

# collaborative Protection Profile for Hardcopy Devices

## Acknowledgements

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### INDUSTRY

*Vendors*

### COMMON CRITERIA TESTING LABORATORIES

*ITSEF Name*

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## Revision History

*Table 1. Revision history*

Version	Date	Description
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## Preface

### Objectives of Document

This document presents the Common Criteria (CC) collaborative Protection Profile (cPP) to express the security functional requirements (SFRs) and security assurance requirements (SARs) for a Hardcopy Device (HCD). The Evaluation activities that specify the actions the evaluator performs to determine if a product satisfies the SFRs captured within this cPP, are described in [\[SD\]](#).

### Scope of Document

The scope of the cPP within the development and evaluation process is described in the Common Criteria for Information Technology Security Evaluation. In particular, a cPP defines the IT security requirements of a generic type of TOE and specifies the functional security measures to be offered by that TOE to meet stated requirements [\[\[CC1\]](#), Section B.14].

### Intended Readership

The target audiences of this cPP are developers, CC consumers, system integrators, evaluators and schemes.

Although the cPP and SD may contain minor editorial errors, the cPP is recognized as living document and the iTC is dedicated to ongoing updates and revisions. Please report any issues to the HCD-iTC.

- [\[CC1\]](#) Common Criteria for Information Technology Security Evaluation, Part 1: Introduction and General Model, CCMB-2017-04-001, Version 3.1 Revision 5, April 2017.
- [\[CC2\]](#) Common Criteria for Information Technology Security Evaluation, Part 2: Security Functional Components, CCMB-2017-04-002, Version 3.1 Revision 5, April 2017.

- [CC3] Common Criteria for Information Technology Security Evaluation, Part 3: Security Assurance Components, CCMB-2017-04-003, Version 3.1 Revision 5, April 2017.
- [CEM] Common Methodology for Information Technology Security Evaluation, Evaluation Methodology, CCMB-2017-04-004, Version 3.1 Revision 5, April 2017.
- [SD] Supporting Document Draft, v0.4, August 26, 2020 (<https://ccusersforum.onlyoffice.com/Products/Files/doceditor.aspx?fileid=6744251&action=view>)

For more see the [Common Criteria Portal](#).

# 1. PP Introduction

## 1.1. PP Reference Identification

- PP Reference: collaborative Protection Profile for Hardcopy Devices
- PP Version: 0.7.0
- PP Date: 2020-10-18

## 1.2. TOE Overview

The Target of Evaluation in this cPP is an HCD. HCDs support job functions to convert hardcopy documents into digital form (scanning), convert digital documents into hardcopy form (printing), duplicate hardcopy documents (copying), or transmit documents over a Public Switched Telephone Network (PSTN) connection (PSTN faxing). Hardcopy documents typically take the form of paper, but can take other forms (e.g. transparencies).

For the purpose of this cPP, a conforming HCD must support at least one of the job functions printing, scanning, or copying and must support the functions network communications and administration.

The job functions supported by the HCD and the network communications and administration functions are "Required Uses" of a conforming HCD and are mandatory functions. A conforming HCD may also support "Conditionally Mandatory Uses" as well as "Optional Uses". Conditionally Mandatory Uses are optional functions, the presence of which in a HCD is not required for conformance, but which must meet conditionally mandatory requirements if they are present in a HCD. "Optional Uses" are optional functions that may, but need not, be evaluated.

## 1.3. TOE Design

### 1.3.1. Boundary of the TOE

The physical boundary of the TOE is the entire HCD product. Options and add-ons that are not security relevant, such as finishers, do not need to be included in the TOE. If it is possible for users to connect personal storage devices (such as portable flash memory devices) to the HCD, those devices and data contained within them are out of scope of the TOE and interfaces to connect such devices should be disabled.

The logical boundary of the TOE includes all security functions related to the Required Uses of the HCD as described in section 1.3.1.1, all Conditionally Mandatory Uses as described in section 1.3.1.2 that are present in the HCD, and all Optional Uses as described in section 1.3.1.3 that are to be included in the evaluation.

### **1.3.2. Operational Environment**

For the purposes of this cPP, HCDs are used in an office environment by commercial, government, or other organizations, and are connected to a wired LAN. If a PSTN fax function is present, then the HCD can also be connected to the PSTN for sending and receiving PSTN faxes.

Users may interact with the HCD through a variety of interfaces:

- A Local User interacts with the HCD using its physical operator console
- A Network User uses interacts with the HCD using programs installed on personal computers or other IT devices external to the HCD which communicate with the HCD through the LAN. This includes the use of general client programs such as web browsers and specific programs such as print or scan drivers.

The HCD and External IT Entities may also interact independently of human User input.

The Operational Environment is assumed to be physically and logically protected from Threats originating from outside of that environment, typically by limiting physical access to the HCD and connecting it to a LAN that is protected from the public Internet.

## **1.4. TOE Use Case**

### **1.4.1. USE CASE 1: Required Use Cases**

The security-relevant use cases for Required Uses of a conforming HCD are:

1. One or more of the following:
  - a. Printing: A Network User sends a Document from an External IT Entity to the HCD over a LAN with instructions for printing. The HCD has the capability to protect the User's Document from unauthorized disclosure or alteration while it is in transit to the HCD, in Temporary Storage in the HCD, and before printed output is released to a User.
  - b. Scanning: A Local User initiates scanning a Document on the HCD and the HCD sends the digital image to an External IT Entity. The HCD has the capability to protect the User's Document from unauthorized disclosure or alteration while it is in Temporary Storage in the HCD and while it is in transit to the External IT Entity.
  - c. Copying: A Local User scans a Document on the HCD and the HCD prints the Document. The HCD has the capability to protect the User's Document from unauthorized disclosure and alteration while it is in Temporary Storage in the HCD.
2. Configuration: A Local or Network User with administrative privileges configures the security settings of the HCD. The HCD has the capability to assign Users to roles that distinguish Users who can perform administrative functions from Users who can perform User functions. The HCD also has the capability to protect its security settings from unauthorized disclosure and

alteration when they are stored in the HCD and in transit to or from an External IT Entity.

3. Auditing: Authorized personnel monitor security-relevant events in an audit log. The HCD generates audit log records when security-relevant events occur. It is mandatory that the HCD is able to securely transmit audit logs to an External IT Entity for storage, and the HCD has the capability to protect it from unauthorized disclosure or alteration while in transit to the External IT Entity.
4. Verifying software updates: Authorized personnel install updated software on the HCD. The HCD ensures that only authorized personnel are permitted to install software, has the capability to help the installer to verify the authenticity of the software update.
5. Verifying HCD function: The HCD checks itself for malfunctions by performing a self-test each time that it is powered on.

### **1.4.2. USE CASE 2: Conditionally Mandatory Use Cases**

Conditionally Mandatory Uses are security-relevant capabilities that are optional in the HCD, however if they are present, must be conforming:

1. Sending PSTN faxes: A Local User scans a Document on the HCD, or a Network User sends a Document from an External IT Entity to the HCD; the User provides instructions for sending it to a remote PSTN fax destination; the HCD sends a facsimile of the Document over the PSTN to the PSTN fax destination using standard PSTN fax protocols. The HCD has the capability to protect the Network User's Document from unauthorized disclosure and alteration while in transit on the LAN. The HCD also has the capability to protect the User's Document from unauthorized disclosure and alteration while in Temporary Storage in the HCD.
2. Receiving PSTN faxes: A remote PSTN fax sender sends a facsimile of a Document over the PSTN to the HCD using standard PSTN fax protocols. The HCD has the capability to protect received PSTN faxes from unauthorized disclosure and alteration while it is present in the HCD. Further, the HCD has the capability to ensure that the PSTN fax modem is not used to access the LAN.
3. Storing and retrieving Documents: A Local or Network User instructs the HCD to store or retrieve an electronic Document in the HCD. The sources and destinations of such Documents may be any of the other operations such as scanning, printing, or PSTN faxing. The HCD has the capability to protect such Documents from unauthorized disclosure and alteration while in transit and in storage in the HCD.
4. Nonvolatile Storage Devices: Authorized personnel remove the HCD from service in its Operational Environment to perform preventative maintenance, repairs, or other servicing-related operations. The HCD has the capability to protect documents or confidential system information that may be present in Nonvolatile Storage Devices from exposure if such a device is removed from the HCD.

### **1.4.3. USE CASE 3: Optional Use Cases**

Optional Uses are security-relevant capabilities that are optional in the HCD, and even if present in the HCD, are not required to be evaluated:

1. Internal Audit Log Storage: If the audit log can also be stored in the HCD, the HCD has the capability to protect its audit log from unauthorized disclosure and alteration.

2. Image Overwrite: At the conclusion of an image processing job, residual image data may be present in the HCD. The HCD has the capability to actively overwrite such image data.
3. Redeploying or Decommissioning the HCD: Authorized personnel remove the HCD from service in its Operational Environment to move it to a different Operational Environment, to permanently remove it from operation, or otherwise change its ownership. The HCD has the capability to make all customer data that may be present in the HCD unavailable for recovery if it is removed from the Operational Environment.

#### **1.4.4. Major Security Functions of the HCD**

To support the use cases in [Section 1.4, “TOE Use Case”](#), a conforming HCD provides the following security functions:

1. Identification, authentication, and authorization to use HCD functions
2. Access control
3. Encryption
4. Trusted communications
5. Administrative roles
6. Auditing
7. Trusted operation
8. PSTN fax-network separation (if PSTN fax function is present)
9. Data clearing and purging (optional)

Each of these functions is described in the next subsections.

##### **1.4.4.1. Identification, Authentication, and Authorization**

User identification, authentication, and authorization ensure that functions of the HCD are accessible only to Users who have been authorized by an Administrator. User identification and authentication is also used as the basis for access control and administrative roles and helps associate security-relevant events and HCD use with specific Users. Identification and authentication may be performed by the HCD or by an external server.

##### **1.4.4.2. Access Control**

Access controls ensure that Documents, information related to Document Processing, and security-relevant data are accessible only to Users who have appropriate access permissions.

##### **1.4.4.3. Data Encryption**

Data encryption ensures that data assets cannot be accessed while in transit on the LAN.

By policy, data encryption is also used to protect documents and confidential system information on Nonvolatile Storage Devices to protect such data if such a device is removed from the HCD.

The effectiveness of data encryption is assured through the use of internationally accepted

cryptographic algorithms.

#### **1.4.4.4. Trusted Communications**

Trusted communication paths are established to ensure that communications with the HCD are performed with known endpoints.

#### **1.4.4.5. Administrative Roles**

Role-based access controls ensure that the ability to configure the security settings of the HCD is available only to Users who have been authorized with an Administrator role.

#### **1.4.4.6. Auditing**

Audit logs are generated by the HCD to ensure that security-relevant events and HCD use can be monitored by authorized personnel. The HCD must generate audit logs and securely transmit them to an External IT entity for storage. Optionally, audit logs may also be stored in the HCD where they can be reviewed by an Administrator.

#### **1.4.4.7. Trusted Operation**

Software updates to the HCD are verified to ensure the authenticity of the software before applying the update. The HCD performs self-tests to ensure that its operation is not disrupted by some detectable malfunctions.

#### **1.4.4.8. PSTN Fax-Network Separation**

If a conforming HCD has a PSTN fax function, PSTN fax-network separation ensures that the PSTN fax modem is not used to create a data bridge between the PSTN and the LAN.

#### **1.4.4.9. Data Clearing and Purging**

Optionally, an HCD may provide functions that actively overwrite image data, or that purge all customer-supplied information at the request of an authorized Administrator. These are discussed in Appendix C.

