, this component's assurance activities are covered by the assurance activities listed for [ALC\\_CMC.1](#).

#### Developer action elements:

ATE\_IND.1.1D

The developer shall provide the OS for testing.

#### Content and presentation elements:

ATE\_IND.1.2C

The OS shall be suitable for testing.

#### Evaluator action elements:

ATE\_IND.1.3E

The evaluator *shall confirm* that the information provided meets all requirements for content and presentation of evidence.

ATE\_IND.1.4E

The evaluator shall test a subset of the TSF to confirm that the TSF operates as specified.

**Application Note:** The evaluator will test the OS on the most current fully patched version of the platform.

#### Evaluation Activities ▼

##### **ATE\_IND.1:**

*The evaluator will prepare a test plan and report documenting the testing aspects of the system, including any application crashes during testing. The evaluator shall determine the root cause of any application crashes and include that information in the report. The test plan covers all of the testing actions contained in the [\[CEM\]](#) and the body of this PP's Assurance Activities. While it is not necessary to have one test case per test listed in an Assurance Activity, the evaluator must document in the test plan that each applicable testing requirement in the ST is covered. The test plan identifies the platforms to be tested, and for those platforms not included in the test plan but included in the ST, the test plan provides a justification for not testing the platforms. This justification must address the differences between the tested platforms and the untested platforms, and make an argument that the differences do not affect the testing to be performed. It is not sufficient to merely assert that the differences have no affect; rationale must be provided. If all platforms claimed in the ST are tested, then no rationale is necessary. The test plan describes the composition of each platform to be tested, and any setup that is necessary*

beyond what is contained in the AGD documentation. It should be noted that the evaluator is expected to follow the AGD documentation for installation and setup of each platform either as part of a test or as a standard pre-test condition. This may include special test drivers or tools. For each driver or tool, an argument (not just an assertion) should be provided that the driver or tool will not adversely affect the performance of the functionality by the OS and its platform. This also includes the configuration of the cryptographic engine to be used. The cryptographic algorithms implemented by this engine are those specified by this PP and used by the cryptographic protocols being evaluated (IPsec, TLS). The test plan identifies high-level test objectives as well as the test procedures to be followed to achieve those objectives. These procedures include expected results. The test report (which could just be an annotated version of the test plan) details the activities that took place when the test procedures were executed, and includes the actual results of the tests. This shall be a cumulative account, so if there was a test run that resulted in a failure; a fix installed; and then a successful re-run of the test, the report would show a "fail" and "pass" result (and the supporting details), and not just the "pass" result.

### 5.2.6 Class AVA: Vulnerability Assessment

For the first generation of this protection profile, the evaluation lab is expected to survey open sources to discover what vulnerabilities have been discovered in these types of products. In most cases, these vulnerabilities will require sophistication beyond that of a basic attacker. Until penetration tools are created and uniformly distributed to the evaluation labs, the evaluator will not be expected to test for these vulnerabilities in the OS. The labs will be expected to comment on the likelihood of these vulnerabilities given the documentation provided by the vendor. This information will be used in the development of penetration testing tools and for the development of future protection profiles.

#### AVA\_VAN.1 Vulnerability Survey (AVA\_VAN.1)

##### Developer action elements:

AVA\_VAN.1.1D

The developer shall provide the OS for testing.

##### Content and presentation elements:

AVA\_VAN.1.2C

The OS shall be suitable for testing.

##### Evaluator action elements:

AVA\_VAN.1.3E

The evaluator shall confirm that the information provided meets all requirements for content and presentation of evidence.

AVA\_VAN.1.4E

The evaluator shall perform a search of public domain sources to identify potential vulnerabilities in the OS.

**Application Note:** Public domain sources include the Common Vulnerabilities and Exposures (CVE) dictionary for publicly-known vulnerabilities. Public domain sources also include sites which provide free checking of files for viruses.

AVA\_VAN.1.5E

The evaluator shall conduct penetration testing, based on the identified potential vulnerabilities, to determine that the OS is resistant to attacks performed by an attacker possessing Basic attack potential.

#### Evaluation Activities ▼

##### AVA\_VAN.1:

The evaluator will generate a report to document their findings with respect to this requirement. This report could physically be part of the overall test report mentioned in ATE\_IND, or a separate document. The evaluator performs a search of public information to find vulnerabilities that have been found in similar applications with a particular focus on network protocols the application uses and document formats it parses. The evaluator documents the sources consulted and the vulnerabilities found in the report.

For each vulnerability found, the evaluator either provides a rationale with respect to its non-applicability, or the evaluator formulates a test (using the guidelines provided in ATE\_IND) to confirm the vulnerability, if suitable. Suitability is determined by assessing the attack vector needed to take advantage of the vulnerability. If exploiting the vulnerability requires expert skills and an electron microscope, for instance, then a test would not be suitable and an appropriate justification would be formulated.