## **2. CC Conformance Claims**

As defined by the references [\[CC1\]](#), [\[CC2\]](#) and [\[CC3\]](#), this cPP:

- conforms to the requirements of Common Criteria v3.1, Revision 5,
- is Part 2 extended,
- is Part 3 conformant,
- does not claim conformance to any other security functional requirement packages.

Conformance to this Protection Profile: To claim conformance to this Protection Profile, the conforming Security Target must comply with all of the following rules:

1. The TOE must support at least one of the Required Uses scanning, printing, or copying, and must



support the Required Uses network communications and administration, described in section 1.3.1.1.

2. Security for all of those Required Uses supported by the TOE must be evaluated, conforming to the requirements of this Protection Profile.
3. If the TOE supports any of the Conditionally Mandatory Uses described in [Section 1.4.2, “USE CASE 2: Conditionally Mandatory Use Cases”](#), then that support must be evaluated conforming to the corresponding conditionally mandatory requirements described in [Appendix B, Conditionally Mandatory Requirements](#).
4. The selected communications protocol(s) must be evaluated conforming to the corresponding selection-based protocol requirements in Appendix D.2.
5. The Security Target author may choose to include for evaluation any of the Optional Uses described in section 1.3.1.3. The vendor may choose to evaluate those optional functions as described in Appendix C.
6. The TOE must demonstrate Exact Conformance. Exact Conformance, as a subset of Strict Conformance as defined in Annex D.2 of CC Part 1 (CCMB-2012-09-001), is defined as the ST meeting all of the previous conformance rules. While iteration is allowed, no additional requirements (from the CC parts 2 or 3) are allowed to be included in the ST.

## 3. Security Problem Definition

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

### 3.1. Users

A conforming TOE must define at least the following two User roles:

1. Normal Users [U.NORMAL] who are identified and authenticated and do not have an administrative role.
2. Administrators [U.ADMIN] who are identified and authenticated and have an administrative role.

A conforming TOE may allow additional roles, sub-roles, or groups. In particular, a conforming TOE may allow several administrative roles that have authority to administer different aspects of the TOE.

Note that a User can be a human user or an external IT entity. Also, a Normal User can be a Local User or a Network User as described in Section 1.3.3.

Additional details about Users are in [Section K.1, “User Definitions”](#).

### 3.2. Assets

From a User’s perspective, the primary Asset to be protected in a TOE is User Document Data

[D.USER.DOC]. A User's job instructions, User Job Data [D.USER.JOB] (information related to a User's Document or Document Processing Job), may also be protected if their compromise impacts the protection of User Document Data. Together, User Document Data and User Job Data are considered to be User Data.

As an illustrative example, data sent by a Network User for printing contains a User's Document [D.USER.DOC] which must not be accessed by anyone else, and job instructions such as the destination to send scanned Documents [D.USER.JOB] which must not be altered by anyone else.

From an Administrator's perspective, the primary Asset to be protected in a TOE is data that is used to configure and monitor the secure operation of the TOE. This kind of data is considered to be TOE Security Functionality (TSF) Data.

There are two broad categories for this kind of data:

1. Protected TSF Data, which may be read by any User but must be protected from unauthorized modification and deletion [D.TSF.PROT]; and,
2. Confidential TSF Data, which may neither be read nor modified or deleted except by authorized Users [D.TSF.CONF].

Examples of assets requiring protection include transmitted communication data on the network (against unauthorised disclosure or modification), firmware and/or software in the HCD (against unauthorised modification or deletion), and audit records generated by the HCD (against unauthorised modification or deletion).

An illustrative example is data that is used by the TOE to identify and authenticate authorized Users. Typically, a username that is used for identification may be read by anyone but must be protected from unauthorized modification and deletion [D.TSF.PROT]. In contrast, a User's password that is used for authentication must be confidential, prohibiting any Unauthorized Access [D.TSF.CONF].

If TSF Data is compromised, it can be used for a variety of malicious purposes that include elevation of privileges, accessing stored Documents, redirecting the destination of processed Documents, masquerading as an authorized User or Administrator, altering the operating software of the TOE, and attacking External IT Entities.

In a conforming TOE, TSF Data is clearly identified and categorized as either Protected TSF Data or Confidential TSF Data.

From a network security perspective, it is important to ensure the secure operation of the TOE and other IT entities in its Operational Environment. Since the Operational Environment is outside of the TOE, Organizational Security Policies are employed to address protection of the Operational Environment.

Additional details about assets are in [Section K.2, "Asset Definitions"](#).

## 3.3. Threats

The following are Threats against the TOE that are countered by conforming products. Additional

details about threats are in Appendix A.3.

### **3.3.1. Unauthorized Access to User Data**

An attacker may access (read, modify, or delete) User Document Data or change (modify or delete) User Job Data in the TOE through one of the TOE's interfaces [T.UNAUTHORIZED\_ACCESS]. For example, depending on the design of the TOE, the attacker might access the printed output of a Network User's print job, or modify the instructions for a job that is waiting in a queue, or read User Document Data that is in a User's private or group storage area.

### **3.3.2. Unauthorized Access to TSF Data**

An attacker may gain Unauthorized Access to TSF Data in the TOE through one of the TOE's interfaces [T.TSF\_COMPROMISE]. For example, depending on the design of the TOE, the attacker might use Unauthorized Access to TSF Data to elevate their own privileges, alter an Address Book to redirect output to a different destination, or use the TOE's Credentials to gain access to an external server.

An attacker may cause the installation of unauthorized software on the TOE [T.UNAUTHORIZED\_UPDATE]. For example, unauthorized software could be used to gain access to information that is processed by the TOE, or to attack other systems on the LAN.

### **3.3.3. Network Communication Attacks**

An attacker may access data in transit or otherwise compromise the security of the TOE by monitoring or manipulating network communication [T.NET\_COMPROMISE]. For example, here are several ways that network communications could be compromised: By monitoring clear-text communications on a wired LAN, the attacker might obtain User Document Data, User Credentials, or system Credentials, or hijack an interactive session. The attacker might record and replay a network communication session in order to log into the TOE as an authorized User to access Documents or as an authorized Administrator to change security settings. The attacker might masquerade as a trusted system on the LAN in order to receive outgoing scan jobs, to record the transmission of system Credentials, or to send malicious data to the TOE.

### **3.3.4. Malfunction**

A malfunction of the TSF may cause loss of security if the TOE is permitted to operate while in a degraded state [T.TSF\_FAILURE]. Hardware or software malfunctions can produce unpredictable results, with a possibility that security functions will not operate correctly.

## **3.4. Assumptions**

The following assumptions must be upheld so that the objectives and requirements can effectively counter the threats described in this Protection Profile. Additional details about assumptions are in Appendix A.5.

### **3.4.1. Physical Security**

Physical security, commensurate with the value of the TOE and the data it stores or processes, is assumed to be provided by the environment [A.PHYSICAL]. The TOE is assumed to be located in a physical environment that is controlled or monitored such that a physical attack is prevented or detected.

### **3.4.2. Network Security**

The Operational Environment is assumed to protect the TOE from direct, public access to its LAN interface [A.NETWORK]. The TOE is not intended to withstand network-based attacks from an unmanaged network environment.

### **3.4.3. Administrator Trust**

TOE Administrators are trusted to administer the TOE according to site security policies [A.TRUSTED\_ADMIN]. It is the responsibility of the TOE Owner to only authorize administrators who are trusted to configure and operate the TOE according to site policies and to not use their privileges for malicious purposes.

### **3.4.4. User Training**

Authorized Users are trained to use the TOE according to site security policies [A.TRAINED\_USERS]. It is the responsibility of the TOE Owner to only authorize Users who are trained to use the TOE according to site policies.

## **3.5. Organizational Security Policies**

The following are Organizational Security Policies (OSPs) that are upheld by conforming products. Additional details about OSPs are in Appendix A.4.

### **3.5.1. User Authorization**

Users must be authorized before performing Document Processing and administrative functions [P.AUTHORIZATION]. Authorization allows the TOE Owner to control who is able to use the resources of the TOE and who is permitted to perform administrative functions.

### **3.5.2. Auditing**

Security-relevant activities must be audited and the log of such actions must be protected and transmitted to an External IT Entity [P.AUDIT]. Stored on an External IT Entity (or, optionally, also in the TOE), an audit trail makes it possible for authorized personnel to review and identify suspicious activities and to account for TOE use as may be required by site policy or regulations.

### **3.5.3. Protected Communications**

The TOE must be able to identify itself to other devices on the LAN [P.COMMS\_PROTECTION]. Assuring identification helps prevent an attacker from masquerading as the TOE in order to receive

incoming print jobs, recording the transmission of User Credentials, or sending malicious data to External IT Entities.

#### **3.5.4. Storage Encryption (conditionally mandatory)**

If the TOE stores User Document Data or Confidential TSF Data on Nonvolatile Storage Devices, it will encrypt such data on those devices [P.STORAGE\_ENCRYPTION]. Data is assumed to be protected by the TSF when the TOE is operating in its Operational Environment. However, if Nonvolatile Storage Devices are removed from the TOE for Servicing, redeployment to another environment, or decommissioning, an attacker may be able to expose or modify User Document Data or Confidential TSF Data. Encrypting such data prevents the attacker from doing so without access to encryption keys or keying material.

Cleartext keys, submasks, random numbers, or any other values that contribute to the creation of encryption keys for Nonvolatile Storage of User Document Data or Confidential TSF Data must be protected from unauthorized access and must not be stored on that storage device [P.KEY\_MATERIAL]. Unauthorized possession of key material in cleartext may allow an attacker to decrypt User Document Data or Confidential TSF Data.

#### **3.5.5. PSTN Fax-Network Separation (conditionally mandatory)**

If the TOE includes a PSTN fax function, it will ensure separation between the PSTN fax line and the LAN [P.FAX\_FLOW]. The TOE is assumed to be in an Operational Environment that is protected, such as by an external firewall. However, the PSTN fax modem may be connected to a public switched telephone network. Ensuring separation of the PSTN fax and network prevents an attacker from using the PSTN fax modem to bypass the firewall or other external protection to access the protected environment.

#### **3.5.6. Image Overwrite (optional)**

Upon completion or cancellation of a Document Processing job, periodically, or when requested by an authorized administrator, the TOE shall overwrite residual image data from its Nonvolatile Storage Devices [P.IMAGE\_OVERWRITE]. A customer may be concerned that image data that has been dereferenced by the TOE operating software may remain on Nonvolatile Storage Devices in the TOE after a Document Processing job has been completed or cancelled. Such customers desire that the image data be made unavailable by overwriting it with other data.

#### **3.5.7. Purge Data (optional)**

The TOE shall provide a function that an authorized administrator can invoke to make all customer-supplied User Data and TSF Data permanently irretrievable from Nonvolatile Storage Devices [P.PURGE\_DATA]. A customer may be concerned that data which is considered confidential in the Operational Environment may remain in Nonvolatile Storage Devices in the TOE after the TOE is permanently removed from its Operational Environment to be decommissioned from service or to be redeployed to a different Operational Environment. Such customers desire that all customer-supplied User Data and TSF Data be purged from the TOE so that it cannot be retrieved outside of the Operational Environment.

# 4. Security Objectives

## 4.1. Security Objectives for the TOE

The following Security Objectives must be fulfilled by the TOE. Additional details about objectives for the TOE are in Appendices A.6 and A.7.

### 4.1.1. User Authorization

The TOE shall perform authorization of Users in accordance with security policies [O.USER\_AUTHORIZATION].

This objective supports the policy that Users are authorized to administer the TOE or perform Document Processing functions that consume TOE resources. Users must be authorized to perform any of the Document Processing functions present in the TOE.

The mechanism for authorization is implemented within the TOE, and it may also depend on a trusted External IT Entity. If a conforming TOE supports more than one mechanism, then each should be evaluated as separate modes of operation.

In the case of printing (if that function is present in the TOE), User authorization may take place after the job has been submitted but must take place before printed output is made available to the User.

Users must be authorized to perform PSTN fax sending functions and document storage and retrieval functions, if such functions are provided by the conforming TOE.

Note that the TOE can receive a PSTN fax without any User authorization, but the received Document is subject to access controls.

### 4.1.2. User Identification and Authentication

The TOE shall perform identification and authentication of Users for operations that require access control, User authorization, or Administrator roles [O.USER\_I&A].

The mechanism for identification and authentication (I&A) is implemented within the TOE, and it may also depend on a trusted External IT Entity (e.g., LDAP, Kerberos, or Active Directory). If a conforming TOE supports more than one mechanism, then each should be evaluated as separate modes of operation.

### 4.1.3. Access Control

The TOE shall enforce access controls to protect User Data and TSF Data in accordance with security policies [O.ACCESS\_CONTROL].

The guiding principles for access control security policies in this cPP are:

1. User Document Data [D.USER.DOC] can be accessed only by the Document owner or an Administrator.

2. User Job Data [D.USER.JOB] can be read by any User but can be modified only by the Job Owner or an Administrator.
3. Protected TSF Data [D.TSF.PROT] are data that can be read by any User but can be modified only by an Administrator or (in certain cases) a Normal User who is the owner of or otherwise associated with that data.
4. Confidential TSF Data [D.TSF.CONF] are data that can only be accessed by an Administrator or (in certain cases) a Normal User who is the owner of or otherwise associated with that data.

The Security Target of a conforming TOE must clearly specify its access control policies for User Data and TSF Data.

#### **4.1.4. Administrator Roles**

The TOE shall ensure that only authorized Administrators are permitted to perform administrator functions [O.ADMIN\_ROLES].

This objective addresses the need to have at least one Administrator role that is distinct from Normal Users. A conforming TOE may have specialized Administrator sub-roles, such as for device management, network management, or audit management.

#### **4.1.5. Software Update Verification**

The TOE shall provide mechanisms to verify the authenticity of software updates [O.UPDATE\_VERIFICATION].

This objective addresses the concern that malicious software may be introduced into the TOE as a software update. Verifying authenticity, such as with a digital signature or published hash, is required. Access control by itself does not satisfy this objective.

#### **4.1.6. Self-test**

The TOE shall test some subset of its security functionality to help ensure that subset is operating properly [O.TSF\_SELF\_TEST].

A malfunction of the TOE may compromise its security if the malfunction is not detected and the TOE is allowed to operate. Self-test is intended to detect such malfunctions. It is performed during power-up.

#### **4.1.7. Communications Protection**

The TOE shall have the capability to protect LAN communications of User Data and TSF Data from Unauthorized Access, replay, and source/destination spoofing [O.COMMS\_PROTECTION]. This objective addresses the common concerns of network communications:

1. Sensitive data or Credentials are obtained by monitoring LAN data outside of the TOE.
2. A successfully authenticated session is captured and replayed on the LAN, permitting the attacker to masquerade as the authenticated User.
3. Sensitive data or Credentials are obtained by redirecting communications from the TOE or from

an External IT Entity to a malevolent destination.

#### **4.1.8. Auditing**

The TOE shall generate audit data, and be capable of sending it to a trusted External IT Entity. Optionally, it may store audit data in the TOE [O.AUDIT].

The TOE must be able to send audit data to a trusted External IT Entity (e.g., an audit server such as a syslog server). Audit data may also be stored in the TOE with appropriate access controls to ensure confidentiality and integrity. If a conforming TOE supports both mechanisms, then each should be evaluated as separate modes of operation.

#### **4.1.9. Storage Encryption (conditionally mandatory)**

If the TOE stores User Document Data or Confidential TSF Data in Nonvolatile Storage devices, then the TOE shall encrypt such data on those devices. [O.STORAGE\_ENCRYPTION].

This objective addresses the concern that User Document Data or Confidential TSF Data on a Nonvolatile Storage Device may be exposed if the device is removed from the TOE, such as for Servicing, Redeployment to another environment, or Decommissioning.

#### **4.1.10. Protection of Key Material (conditionally mandatory)**

The TOE shall protect from unauthorized access any cleartext keys, submasks, random numbers, or other values that contribute to the creation of encryption keys for storage of User Document Data or Confidential TSF Data in Nonvolatile Storage Devices; The TOE shall ensure that such key material is not stored in cleartext on the storage device that uses that material [O.KEY\_MATERIAL].

This objective addresses the concern that unauthorized possession of keys or key material may be used to decrypt User Document Data or Confidential TSF Data.

#### **4.1.11. PSTN Fax-Network Separation (conditionally mandatory)**

If the TOE provides a PSTN fax function, then the TOE shall ensure separation of the PSTN fax telephone line and the LAN, by system design or active security function [O.FAX\_NET\_SEPARATION].

This objective addresses customer concerns about having a telephone line connected to a device that is inside their firewall. Depending on implementation, it may be satisfied in different ways, such as by system architecture (no data path from the PSTN fax interface to the network interface), by system design (fax chipset recognizes only PSTN fax protocols), or by active security function (flow control).

#### **4.1.12. Image Overwrite (optional)**

Upon completion or cancellation of a Document Processing job, periodically, or when requested by an authorized administrator, the TOE shall overwrite residual image data from its Nonvolatile Storage Devices [P.IMAGE\_OVERWRITE]. This objective addresses customer concerns that image data may remain on Nonvolatile Storage Devices in the TOE after a Document Processing job has



been completed or cancelled.

#### **4.1.13. Purge Data (optional)**

The TOE provides a function that an authorized administrator can invoke to make all customer-supplied User Data and TSF Data permanently irretrievable from Nonvolatile Storage Devices [O.PURGE\_DATA]. This objective addresses customer concerns that data that is protected in the Operational Environment may remain in Nonvolatile Storage Devices after the TOE is permanently removed from its Operational Environment to be decommissioned from service or to be redeployed to a different Operational Environment.

## **4.2. Security Objectives for the Operational Environment**

The following Security Objectives must be provided by the Operational Environment. Additional details about objectives for the Operational Environment are in Appendix A.7.

### **4.2.1. Physical Protection**

The Operational Environment shall provide physical security, commensurate with the value of the TOE and the data it stores or processes [OE.PHYSICAL\_PROTECTION].

Due to its intended function, this kind of TOE must be physically accessible to authorized Users, but it is not expected to be hardened against physical attacks. Therefore, the environment must provide an appropriate level of physical protection or monitoring to prevent physical attacks.

### **4.2.2. Network Protection**

The Operational Environment shall provide network security to protect the TOE from direct, public access to its LAN interface [OE.NETWORK\_PROTECTION].

This kind of TOE is not intended to be directly connected to a hostile network. Therefore, the environment must provide an appropriate level of network isolation.

### **4.2.3. Trusted Administrators**

The TOE Owner shall establish trust that Administrators will not use their privileges for malicious purposes [OE.ADMIN\_TRUST].

Administrators have privileges that can be misused for malicious purposes. It is the responsibility of the TOE Owner to grant administrator privileges only to individuals whom the TOE Owner trusts.

### **4.2.4. Trained Users**

The TOE Owner shall ensure that Users are aware of site security policies and have the competence to follow them [OE.USER\_TRAINING].

Site security depends on a combination of TOE security functions and appropriate use of those

functions by Normal Users. Manufacturers may provide guidance to the TOE Owner regarding the TOE security functions that apply to Normal Users.

#### 4.2.5. Trained Administrators

The TOE Owner shall ensure that Administrators are aware of site security policies and have the competence to use manufacturer's guidance to correctly configure the TOE and protect passwords and keys accordingly [OE.ADMIN\_TRAINING].

This kind of TOE may have many options for enabling and disabling security functions. Administrators must be able to understand and configure the TOE security functions to enforce site security policies.

### 4.3. Security Objectives Rationale

The following table describes how the assumptions, threats, and organizational security policies map to the security objectives.

Table 2. Mapping between Security Problem Definition and Security Objectives

Threat, Assumption, or OSP	Security Objectives	Rationale

## 5. Security Functional Requirements

### 5.1. Conventions

The individual security functional requirements are specified in the sections below. The following conventions are used for the completion of operations:

- *[Italicized text within square brackets]* indicates an operation to be completed by the ST author.
- **Bold text** indicates additional text provided as a refinement.
- **[Bold text within square brackets]** indicates the completion of an assignment.
- [text within square brackets] indicates the completion of a selection.
- Number in parentheses after SFR name, e.g. (1) indicates the completion of an iteration.
- Extended SFRs are identified by having a label "EXT" at the end of the SFR name.

### 5.2. Security Audit (FAU)

#### 5.2.1. FAU\_GEN.1 Audit data generation

(for O.AUDIT)  
Hierarchical to: No other components.  
Dependencies: FPT\_STM.1 Reliable time stamps

**FAU\_GEN.1.1** The TSF shall be able to generate an audit record of the following auditable events:

- a. Start-up and shutdown of the audit functions;
- b. All auditable events for the **not specified** level of audit; and
- c. **All auditable events specified in Table 1**, [assignment: *other specifically defined auditable events*].

**FAU\_GEN.1.2** The TSF shall record within each audit record at least the following information:

- a. Date and time of the event, type of event, subject identity (if applicable), and the outcome (success or failure) of the event; and
- b. For each audit event type, based on the auditable event definitions of the functional components included in the PP/ST, **additional information specified in Table 3**, [assignment: *other audit relevant information*].

*Table 3. Auditable Events*

Auditable Event	Relevant SFR	Additional Information
Job Completion	FDP_ACF.1	Type of Job
Unsuccessful login attempts limit is met or exceeded	FIA_AFL.1	None
Unsuccessful User authentication	FIA_UAU.1	Origin of the attempt (e.g., IP address)
Unsuccessful User identification	FIA_UID.1	Origin of the attempt (e.g., IP address)
Use of management functions	FMT_SMF.1	Function that is invoked by user
Modification to the group of Users that are part of a role	FMT_SMR.1	None
Changes to the time	FPT_STM.1	None
Failure to establish session	FTP_ITC.1, FTP_TRP.1(a), FTP_TRP.1(b)	Reason for failure

**Application Note:**

*In cases where user identification events are inseparable from user authentication events, they may be considered to be a single event for audit purposes.*

*Regarding FMT\_SMR.1, if the relationship between users and roles is not modifiable, its auditable event cannot be generated and the requirement to generate an audit record can be ignored.*

*The ST author can include other auditable events directly in the table; they are not limited to the list presented.*

## **5.2.2. FAU\_GEN.2 User identity association**

(for 0.AUDIT)  
Hierarchical to: No other components.  
Dependencies: FAU\_GEN.1 Audit data generation  
FIA\_UID.1 Timing of identification

**FAU\_GEN.2.1** For audit events resulting from actions of identified users, the TSF shall be able to associate each auditable event with the identity of the user that caused the event.

### 5.2.3. FAU\_SAR.1 Audit review

(for 0.AUDIT)  
Hierarchical to: No other components.  
Dependencies: FAU\_GEN.1 Audit data generation

**FAU\_SAR.1.1** The TSF shall provide [assignment: *an Administrator*] with the capability to read **all records** from the audit records.