# Appendix A - Optional Requirements

As indicated in the introduction to this PP, the baseline requirements (those that must be performed by the TOE) are contained in the body of this PP. This appendix contains three other types of optional requirements that may be included in the ST, but are not required in order to conform to this PP. However, applied modules, packages and/or use cases may refine specific requirements as mandatory.

The first type ( [A.1 Strictly Optional Requirements](#) ) are strictly optional requirements that are independent of the TOE implementing any function. If the TOE fulfills any of these requirements or supports a certain functionality, the vendor is encouraged to include the SFRs in the ST, but are not required in order to conform to this PP.

The second type ( [A.2 Objective Requirements](#) ) are objective requirements that describe security functionality not yet widely available in commercial technology. The requirements are not currently mandated in the body of this PP, but will be included in the baseline requirements in future versions of this PP. Adoption by vendors is encouraged and expected as soon as possible.

The third type ( [A.3 Implementation-based Requirements](#) ) are dependent on the TOE implementing a particular function. If the TOE fulfills any of these requirements, the vendor must either add the related SFR or disable the functionality for the evaluated configuration.

## A.1 Strictly Optional Requirements

---

This PP does not define any Strictly Optional requirements.

## A.2 Objective Requirements

---

This PP does not define any Objective requirements.

## A.3 Implementation-based Requirements

---

This PP does not define any Implementation-based requirements.

# Appendix B - Selection-based Requirements

As indicated in the introduction to this PP, the baseline requirements (those that must be performed by the TOE or its underlying platform) are contained in the body of this PP. There are additional requirements based on selections in the body of the PP: if certain selections are made, then additional requirements below must be included.

This PP does not define any Selection-based requirements.



# Appendix C - Inherently Satisfied Requirements

This appendix lists requirements that should be considered satisfied by products successfully evaluated against this Protection Profile. However, these requirements are not featured explicitly as SFRs and should not be included in the ST. They are not included as standalone SFRs because it would increase the time, cost, and complexity of evaluation. This approach is permitted by [CC] Part 1, **8.2 Dependencies between components**.

This information benefits systems engineering activities which call for inclusion of particular security controls. Evaluation against the Protection Profile provides evidence that these controls are present and have been evaluated.

| Requirement | Rationale for Satisfaction |
|-------------|----------------------------|
|-------------|----------------------------|

|                                      |  |
|--------------------------------------|--|
| FIA_UAU.1 - Timing of authentication | FIA_AFL.1 implicitly requires that the OS perform all necessary actions, including those on behalf of the user who has not been authenticated, in order to authenticate; therefore it is duplicative to include these actions as a separate assignment and test. |
|--------------------------------------|--|

|                                      |   |
|--------------------------------------|---|
| FIA_UID.1 - Timing of identification | FIA_AFL.1 implicitly requires that the OS perform all necessary actions, including those on behalf of the user who has not been identified, in order to authenticate; therefore it is duplicative to include these actions as a separate assignment and test. |
|--------------------------------------|---|

|                            |   |
|----------------------------|---|
| FMT_SMR.1 - Security roles | FMT_MOF_EXT.1 specifies role-based management functions that implicitly defines user and privileged accounts; therefore, it is duplicative to include separate role requirements. |
|----------------------------|---|

|                                  |   |
|----------------------------------|---|
| FPT_STM.1 - Reliable time stamps | FAU_GEN.1.2 explicitly requires that the OS associate timestamps with audit records; therefore it is duplicative to include a separate timestamp requirement. |
|----------------------------------|---|

|   |  |
|---|--|
| FTA_SSL.1 - TSF-initiated session locking | FMT_MOF_EXT.1 defines requirements for managing session locking; therefore, it is duplicative to include a separate session locking requirement. |
|---|--|

|                                    |  |
|------------------------------------|--|
| FTA_SSL.2 - User-initiated locking | FMT_MOF_EXT.1 defines requirements for user-initiated session locking; therefore, it is duplicative to include a separate session locking requirement. |
|------------------------------------|--|

|   |   |
|---|---|
| FAU_STG.1 - Protected audit trail storage | FPT_ACF_EXT.1 defines a requirement to protect audit logs; therefore, it is duplicative to include a separate protection of audit trail requirements. |
|---|---|

|                                       |   |
|---------------------------------------|---|
| FAU_GEN.2 - User identity association | FAU_GEN.1.2 explicitly requires that the OS record any user account associated with each event; therefore, it is duplicative to include a separate requirement to associate a user account with each event. |
|---------------------------------------|---|

|                          |  |
|--------------------------|--|
| FAU_SAR.1 - Audit review | FPT_ACF_EXT.1.2 requires that audit logs (and other objects) are protected from reading by unprivileged users; therefore, it is duplicative to include a separate requirement to protect only the audit information. |
|--------------------------|--|

**Appendix D - Acronyms**

# Appendix E - Selection Rules

This rules in this appendix define which combinations of selections are considered valid. An ST is considered conforming only if it satisfies all rules.