**FAU\_SAR.1.2** The TSF shall provide the audit records in a manner suitable for the user to interpret the information.

### 5.2.4. FAU\_SAR.2 Restricted audit review

(for 0.AUDIT)  
Hierarchical to: No other components.  
Dependencies: FAU\_SAR.1 Audit review

**FAU\_SAR.2.1** The TSF shall prohibit all users read access to the audit records, except those users that have been granted explicit read-access.

### 5.2.5. FAU\_STG.1 Protected audit trail storage

(for 0.AUDIT)  
Hierarchical to: No other components.  
Dependencies: FAU\_GEN.1 Audit data generation

**FAU\_STG.1.1** The TSF shall protect the stored audit records in the audit trail from unauthorised deletion.

**FAU\_STG.1.2** The TSF shall be able to **prevent** unauthorised modifications to the stored audit records in the audit trail.

### 5.2.6. FAU\_STG.4 Prevention of audit data loss

(for 0.AUDIT)

Hierarchical to: FAU\_STG.3 Action in case of possible audit data loss

Dependencies: FAU\_STG.1 Protected audit trail storage

**FAU\_STG.4.1 Refinement:** The TSF shall [selection, choose one of: ~~“ignore audited events”~~, “prevent audited events, except those taken by the authorised user with special rights”, “overwrite the oldest stored audit records”] and [assignment: other actions to be taken in case of audit storage failure] if the audit trail is full.

### 5.2.7. FAU\_STG\_EXT.1 Extended: External Audit Trail Storage

(for 0.AUDIT)

Hierarchical to: No other components.

Dependencies: FAU\_GEN.1 Audit data generation,  
FTP\_ITC.1 Inter-TSF trusted channel.

**FAU\_STG\_EXT.1.1** The TSF shall be able to transmit the generated audit data to an External IT Entity using a trusted channel according to FTP\_ITC.1.

(for 0.AUDIT)

Hierarchical to: No other components.

Dependencies: FAU\_GEN.1 Audit data generation,  
FTP\_ITC.1 Inter-TSF trusted channel.

## 5.3. Cryptographic Support (FCS)

### 5.3.1. FCS\_CKM.1(b) Cryptographic key generation (Symmetric Keys)

(for 0.COMMS\_PROTECTION, 0.STORAGE\_ENCRYPTION)

Hierarchical to: No other components.

Dependencies: [~~FCS\_CKM.2 Cryptographic key distribution, or~~]  
FCS\_COP.1/DataEncryption Cryptographic Operation (Symmetric encryption/decryption)  
FCS\_COP.1(d) Cryptographic Operation (AES Data Encryption/Decryption)  
FCS\_COP.1(e) Cryptographic Operation (Key Wrapping)  
FCS\_COP.1(f) Cryptographic operation (Key Encryption)  
FCS\_COP.1/KeyedHash Cryptographic Operation (for keyed-hash message authentication)  
FCS\_COP.1(h) Cryptographic Operation (for keyed-hash message authentication)]  
FCS\_CKM\_EXT.4 Extended: Cryptographic Key Material Destruction  
FCS\_RBG\_EXT.1 Extended: Cryptographic Operation (Random Bit Generation)

**FCS\_CKM.1.1(b) Refinement:** The TSF shall generate **symmetric** cryptographic keys **using a Random Bit Generator as specified in FCS\_RBG\_EXT.1 and specified cryptographic key sizes [selection: 128 bit, 256 bit] that meet the following: No Standard.**

### ***Application Note:***

*Symmetric keys may be used to generate keys along the key chain.*

## **5.3.2. FCS\_CKM.2 Cryptographic Key Establishment (Refinement)**

**FCS\_CKM.2.1** The TSF shall **perform** cryptographic **key establishment** in accordance with a specified cryptographic key **establishment** method: [selection:

- *RSA-based key establishment schemes that meet the following: RSAES-PKCS1-v1\_5 as specified in Section 7.2 of RFC 3447, “Public-Key Cryptography Standards (PKCS) #1: RSA Cryptography Specifications Version 2.1”;*
- *Elliptic curve-based key establishment schemes that meet the following: NIST Special Publication 800-56A Revision 2, “Recommendation for Pair-Wise Key Establishment Schemes Using Discrete Logarithm Cryptography”;*
- *Finite field-based key establishment schemes that meet the following: NIST Special Publication 800-56A Revision 2, “Recommendation for Pair-Wise Key Establishment Schemes Using Discrete Logarithm Cryptography”;*
- *FFC Schemes using “safe-prime” groups that meet the following: ‘NIST Special Publication 800-56A Revision 3, “Recommendation for Pair-Wise Key Establishment Schemes Using Discrete Logarithm Cryptography” and [selection: RFC 3526, RFC 7919].*

] <del>that meets the following: [assignment: list of standards]</del>.

### ***Application Note 10***

*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 elliptic curves used for the key establishment scheme correlate with the curves specified in FCS\_CKM.1.1.*

*The domain parameters used for the finite field-based key establishment scheme are specified by the key generation according to FCS\_CKM.1.1.*

## **5.3.3. FCS\_CKM\_EXT.4 Extended: Cryptographic Key Material Destruction**

(for O.COMMS\_PROTECTION, O.STORAGE\_ENCRYPTION, O.PURGE\_DATA)

Hierarchical to: No other components.

Dependencies: [FCS\_CKM.1(a) Cryptographic Key Generation (for asymmetric keys), or FCS\_CKM.1(b) Cryptographic key generation (Symmetric Keys)],  
FCS\_CKM.4 Cryptographic key destruction

**FCS\_CKM\_EXT.4.1** The TSF shall destroy all plaintext secret and private cryptographic keys and cryptographic critical security parameters when no longer needed.

### ***Application Note:***

*“Cryptographic Critical Security Parameters” are defined in FIPS 140-2 as “security-related information (e.g., secret and private cryptographic keys, and authentication data such as passwords and PINs) whose disclosure or modification can compromise the security of a cryptographic module”.*

*Keys, including intermediate keys and key material that are no longer needed are destroyed by using an approved method, FCS\_CKM.4.1. Examples of keys are intermediate keys, submasks, and BEV. There may be instances where keys or key material that are contained in persistent storage are no longer needed and require destruction. Based on their implementation, vendors will explain when certain keys are no longer needed. There are multiple situations in which key material is no longer necessary, for example, a wrapped key may need to be destroyed when a password is changed. However, there are instances when keys are allowed to remain in memory, for example, a device identification key.*

#### 5.3.4. FCS\_CKM.4 Cryptographic key destruction

(for O.COMMS\_PROTECTION, O.STORAGE\_ENCRYPTION, O.PURGE\_DATA)

Hierarchical to: No other components.

Dependencies: [FCS\_CKM.1(a) Cryptographic Key Generation (for asymmetric keys), or FCS\_CKM.1(b) Cryptographic key generation (Symmetric Keys)]

**FCS\_CKM.4.1 Refinement:** The TSF shall destroy cryptographic keys in accordance with a specified cryptographic key destruction method [**selection:**

*For volatile memory, the destruction shall be executed by a [selection: single overwrite consisting of [selection: a pseudo-random pattern using the TSF’s RBG, zeroes, ones, a new value of a key, [assignment: any value that does not contain any CSP]], removal of power to the memory, destruction of reference to the key directly followed by a request for garbage collection or memory management];*

*For nonvolatile memory, the destruction shall be executed by a [selection: [selection: single, [assignment: ST author defined multi-pass]] overwrite consisting of [selection: zeroes, ones, pseudo-random pattern, a new value of a key of the same size, [assignment: any value that does not contain any CSP]], block erase];*

] that meets the following: [**selection: no standard**].

##### **Application Note:**

*In the first selection, the ST Author is presented options for destroying disused cryptographic keys based on whether they are in volatile memory or non-volatile memory within the TOE.*

*The selection of block erase for non-volatile memory applies only to flash memory.*

*Within the selections is the option to overwrite the memory location with a new value of a key. The intent is that a new value of a key (as specified in another SFR within the PP) can be used to “replace” an existing key.*

*Several selections allow assignment of a ‘value that does not contain any CSP’. This means that the TOE uses some other specified data not drawn from a source that may contain key material or reveal*

information about key material, and not being any of the particular values listed as other selection options. The point of the phrase ‘does not contain any CSP’ is to ensure that the overwritten data is carefully selected, and not taken from a general ‘pool’ that might contain current or residual data that itself requires confidentiality protection.

### 5.3.5. FCS\_COP.1/DataEncryption Cryptographic Operation (AES Data Encryption/ Decryption)

**FCS\_COP.1.1/DataEncryption** The TSF shall perform *encryption/decryption* in accordance with a specified cryptographic algorithm *AES used in* [selection: *CBC, CTR, GCM*] *mode* and cryptographic key sizes [selection: *128 bits, 192 bits, 256 bits*] that meet the following: *AES as specified in ISO 18033-3, [selection: CBC as specified in ISO 10116, CTR as specified in ISO 10116, GCM as specified in ISO 19772].*

#### **Application Note 12**

*For the first selection of FCS\_COP.1.1/DataEncryption, the ST author chooses the mode or modes in which AES operates. For the second selection, the ST author chooses the key sizes that are supported by this functionality. The modes and key sizes selected here correspond to the cipher suite selections made in the trusted channel requirements.*

### 5.3.6. FCS\_COP.1/SigGen Cryptographic Operation (Signature Generation and Verification)

**FCS\_COP.1.1/SigGen** The TSF shall perform *cryptographic signature services (generation and verification)* in accordance with a specified cryptographic algorithm [selection:

- *RSA Digital Signature Algorithm and cryptographic key sizes (modulus) [assignment: 2048 bits or greater],*
- *Elliptic Curve Digital Signature Algorithm and cryptographic key sizes [assignment: 256 bits or greater]*

]

that meet the following: [selection:

- *For RSA schemes: FIPS PUB 186-4, “Digital Signature Standard (DSS)”, Section 5.5, using PKCS #1 v2.1 Signature Schemes RSASSA-PSS and/or RSASSA-PKCS1v1\_5; ISO/IEC 9796-2, Digital signature scheme 2 or Digital Signature scheme 3,*
- *For ECDSA schemes: FIPS PUB 186-4, “Digital Signature Standard (DSS)”, Section 6 and Appendix D, Implementing “NIST curves” [selection: P-256, P-384, P-521]; ISO/IEC 14888-3, Section 6.4*

].

#### **Application Note 13**

*The ST Author chooses the algorithm(s) implemented to perform digital signatures. For the algorithm(s) chosen, the ST author makes the appropriate assignments/selections to specify the parameters that are implemented for that algorithm. The ST author ensures that the assignments and*



selections for this SFR include all the parameter values necessary for the cipher suites selected for the protocol SFRs (see Appendix B.3.1) that are included in the ST. The ST Author checks for consistency of selections with other FCS requirements, especially when supporting elliptic curves.

### 5.3.7. 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 that accumulates entropy from [selection: [assignment: *number of software-based sources*] software-based noise source, [assignment: *number of platform-based sources*] platform-based noise source] with a minimum of [selection: *128 bits*, *192 bits*, *256 bits*] of entropy at least equal to the greatest security strength, according to ISO/IEC 18031:2011 Table C.1 “Security Strength Table for Hash Functions”, of the keys and hashes that it will generate.

#### ***Application Note 16***

*For the first selection in FCS\_RBG\_EXT.1.2, the ST author selects at least one of the types of noise sources. If the TOE contains multiple noise sources of the same type, the ST author fills the assignment with the appropriate number for each type of source (e.g., 2 software-based noise sources, 1 platform-based noise source). The documentation and tests required in the Evaluation Activity for this element should be repeated to cover each source indicated in the ST. Platform-based means the hardware-based or within the VS resources.*

*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). The ST author will select the function used and include the specific underlying cryptographic primitives used in the requirement. While any of the identified hash functions (SHA-1, SHA-256, SHA-384, SHA-512) are allowed for Hash\_DRBG or HMAC\_DRBG, only AES-based implementations for CTR\_DRBG are allowed.*

*If the key length for the AES implementation used here is different than that used to encrypt the user data, then FCS\_COP.1 may have to be adjusted or iterated to reflect the different key length. For the selection in FCS\_RBG\_EXT.1.2, the ST author selects the minimum number of bits of entropy that is used to seed the RBG, which must be equal or greater than the security strength of any key generated by the TOE.*

## 5.4. User Data Protection (FDP)

#### ***Application Note:***

*The User Data Access Control SFP is composed of Table 2, Table 3, FDP\_ACC.1, FDP\_ACF.1, FMT\_MSA.1, and FMT\_MSA.3.*

### 5.4.1. FDP\_ACC.1 Subset access control

(for O.ACCESS\_CONTROL and O.USER\_AUTHORIZATION)  
 Hierarchical to: No other components.  
 Dependencies: FDP\_ACF.1 Security attribute based access control

**FDP\_ACC.1.1 Refinement:** The TSF shall enforce the **User Data Access Control SFP** on subjects, objects, and operations among subjects and objects specified in **Table 4 and Table 5**.

## 5.4.2. FDP\_ACF.1 Security attribute based access control

(for O.ACCESS\_CONTROL and O.USER\_AUTHORIZATION)  
 Hierarchical to: No other components.  
 Dependencies: FDP\_ACC.1 Subset access control  
 FMT\_MSA.3 Static attribute initialization

**FDP\_ACF.1.1 Refinement:** The TSF shall enforce the **User Data Access Control SFP** to objects based on the following: subjects, objects, and attributes specified in **Table 4 and Table 5**.

**FDP\_ACF.1.2 Refinement:** The TSF shall enforce the following rules to determine if an operation among controlled subjects and controlled objects is allowed: ***rules governing access among controlled subjects and controlled objects using controlled operations on controlled objects specified in Table 4 and Table 5***.

**FDP\_ACF.1.3 Refinement:** The TSF shall explicitly authorise access of subjects to objects based on the following additional rules: [assignment: ***rules that do not conflict with the User Data Access Control SFP, based on security attributes, that explicitly authorise access of subjects to objects***].

**FDP\_ACF.1.4 Refinement:** The TSF shall explicitly deny access of subjects to objects based on the following additional rules: [assignment: ***rules that do not conflict with the User Data Access Control SFP, based on security attributes, that explicitly deny access of subjects to objects***].

Table 4. D.USER.DOC Access Control SFP

PRINT	"Create"	"Read"	"Modify"	"Delete"
Operation:	Submit a document to be printed	View image or Release printed output	Modify stored document	Delete stored document
Job owner	(note 1)			
U.ADMIN				
U.NORMAL		denied	denied	denied
Unauthenticated	(condition 1)	denied	denied	denied

SCAN	"Create"	"Read"	"Modify"	"Delete"
Operation:	Submit a document for scanning	View scanned image	Modify stored image	Delete stored image

Job owner	(note 2)			
U.ADMIN				
U.NORMAL		denied	denied	denied
Unauthenticated	denied	denied	denied	denied

<b>COPY</b>	"Create"	"Read"	"Modify"	"Delete"
Operation:	Submit a document for copying	View scanned image or Release printed copy output	Modify stored image	Delete stored image
Job owner	(note 2)			
U.ADMIN				
U.NORMAL		denied	denied	denied
Unauthenticated	denied	denied	denied	denied

<b>FAX SEND</b>	"Create"	"Read"	"Modify"	"Delete"
Operation:	Submit a document to send as a fax	View scanned image	Modify stored image	Delete stored image
Job owner	(note 2)			
U.ADMIN				
U.NORMAL		denied	denied	denied
Unauthenticated	denied	denied	denied	denied

<b>FAX RECEIVE</b>	"Create"	"Read"	"Modify"	"Delete"
Operation:	Receive a fax and store it	View fax image or Release printed fax output	Modify image of received fax	Delete image of received fax
Fax owner	(note 3)			
U.ADMIN	(note 4)			
U.NORMAL	(note 4)	denied	denied	denied
Unauthenticated		denied	denied	denied

<b>STORAGE/RETRIEVAL</b>	"Create"	"Read"	"Modify"	"Delete"
Operation:	Store document	Retrieve stored document	Modify stored document	Delete stored document
Job owner	(note 1)			
U.ADMIN				

U.NORMAL		denied	denied	denied
Unauthenticated	(condition 1)	denied	denied	denied

Table 5. D.USER.JOB Access Control SFP

"PRINT"	"Create" *	"Read"	"Modify"	"Delete"
Operation:	Create print job	View print queue / log	Modify print job	Cancel print job
Job owner	(note 1)			
U.ADMIN				
U.NORMAL			denied	denied
Unauthenticated			denied	denied

"SCAN"	"Create" *	"Read"	"Modify"	"Delete"
Operation:	Create scan job	View scan status / log	Modify scan job	Cancel scan job
Job owner	(note 2)			
U.ADMIN				
U.NORMAL			denied	denied
Unauthenticated	denied		denied	denied

"COPY"	"Create" *	"Read"	"Modify"	"Delete"
Operation:	Create copy job	View copy status / log	Modify copy job	Cancel copy job
Job owner	(note 2)			
U.ADMIN				
U.NORMAL			denied	denied
Unauthenticated	denied		denied	denied

"FAX SEND"	"Create" *	"Read"	"Modify"	"Delete"
Operation:	Create fax send job	View fax job queue / log	Modify fax send job	Cancel fax send job
Job owner	(note 2)			
U.ADMIN				
U.NORMAL			denied	denied
Unauthenticated	denied		denied	denied

"FAX RECEIVE"	"Create" *	"Read"	"Modify"	"Delete"
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Operation:	Create fax receive job	View fax receive status / log	Modify fax receive job	Cancel fax receive job
Fax owner	(note 3)			
U.ADMIN	(note 4)			
U.NORMAL	(note 4)		denied	denied
Unauthenticated			denied	denied

"STORAGE/RETRIEVAL"	"Create" *	"Read"	"Modify"	"Delete"
Operation:	Create storage / retrieval job	View storage / retrieval log	Modify storage / retrieval log	Cancel storage / retrieval log
Job owner	(note 1)			
U.ADMIN				
U.NORMAL			denied	denied
Unauthenticated	(condition 1)		denied	denied

**Application note:**

*In general, the ST Author may modify this SFP provided that any changes are more restrictive. As examples, the ST Author may: remove the rules related to Document Processing functions that are not present in a TOE, add or modify rules to further deny access, or subdivide User Data to further restrict access for some data (e.g., D.USER.JOB.PROT and D.USER.JOB.CONF). Empty cells in the table indicate that the operation may be permitted, but it is not required to be permitted.*

*In particular, referring to Table 2 and Table 3:*

- A cell marked “Denied” indicates that the user (row) must not be permitted to perform the operation (column). The ST Author cannot override this.
- A cell that is blank indicates that the user may be permitted to perform the operation. However, the ST author may add conditions or restrictions, or deny permission entirely.
- A cell that is marked with a Condition means that the user can be permitted to perform the operation, provided that it meets that Condition as specified below. As with blank cells, the ST author can make it more restrictive.

**Condition 1:** Jobs submitted by unauthenticated users must contain a credential that the TOE can use to identify the Job Owner.

*See also the following Notes that are referenced in Table 2 and Table 3:*

**Note 1:** Job Owner is identified by a credential or assigned to an authorized User as part of the process of submitting a print or storage Job.

**Note 2:** Job Owner is assigned to an authorized User as part of the process of initiating a scan, copy, fax send, or retrieval Job.

**Note 3:** Job Owner of received faxes is assigned by default or configuration. Minimally, ownership of received faxes is assigned to a specific user or U.ADMIN role.

**Note 4:** PSTN faxes are received from outside of the TOE, they are not initiated by Users of the TOE.

## 5.5. Identification and Authentication (FIA)

### 5.5.1. FIA\_AFL.1 Authentication failure handling

(for 0.USER\_I&A)  
Hierarchical to: No other components.  
Dependencies: FIA\_UAU.1 Timing of authentication

**FIA\_AFL.1.1** The TSF shall detect when [selection: [assignment: *positive integer number*], an administrator configurable positive integer within [assignment: *range of acceptable values*]] unsuccessful authentication attempts occur related to [assignment: *list of authentication events*].

**FIA\_AFL.1.2** When the defined number of unsuccessful authentication attempts has been [selection: met, surpassed], the TSF shall [assignment: *list of actions*].

**Application note:**

*This SFR applies only to internal identification and authentication.*

### 5.5.2. FIA\_ATD.1 User attribute definition

(for 0.USER\_AUTHORIZATION)  
Hierarchical to: No other components.  
Dependencies: No dependencies.

**FIA\_ATD.1.1** The TSF shall maintain the following list of security attributes belonging to individual users: [assignment: *list of security attributes*].

**Application note:**

The list of security attributes should be the union of all attributes for each of the supported authentication methods.

### 5.5.3. FIA\_PMG\_EXT.1 Extended: Password Management

(for 0.USER\_I&A)  
Hierarchical to: No other components.  
Dependencies: No dependencies.

**FIA\_PMG\_EXT.1.1** The TSF shall provide the following password management capabilities for User passwords:

- Passwords shall be able to be composed of any combination of upper and lower case letters, numbers, and the following special characters: [selection: “!”, “@”, “#”, “\$”, “%”, “^”, “&”, “\*”, “(”, “)”, [assignment: *other characters*]];
- Minimum password length shall be settable by an Administrator, and have the capability to require passwords of 15 characters or greater;

***Application note:***

*This SFR applies only to password-based single-factor Internal Authentication.*

#### 5.5.4. FIA\_UAU.1 Timing of authentication

(for 0.USER\_I&A)  
 Hierarchical to: No other components.  
 Dependencies: FIA\_UID.1 Timing of identification

**FIA\_UAU.1.1 Refinement:** The TSF shall allow [assignment: *list of TSF mediated actions that do not conflict with the User Data Access Control SFP, and do not provide access to D.TSF.CONF, and do not change any TSF data*] on behalf of the user to be performed before the user is authenticated.

**FIA\_UAU.1.2** The TSF shall require each user to be successfully authenticated before allowing any other TSF-mediated actions on behalf of that user.

***Application note:***

*User authentication may be performed internally by the TOE or externally by an External IT Entity.*

#### 5.5.5. FIA\_UAU.7 Protected authentication feedback

(for 0.USER\_I&A)  
 Hierarchical to: No other components.  
 Dependencies: FIA\_UAU.1 Timing of authentication

**FIA\_UAU.7.1** The TSF shall provide only [assignment: *list of feedback*] to the user while the authentication is in progress.

***Application note:***

*FIA\_UAU.7 applies only to authentication processes in which the User interacts with the TOE.*

#### 5.5.6. FIA\_UID.1 Timing of identification

(for 0.USER\_I&A and 0.ADMIN\_ROLES)  
 Hierarchical to: No other components.  
 Dependencies: No dependencies.

**FIA\_UID.1.1 Refinement:** The TSF shall allow [assignment: *list of TSF-mediated actions that do not conflict with the User Data Access Control SFP, and do not provide access to D.TSF.CONF, and do not change any TSF data*] on behalf of the user to be performed before the user is identified.