# Appendix F - Use Case Templates

## F.1 Elephant-own device

---

Choose something other than:

- \*
- \*

Choose something other than:

- \*

# Appendix G - Acronyms

| Acronym | Meaning   |
|---------|---|
| AES     | Advanced Encryption Standard                        |
| API     | Application Programming Interface                   |
| API     | Application Programming Interface                   |
| ASLR    | Address Space Layout Randomization                  |
| Base-PP | Base Protection Profile                             |
| CC      | Common Criteria                                     |
| CEM     | Common Evaluation Methodology                       |
| CESG    | Communications-Electronics Security Group           |
| CMC     | Certificate Management over CMS                     |
| CMS     | Cryptographic Message Syntax                        |
| CN      | Common Names  |
| CRL     | Certificate Revocation List                         |
| CSA     | Computer Security Act                               |
| CSP     | Critical Security Parameters                        |
| DAR     | Data At Rest  |
| DEP     | Data Execution Prevention                           |
| DES     | Data Encryption Standard                            |
| DHE     | Diffie-Hellman Ephemeral                            |
| DNS     | Domain Name System                                  |
| DRBG    | Deterministic Random Bit Generator                  |
| DSS     | Digital Signature Standard                          |
| DSS     | Digital Signature Standard                          |
| DT      | Date/Time Vector                                    |
| DTLS    | Datagram Transport Layer Security                   |
| EAP     | Extensible Authentication Protocol                  |
| ECDHE   | Elliptic Curve Diffie-Hellman Ephemeral             |
| ECDSA   | Elliptic Curve Digital Signature Algorithm          |
| EST     | Enrollment over Secure Transport                    |
| FIPS    | Federal Information Processing Standards            |
| HMAC    | Hash-based Message Authentication Code              |
| HTTP    | Hypertext Transfer Protocol                         |
| HTTPS   | Hypertext Transfer Protocol Secure                  |
| IETF    | Internet Engineering Task Force                     |
| IP      | Internet Protocol                                   |
| ISO     | International Organization for Standardization      |
| IT      | Information Technology                              |
| ITSEF   | Information Technology Security Evaluation Facility |
| NIAP    | National Information Assurance Partnership          |
| NIST    | National Institute of Standards and Technology      |
| OCSP    | Online Certificate Status Protocol                  |
| OE      | Operational Environment                             |
| OID     | Object Identifier                                   |
| OMB     | Office of Management and Budget                     |

|                  |   |
|------------------|---|
| OS               | Operating System                                      |
| PII              | Personally Identifiable Information                   |
| PKI              | Public Key Infrastructure                             |
| PP               | Protection Profile                                    |
| PP               | Protection Profile                                    |
| PP-Configuration | Protection Profile Configuration                      |
| PP-Module        | Protection Profile Module                             |
| RBG              | Random Bit Generator                                  |
| RFC              | Request for Comment                                   |
| RNG              | Random Number Generator                               |
| RNGVS            | Random Number Generator Validation System             |
| S/MIME           | Secure/Multi-purpose Internet Mail Extensions         |
| SAN              | Subject Alternative Name                              |
| SAR              | Security Assurance Requirement                        |
| SFR              | Security Functional Requirement                       |
| SHA              | Secure Hash Algorithm                                 |
| SIP              | Session Initiation Protocol                           |
| ST               | Security Target                                       |
| SWID             | Software Identification                               |
| TLS              | Transport Layer Security                              |
| TOE              | Target of Evaluation                                  |
| TSF              | TOE Security Functionality                            |
| TSFI             | TSF Interface   |
| TSS              | TOE Summary Specification                             |
| URI              | Uniform Resource Identifier                           |
| URL              | Uniform Resource Locator                              |
| USB              | Universal Serial Bus                                  |
| VM               | Virtual Machine                                       |
| XCCDF            | eXtensible Configuration Checklist Description Format |
| XOR              | Exclusive Or  |
| app              | Application   |

# Appendix H - Bibliography

| Identifier | Title   |
|------------|---|
| [CC]       | Common Criteria for Information Technology Security Evaluation - <ul style="list-style-type: none"><li>• <a href="#">Part 1: Introduction and General Model</a>, CCMB-2017-04-001, Version 3.1 Revision 5, April 2017.</li><li>• <a href="#">Part 2: Security Functional Components</a>, CCMB-2017-04-002, Version 3.1 Revision 5, April 2017.</li><li>• <a href="#">Part 3: Security Assurance Components</a>, CCMB-2017-04-003, Version 3.1 Revision 5, April 2017.</li></ul> |
| [CEM]      | <a href="#">Common Evaluation Methodology for Information Technology Security - Evaluation Methodology</a> , CCMB-2012-09-004, Version 3.1, Revision 4, September 2012.   |
| [CESG]     | CESG - <a href="#">End User Devices Security and Configuration Guidance</a>   |
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| [OMB]      | <a href="#">Reporting Incidents Involving Personally Identifiable Information and Incorporating the Cost for Security in Agency Information Technology Investments</a> , OMB M-06-19, July 12, 2006.  |