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

**Application note:**

*User identification may be performed internally by the TOE or externally by an External IT Entity.*

### 5.5.7. FIA\_USB.1 User-subject binding

(for 0.USER\_I&A)  
Hierarchical to: No other components.  
Dependencies: FIA\_ATD.1 User attribute definition

**FIA\_USB.1.1** The TSF shall associate the following user security attributes with subjects acting on the behalf of that user: [assignment: *list of user security attributes*].

**FIA\_USB.1.2** The TSF shall enforce the following rules on the initial association of user security attributes with subjects acting on the behalf of users: [assignment: *rules for the initial association of attributes*].

**FIA\_USB.1.3** The TSF shall enforce the following rules governing changes to the user security attributes associated with subjects acting on the behalf of users: [assignment: *rules for the changing of attributes*].

## 5.6. Security Management (FMT)

### 5.6.1. FMT\_MOF.1 Management of security functions behavior

(for 0.ADMIN\_ROLES)  
Hierarchical to: No other components.  
Dependencies: FMT\_SMR.1 Security roles  
FMT\_SMF.1 Specification of Management Functions

**FMT\_MOF.1.1 Refinement:** The TSF shall restrict the ability to [selection: *determine the behaviour of, disable, enable, modify the behaviour of*] the functions [assignment: *list of functions*] to **U.ADMIN**.

### 5.6.2. FMT\_MSA.1 Management of security attributes



(for 0.ACCESS\_CONTROL and 0.USER\_AUTHORIZATION)  
 Hierarchical to: No other components.  
 Dependencies: [FDP\_ACC.1 Subset access control, [strikeout]or  
 FDP\_IFC.1 Subset information flow control][strikeout]  
 FMT\_SMR.1 Security roles  
 FMT\_SMF.1 Specification of Management Functions

**FMT\_MSA.1.1 Refinement:** The TSF shall enforce the **User Data Access Control SFP** to restrict the ability to [selection: *change\_default*, *query*, *modify*, *delete*, [assignment: *other operations*]] the security attributes [assignment: *list of security attributes*] to [assignment: *the authorised identified roles*].

### 5.6.3. FMT\_MSA.3 Static attribute initialization

(for 0.ACCESS\_CONTROL and 0.USER\_AUTHORIZATION)  
 Hierarchical to: No other components.  
 Dependencies: FMT\_MSA.1 Management of security attributes  
 FMT\_SMR.1 Security roles

**FMT\_MSA.3.1 Refinement:** The TSF shall enforce the **User Data Access Control SFP** to provide [selection, choose one of: *restrictive*, *permissive*, [assignment: *other property*]] default values for security attributes that are used to enforce the SFP.

**FMT\_MSA.3.2 Refinement:** The TSF shall allow the [**selection: *U.ADMIN*, *no role***] to specify alternative initial values to override the default values when an object or information is created.

#### **Application note:**

FMT\_MSA.3.2 applies only to security attributes whose default values can be overridden.

### 5.6.4. FMT\_MTD.1 Management of TSF data

(for 0.ACCESS CONTROL)  
 Hierarchical to: No other components.  
 Dependencies: FMT\_SMR.1 Security roles  
 FMT\_SMF.1 Specification of Management Functions

**FMT\_MTD.1.1 Refinement:** The TSF shall restrict the ability to **perform the specified operations on the specified TSF Data to the roles specified in Table 6.**

Table 6. Management of TSF Data

Data	Operation	Authorised role(s)
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[assignment: list of TSF Data owned by a U.NORMAL or associated with Documents or jobs owned by a U.NORMAL]	[selection: change default, query, modify, delete, clear, [assignment: other operations]]	U.ADMIN, the owning U.NORMAL.
[assignment: list of TSF Data not owned by a U.NORMAL]	[selection: change default, query, modify, delete, clear, [assignment: other operations]]	U.ADMIN
[assignment: list of software, firmware, and related configuration data]	[selection: change default, query, modify, delete, clear, [assignment: other operations]]	U.ADMIN

### 5.6.5. FMT\_SMF.1 Specification of Management Functions

(for O.USER\_AUTHORIZATION, O.ACCESS\_CONTROL, and O.ADMIN\_ROLES)

Hierarchical to: No other components.

Dependencies: No dependencies.

**FMT\_SMF.1.1:** The TSF shall be capable of performing the following management functions: [assignment: *list of management functions provided by the TSF*].

Application note:

Regarding “management functions provided by the TSF”, the ST Author should consider management functions that support the security objectives of this protection profile.

The management functions should be restricted to the authorized identified role in FMT\_MOF.1, FMT\_MTD.1, FMT\_MSA.1.

The ST Author may identify cases where a security objective is fulfilled without explicit manageability.

For example, the following management functions are categorized by security objectives:

For O.USER\_AUTHORIZATION, O.USER\_I&A, O.ADMIN\_ROLES, O.ACCESS\_CONTROL:

- User management (e.g., add/change/remove local user)
- Role management (e.g., assign/deassign role relationship with user)
- Configuring identification and authentication (e.g., selecting between local and external I&A)
- Configuring authorization and access controls (e.g., access control lists for TOE resources)
- Configuring communication with External IT Entities

For O.UPDATE\_VERIFICATION:

- Configuring software updates

For O.COMMS\_PROTECTION:

- Configuring network communications
- Configuring the system or network time source

For O.AUDIT:

- Configuring data transmission to audit server
- Configuring the system or network time source
- Configuring internal audit log storage

For O.STORAGE\_ENCRYPTION, O.KEY\_MATERIAL:

- Configuring and invoking encryption of Nonvolatile Storage Devices

(Optional) For O.IMAGE\_OVERWRITE, O.PURGE DATA:

- Configuring and/or invoking image overwrite functions
- Configuring and/or invoking data purging functions

### 5.6.6. FMT\_SMR.1 Security roles

(for O.ACCESS\_CONTROL, O.USER\_AUTHORIZATION, and O.ADMIN\_ROLES)  
 Hierarchical to: No other components.  
 Dependencies: FIA\_UID.1 Timing of identification

**FMT\_SMR.1.1** The TSF shall maintain the roles **U.ADMIN**, **U.NORMAL**.

**FMT\_SMR.1.2** The TSF shall be able to associate users with roles.

## 5.7. Privacy (FPR)

There are no class FPR requirements.

## 5.8. Protection of the TSF (FPT)

### 5.8.1. FPT\_SKP\_EXT.1 Extended: Protection of TSF Data

(for O.COMMS\_PROTECTION)  
 Hierarchical to: No other components.  
 Dependencies: No dependencies.

**FPT\_SKP\_EXT.1.1** The TSF shall prevent reading of all pre-shared keys, symmetric keys, and private keys.

Application Note:

The intent of the requirement is that an administrator is unable to read or view the identified keys

(stored or ephemeral) through “normal” interfaces. While it is understood that the administrator could directly read memory to view these keys, doing so is not a trivial task and may require substantial work on the part of an administrator. Since the administrator is considered a trusted agent, it is assumed they would not engage in such an activity.

### 5.8.2. FPT\_STM.1 Reliable time stamps

(for 0.AUDIT)  
Hierarchical to: No other components.  
Dependencies: No dependencies.

**FPT\_STM.1.1** The TSF shall be able to provide reliable time stamps.

Application note:

The time may be set by a trusted administrator or by a network service (e.g., NTP) from a trusted External IT Entity.

### 5.8.3. FPT\_TST\_EXT.1 Extended: TSF testing

(for 0.TSF\_SELF\_TEST)  
Hierarchical to: No other components.  
Dependencies: No dependencies.

**FPT\_TST\_EXT.1.1** The TSF shall run a suite of self-tests during initial start-up (and power on) to demonstrate the correct operation of the TSF.

Application note:

Power-on self-tests may take place before the TSF is operational, in which case this SFR can be satisfied by verifying the TSF image by digital signature as specified in FCS\_COP.1/SigGen, or by hash specified in FCS\_COP.1/Hash.

### 5.8.4. FPT\_TUD\_EXT.1 Extended: Trusted Update

(for 0.UPDATE\_VERIFICATION)  
Hierarchical to: No other components.  
Dependencies: FCS\_COP.1/SigGen Cryptographic Operation (for signature generation/verification),  
FCS\_COP.1/Hash Cryptographic operation (Hash Algorithm).

**FPT\_TUD\_EXT.1.1** The TSF shall provide authorized administrators the ability to query the current version of the TOE firmware/software.

**FPT\_TUD\_EXT.1.2** The TSF shall provide authorized administrators the ability to initiate updates to TOE firmware/software.

**FPT\_TUD\_EXT.1.3** The TSF shall provide a means to verify firmware/software updates to the TOE using a digital signature mechanism and [selection: *published hash, no other functions*] prior to installing those updates.

Application note:

FPT\_TUD\_EXT.1.2 may be interpreted to allow an administrator to “pre-authorize” automatic updates, provided that they are verified according to FPT\_TUD\_EXT.1.3.

The digital signature mechanism is specified in FCS\_COP.1/SigGen. The published hash is generated by one of the functions specified in FCS\_COP.1/Hash. It is acceptable to implement both mechanisms.

## 5.9. Resource Utilization (FRU)

There are no class FRU requirements.

## 5.10. TOE Access (FTA)

### 5.10.1. FTA\_SSL.3 TSF-initiated termination

(for 0.USER\_I&A)  
Hierarchical to: No other components.  
Dependencies: No dependencies.

**FTA\_SSL.3.1** The TSF shall terminate an interactive session after a [assignment: *time interval of user inactivity*].

## 5.11. Trusted Paths/Channels (FTP)

### 5.11.1. FTP\_ITC.1 Inter-TSF trusted channel

(for 0.COMMS\_PROTECTION, 0.AUDIT)  
Hierarchical to: No other components.  
Dependencies: [FCS\_IPSEC\_EXT.1 Extended: IPsec selected, or  
FCS\_TLS\_EXT.1 Extended: TLS selected, or  
FCS\_SSH\_EXT.1 Extended: SSH selected, or  
FCS\_HTTPS\_EXT.1 Extended: HTTPS selected].

**FTP\_ITC.1.1 Refinement:** The TSF shall **use** [selection: IPsec, SSH, TLS, TLS/HTTPS] to provide a **trusted** communication channel between itself and **authorized IT entities supporting the following capabilities:** [selection: *authentication server, [assignment: other capabilities]*] that is logically distinct from other communication channels and provides assured identification of its end points and protection of the channel data from **disclosure and detection of modification of the channel data**.

**FTP\_ITC.1.2 Refinement:** The TSF shall permit **the TSF, or the authorized IT entities**, to initiate communication via the trusted channel

**FTP\_ITC.1.3 Refinement:** The TSF shall initiate communication via the trusted channel for [assignment: ***list of services for which the TSF is able to initiate communications***].

***Application note:***

*The assignment in FTP\_ITC.1.3 should address the confidentiality and/or integrity requirements for communication of User and TSF Data between the TOE and another IT entity. FTP\_TRP.1 is intended to be used for interactive communication between the TOE and remote users.*

*The intent of the above requirement is to use a cryptographic protocol to protect external communications with authorized IT entities that the TOE interacts with to perform its functions. Protection (by one of the listed protocols) is required at least for communications with the server that collects the audit information. If it communicates with an authentication server (e.g., RADIUS), then the ST author chooses “authentication server” in FTP\_ITC.1.1 and this connection must be protected by one of the listed protocols. If other authorized IT entities (e.g., NTP server) are protected, the ST author makes the appropriate assignments (for those entities) and selections (for the protocols that are used to protect those connections). After the ST author has made the selections, they are to select the detailed requirements in Appendix D.2 corresponding to their protocol selection to put in the ST. To summarize, the connection to an external audit collection server is required to be protected by one of the listed protocols. If an External Authentication server is supported, then it is required to protect that connection with one of the listed protocols. For any other external server, external communications are not required to be protected, but if protection is claimed, then it must be protected with one of the identified protocols.*

*While there are no requirements on the party initiating the communication, the ST author lists in the assignment for FTP\_ITC.1.3 the services for which the TOE can initiate the communication with the authorized IT entity.*

*The requirement implies that not only are communications protected when they are initially established, but also on resumption after an outage. It may be the case that some part of the TOE setup involves manually setting up tunnels to protect other communication, and if after an outage the TOE attempts to re-establish the communication automatically with (the necessary) manual intervention, there may be a window created where an attacker might be able to gain critical information or compromise a connection.*

### **5.11.2. FTP\_TRP.1(a) Trusted path (for Administrators)**

(for O.COMMS\_PROTECTION)

Hierarchical to: No other components.

Dependencies: [FCS\_IPSEC\_EXT.1 Extended: IPsec selected, or  
FCS\_TLS\_EXT.1 Extended: TLS selected, or  
FCS\_SSH\_EXT.1 Extended: SSH selected, or  
FCS\_HTTPS\_EXT.1 Extended: HTTPS selected].

**FTP\_TRP.1.1(a) Refinement:** The TSF shall use [selection, choose at least one of: IPsec, SSH, TLS,

**TLS/HTTPS]** to provide a **trusted** communication path between itself and **remote administrators** that is logically distinct from other communication paths and provides assured identification of its end points and protection of the communicated data from **disclosure and detection of modification of the communicated data**.

**FTP\_TRP.1.2(a) Refinement:** The TSF shall permit **remote administrators** to initiate communication via the trusted path

**FTP\_TRP.1.3(a) Refinement:** The TSF shall require the use of the trusted path for **initial administrator authentication and all remote administration actions**.

***Application Note:***

*This requirement ensures that authorized remote administrators initiate all communication with the TOE via a trusted path, and that all communications with the TOE by remote administrators is performed over this path. The data passed in this trusted communication path are encrypted as defined the protocol chosen in the first selection. The ST author chooses the mechanism or mechanisms supported by the TOE, and then ensures the detailed requirements in Appendix D.2 corresponding to their selection are copied to the ST if not already present.*

## 6. Security Assurance Requirements

The [Section 4, “Security Objectives”](#) for the TOE were constructed to address [\[threats\]](#) identified in the [Section 3, “Security Problem Definition”](#). The [Section 5, “Security Functional Requirements”](#) are a formal instantiation of the [Section 4, “Security Objectives”](#). This cPP identifies the Security Assurance Requirements 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 cPP. Individual Evaluation Activities to be performed are specified in [\[SD\]](#).

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

After the ST has been approved for evaluation, the ITSEF (IT Security Evaluation Facility) will obtain the TOE, supporting environmental IT (if required), and the administrative/user guides for the TOE. 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 Evaluation Activities contained within the SD, which are intended to be an interpretation of the other CEM assurance requirements as they apply to the specific technology instantiated in the TOE. The Evaluation Activities that are captured in the SD also provide clarification as to what the developer needs to provide to demonstrate the TOE is compliant with the cPP.

*Table 7. Security Assurance Requirements*

Assurance Class	Assurance Components
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Security Target (ASE)	Conformance Claims (ASE_CCL.1)
	Extended components definition (ASE_ECD.1)
	ST introduction (ASE_INT.1)
	Security objectives for the operational environment (ASE_OBJ.2)
	Stated security requirements (ASE_REQ.2)
	Security Problem Definition (ASE_SPD.1)
	TOE summary specification (ASE_TSS.1)
Development (ADV)	Basic functional specification (ADV_FSP.1)
Guidance documents (AGD)	Operational user guidance (AGD_OPE.1)
	Preparative procedures (AGD_PRE.1)
Life cycle support (ALC)	Labeling of the TOE (ALC_CMC.1)
	TOE CM coverage (ALC_CMS.1)
Tests (ATE)	Independent testing – sample (ATE_IND.1)
Vulnerability assessment (AVA)	Vulnerability survey (AVA_VAN.1)

## 6.1. ASE: Security Target

The ST is evaluated as per ASE activities defined in the [\[CEM\]](#). In addition, there may be Evaluation Activities specified within the [\[SD\]](#) that call for necessary descriptions to be included in the TSS that are specific to the TOE technology type.

Appendix E provides a description of the information expected to be provided regarding the quality of entropy in the random bit generator.

Given the criticality of the key management scheme, this cPP requires the developer to provide a detailed description of their key management implementation. This information can be submitted as an appendix to the ST and marked proprietary, as this level of detailed information is not expected to be made publicly available. See Appendix F for details on the expectation of the developer’s Key Management Description.

## 6.2. ADV: Development

The design information about the TOE is contained in the guidance documentation available to the end user as well as the TSS portion of the ST, and any additional information required by this cPP that is not to be made public (e.g., Entropy Report).

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

The functional specification describes the TOE Security Functions Interfaces (TSFIs). It is not necessary to have a formal or complete specification of these interfaces. Additionally, because TOEs conforming to this cPP will necessarily have interfaces to the Operational Environment that are not directly invocable by TOE 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 cPP, the Evaluation Activities for this family 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 Evaluation Activities specified in [\[SD\]](#).

The Evaluation Activities in [\[SD\]](#) are associated with the applicable SFRs; 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.

## 6.3. 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; and
- instructions to provide a protected administrative capability.

Guidance pertaining to particular security functionality must also be provided; requirements on such guidance are contained in the Evaluation Activities specified in the [\[SD\]](#).

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

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.

The developer should review the Evaluation Activities contained in the [\[SD\]](#) 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.

### 6.3.2. Preparative Procedures (AGD\_PRE.1)

As with the operational guidance, the developer should look to the Evaluation Activities to determine the required content with respect to preparative procedures.

## 6.4. Class ALC: Life-cycle Support

At the assurance level provided for TOEs conformant to this cPP, life-cycle support is limited to end-user-visible aspects of the life-cycle, rather than an examination of the TOE 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.

### 6.4.1. Labelling of the TOE (ALC\_CMC.1)

This component is targeted at identifying the TOE 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.

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

Given the scope of the TOE and its associated evaluation evidence requirements, the evaluator performs the CEM work units associated with ALC\_CMC.1.

## 6.5. 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. For this cPP, 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.

### 6.5.1. Independent Testing – Conformance (ATE\_IND.1)

Testing is performed to confirm the functionality described in the TSS as well as the operational guidance (includes “evaluated configuration” instructions). The focus of the testing is to confirm that the requirements specified in Section 5 are being met. The Evaluation Activities in the SD identify the specific testing activities necessary to verify compliance with the SFRs. The evaluator produces a test report documenting the plan for and results of testing, as well as coverage arguments focused on the platform/TOE combinations that are claiming conformance to this cPP.

## 6.6. Class AVA: Vulnerability Assessment

AVA is a difficult subject. This is taken from the NDcPP v2.1 as an example, but will need to be determined by the iTC.

For the first generation of this cPP, the iTC is expected to survey open sources to discover what vulnerabilities have been discovered in these types of products and provide that content into the AVA\_VAN discussion. In most cases, these vulnerabilities will require sophistication beyond that of a basic attacker. This information will be used in the development of future protection profiles.

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

[\[SD\]](#) provides a guide to the evaluator in performing a vulnerability analysis.

## Appendix A: Selection-Based Requirements

As indicated in the introduction to this cPP, the baseline requirements (those that shall be performed by the TOE) are contained in [Section 5, “Security Functional Requirements”](#).

Additionally, there are two other types of requirements specified in [Appendix G, Consistency Rationale](#).

The first type (in this Appendix) comprises requirements based on selections in other SFRs from the cPP: if certain selections are made, then additional requirements in this chapter will need to be included in the body of the ST.

The second type (in the next Appendix) comprises requirements that can be included in the ST, but are not mandatory for a TOE to claim conformance to this cPP.

## A.1. Confidential Data on Nonvolatile Storage Devices

### A.1.1. FCS\_COP.1(d) Cryptographic operation (AES Data Encryption/Decryption)

(for 0. STORAGE\_ENCRYPTION)  
Hierarchical to: No other components.  
Dependencies: [~~FDP\_ITC.1 Import of user data without security attributes, or~~  
FDP\_ITC.2 Import of user data with security attributes, or~~</del>~~  
FCS\_CKM.1(b) Cryptographic key generation (Symmetric Keys)]  
FCS\_CKM\_EXT.4 Extended: Cryptographic Key Material Destruction

**FCS\_COP.1.1(d)** The TSF shall perform **data encryption and decryption** in accordance with a specified cryptographic algorithm **AES used in [selection: CBC, GCM, XTS] mode** and cryptographic key sizes **[selection: 128 bits, 256 bits]** that meet the following: **AES as specified in ISO/IEC 18033-3, [selection: CBC as specified in ISO/IEC 10116, GCM as specified in ISO/IEC 19772, and XTS as specified in IEEE 1619].**

#### **Application Note:**

*This PP allows for software encryption or hardware encryption.*

*If XTS Mode is selected, a cryptographic key of 256-bit or of 512-bit is allowed as specified in IEEE 1619. XTS-AES key is divided into two AES keys of equal size - for example, AES-128 is used as the underlying algorithm, when 256-bit key and XTS mode are selected. AES-256 is used when a 512-bit key and XTS mode are selected.*

*The intent of this requirement is to specify the approved AES modes that the ST Author may select for AES encryption of the appropriate information on the Nonvolatile Storage Device. For the first selection, the ST author should indicate the mode or modes supported by the TOE implementation. The second selection indicates the key size to be used, which is identical to that specified for FCS\_CKM.1(b). The third selection must agree with the mode or modes chosen in the first selection. If multiple modes are supported, it may be clearer in the ST if this component was iterated.*

### A.1.2. FCS\_COP.1(e) Cryptographic operation (Key Wrapping)

(selected in FCS\_KYC\_EXT.1.1)

Hierarchical to: No other components.

Dependencies: [~~FDP\_ITC.1 Import of user data without security attributes, or~~  
FDP\_ITC.2 Import of user data with security attributes, or  
FCS\_CKM.1(b) Cryptographic key generation (Symmetric Keys)]  
FCS\_CKM\_EXT.4 Extended: Cryptographic Key Material Destruction

**FCS\_COP.1.1(e) Refinement:** The TSF shall perform **key wrapping** in accordance with a specified cryptographic algorithm **AES in the following modes [selection: KW, KWP, GCM, CCM]** and the cryptographic key size **[selection: 128 bits, 256 bits]** that meet the following: **[ISO/IEC 18033-3 (AES), [selection: NIST SP 800-38F, ISO/IEC 19772, no other standards]]**.

**Application Note:**

*This requirement is used in the body of the ST if the ST Author chooses to use key wrapping in the key chaining approach that is specified in FCS\_KYC\_EXT.1.*

### **A.1.3. FCS\_COP.1(f) Cryptographic operation (Key Encryption)**

(selected from FCS\_KYC\_EXT.1.1)

Hierarchical to: No other components.

Dependencies: [~~FDP\_ITC.1 Import of user data without security attributes, or~~  
FDP\_ITC.2 Import of user data with security attributes, or  
FCS\_CKM.1(b) Cryptographic key generation (Symmetric Keys)]  
FCS\_CKM\_EXT.4 Extended: Cryptographic Key Material Destruction

**FCS\_COP.1.1(f) Refinement:** The TSF shall perform **key encryption and decryption** in accordance with a specified cryptographic algorithm **AES used in [[selection: CBC, GCM] mode]** and cryptographic key sizes **[selection: 128 bits, 256 bits]** that meet the following: **[AES as specified in ISO /IEC 18033-3, [selection: CBC as specified in ISO/IEC 10116, GCM as specified in ISO/IEC 19772]]**.

**Application Note:**

*This requirement is used in the body of the ST if the ST Author chooses to use AES encryption/decryption for protecting the keys as part of the key chaining approach that is specified in FCS\_KYC\_EXT.1.*

### **A.1.4. FCS\_COP.1(i) Cryptographic operation (Key Transport)**

(selected in FCS\_KYC\_EXT.1.1)

Hierarchical to: No other components.

Dependencies: [~~FDP\_ITC.1 Import of user data without security attributes, or~~  
FDP\_ITC.2 Import of user data with security attributes, or  
FCS\_CKM.1(a) Cryptographic Key Generation (for asymmetric keys)]  
FCS\_CKM\_EXT.4 Extended: Cryptographic Key Material Destruction

**FCS\_COP.1.1(i) Refinement:** The TSF shall perform **key transport** in accordance with a specified cryptographic algorithm **RSA in the following modes [selection: *KTS-OAEP*, *KTS-KEM-KWS*]** and the cryptographic key size **[selection: *2048 bits*, *3072 bits*]** that meet the following: **NIST SP 800-56B, Revision 1.**

***Application Note:***

*This requirement is used in the body of the ST if the ST Author chooses to use key transport in the key chaining approach that is specified in FCS\_KYC\_EXT.1.*

### **A.1.5. FCS\_SMC\_EXT.1 Extended: Submask Combining**

(selected in FCS\_KYC\_EXT.1.1)

Hierarchical to: No other components.

Dependencies: FCS\_COP.1/Hash Cryptographic operation (Hash Algorithm)

**FCS\_SMC\_EXT.1.1** The TSF shall combine submasks using the following method [selection: *exclusive OR (XOR)*, *SHA-256*, *SHA-512*] to generate an intermediary key or BEV.

***Application Note:***

*This requirement specifies the way that a product may combine the various submasks by using either an XOR or an approved SHA-hash. The approved hash function is captured in FCS\_COP.1/Hash in Appendix D.3.1.*

## **A.2. Protected Communications**

As indicated in the FTP requirements, there are several methods by which conformant TOEs can mitigate threats against compromise of the communication channel between administrators, other portions of the TOE, or external IT entities. One of the secure communication protocols (IPsec, SSH, TLS, TLS/HTTPS) must be implemented in order to provide protected connectivity for (at a minimum) the audit server and remote administrators.

There are unique requirements associated with each of the protocol suites; these are specified in below. Depending on the selections for the FTP\_ITC.1 and FTP\_TRP.1 components, the ST author will need to include the associated SFRs and Assurance Activities in the ST.

### **A.2.1. FCS\_IPSEC\_EXT.1 Extended: IPsec selected**

(selected in FTP\_ITC.1.1, FTP\_TRP.1.1)

Hierarchical to: No other components.

Dependencies: <del>FPT\_ITT.1 Basic internal TSF data transfer protection,</del>

FIA\_PSK\_EXT.1 Extended: Pre-Shared Key Composition

FCS\_CKM.1(a) Cryptographic Key Generation (for asymmetric keys)

FCS\_COP.1/DataEncryption Cryptographic Operation (Symmetric encryption/decryption)

FCS\_COP.1/SigGen Cryptographic Operation (for signature generation/verification)

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

FCS\_COP.1/KeyedHash Cryptographic Operation (for keyed-hash message authentication)

FCS\_RBG\_EXT.1 Extended: Cryptographic Operation (Random Bit Generation)

### **Application Note:**

*In order to show that the TSF implements the RFCs in accordance with the requirements of this PP, the evaluator shall perform the assurance activities listed below.*

*The TOE is required to use the IPsec protocol to establish connections used to communicate with an IPsec Peer.*

*The evaluators shall minimally create a test environment equivalent to the test environment illustrated above. It is expected that the traffic generator is used to construct network packets and will provide the evaluator with the ability manipulate fields in the ICMP, IPv4, IPv6, UDP, and TCP packet headers. The evaluators must provide justification for any differences in the test environment.*

**FCS\_IPSEC\_EXT.1.1** The TSF shall implement the IPsec architecture as specified in RFC 4301.

### **Application Note:**

*RFC 4301 calls for an IPsec implementation to protect IP traffic through the use of a Security Policy Database (SPD). The SPD is used to define how IP packets are to be handled: PROTECT the packet (e.g., encrypt the packet), BYPASS the IPsec services (e.g., no encryption), or DISCARD the packet (e.g., drop the packet). The SPD can be implemented in various ways, including router access control lists, firewall rulesets, a “traditional” SPD, etc. Regardless of the implementation details, there is a notion of a “rule” that a packet is “matched” against and a resulting action that takes place.*

*While there must be a means to order the rules, a general approach to ordering is not mandated, as long as the SPD can distinguish the IP packets and apply the rules accordingly. There may be multiple SPDs (one for each network interface), but this is not required.*

**FCS\_IPSEC\_EXT.1.2** The TSF shall implement [selection: *tunnel mode, transport mode*].

**FCS\_IPSEC\_EXT.1.3** The TSF shall have a nominal, final entry in the SPD that matches anything that is otherwise unmatched, and discards it.

**FCS\_IPSEC\_EXT.1.4** The TSF shall implement the IPsec protocol ESP as defined by RFC 4303 using [selection: *the cryptographic algorithms AES-CBC-128 (as specified by RFC 3602) together with a Secure Hash Algorithm (SHA)-based HMAC, AES-CBC-256 (as specified by RFC 3602) together with a Secure Hash Algorithm (SHA)-based HMAC, AES-GCM-128 as specified in RFC 4106, AES-GCM-256 as specified in RFC 4106*].

**FCS\_IPSEC\_EXT.1.5** The TSF shall implement the protocol: [selection: *IKEv1, using Main Mode for Phase 1 exchanges, as defined in RFCs 2407, 2408, 2409, RFC 4109, [selection: no other RFCs for extended sequence numbers, RFC 4304 for extended sequence numbers], and [selection: no other RFCs for hash functions, RFC 4868 for hash functions]; IKEv2 as defined in RFCs 5996, [selection: with no support for NAT traversal, with mandatory support for NAT traversal as specified in section 2.23], and [selection: no other RFCs for hash functions, RFC 4868 for hash functions]]].*

**Application Note:**

*Either IKEv1 or IKEv2 support must be provided, although conformant TOEs can provide both; the first selection is used to make this choice. For IKEv1, the requirement is to be interpreted as requiring the IKE implementation conforming to RFC 2409 with the additions/modifications as described in RFC 4109. RFC 4304 identifies support for extended sequence numbers, which compliant TOEs can specify using the second selection. RFC 4868 identifies additional hash functions for use with both IKEv1 and IKEv2; if these functions are implemented, the third (for IKEv1) and fourth (for IKEv2) selection can be used.*

**FCS\_IPSEC\_EXT.1.6** The TSF shall ensure the encrypted payload in the [selection: *IKEv1, IKEv2*] protocol uses the cryptographic algorithms AES-CBC-128, AES-CBC-256 as specified in RFC 3602 and [selection: *AES-GCM-128, AES-GCM-256 as specified in RFC 5282, no other algorithm*].

**FCS\_IPSEC\_EXT.1.7** The TSF shall ensure that IKEv1 Phase 1 exchanges use only main mode.

**FCS\_IPSEC\_EXT.1.8** The TSF shall ensure that [selection: *IKEv2 SA lifetimes can be established based on [selection: number of packets/number of bytes; length of time, where the time values can be limited to: 24 hours for Phase 1 SAs and 8 hours for Phase 2 SAs]; IKEv1 SA lifetimes can be established based on [selection: number of packets/number of bytes ; length of time, where the time values can be limited to: 24 hours for Phase 1 SAs and 8 hours for Phase 2 SAs]]*].

**Application Note:**

*The ST Author is afforded a selection based on the version of IKE in their implementation. If the lifetime limitations are configurable, then the evaluator verifies that the appropriate instructions for configuring these values are included in the operational guidance.*

*As far as SA lifetimes are concerned, the TOE can limit the lifetime based on the number of bytes transmitted, or the number of packets transmitted. Either packet-based or volume-based SA lifetimes are acceptable; the ST author makes the appropriate selection to indicate which type of lifetime limits are supported.*

**FCS\_IPSEC\_EXT.1.9** The TSF shall ensure that all IKE protocols implement DH Groups 14 (2048-bit MODP), and [selection: *24 (2048-bit MODP with 256-bit POS), 19 (256-bit Random ECP), 20 (384-bit Random ECP, 5 (1536-bit MODP))*], [assignment: *other DH groups that are implemented by the TOE*], no other DH groups].

**Application Note:**

*The above requires that the TOE support DH Group 14. If other groups are supported, then those should be selected (for groups 24, 19, 20, and 5) or specified in the assignment above; otherwise “no other DH groups” should be selected. This applies to IKEv1/IKEv2 exchanges.*

**FCS\_IPSEC\_EXT.1.10** The TSF shall ensure that all IKE protocols perform Peer Authentication using the [selection: *RSA, ECDSA*] algorithm and Pre-shared Keys.

***Application Note:***

*The selected algorithm should correspond to an appropriate selection for FCS\_COP.1/SigGen. If IPsec is included in the TOE, the ST author also includes FIA\_PSK\_EXT from Appendix D.2.6.*

## **A.2.2. FCS\_TLSC\_EXT & FCS\_TLSS\_EXT TLS Protocol**

TLS is not a required component of this cPP. If a TOE implements TLS, a corresponding selection in FPT\_ITT.1, FTP\_ITC.1, or FTP\_TRP.1/Admin should be made to define what the TLS protocol is implemented to protect. If a corresponding option to support TLS has been selected in at least one of the SFRs named above, the corresponding selection-based TLS-related SFRs should be added to the ST from chap. B.3.1.6 (i.e. FCS\_TLSC\_EXT.1 and/or FCS\_TLSS\_EXT.1). The SFRs therein cover only the minimum TLS-related requirements without support for mutual authentication. The support for mutual authentication is optional when using TLS. If a TOE implements TLS with mutual authentication the corresponding optional SFRs should be added to the ST from chap. A.7.1.2 (i.e. FCS\_TLSC\_EXT.2 and/or FCS\_TLSS\_EXT.2) in addition to the corresponding SFRs from chap. B.3.1.6.

A TOE may act as the client, the server, or both in TLS sessions. The requirement has been separated into TLS Client (FCS\_TLSC\_EXT) and TLS Server (FCS\_TLSS\_EXT) requirements to allow for these differences. If the TOE acts as the client during the claimed TLS sessions, the ST author should claim the corresponding FCS\_TLSC\_EXT requirements. If the TOE acts as the server during the claimed TLS sessions, the ST author should claim the corresponding FCS\_TLSS\_EXT requirements. If the TOE acts as both a client and server during the claimed TLS sessions, the ST author should claim the corresponding FCS\_TLSC\_EXT and FCS\_TLSS\_EXT requirements.

Additionally, TLS may or may not be performed with client authentication. The ST author shall claim FCS\_TLSC\_EXT.1 and/or FCS\_TLSS\_EXT.1 if the TOE does not support client authentication. The ST author should claim FCS\_TLSC\_EXT.2 and/or FCS\_TLSS\_EXT.2 if client authentication is performed by the TOE.

The following list contains all DTLS-/TLS-related ciphersuites supported by this cPP.

- TLS\_RSA\_WITH\_AES\_128\_CBC\_SHA as defined in RFC 3268
- TLS\_RSA\_WITH\_AES\_256\_CBC\_SHA as defined in RFC 3268
- TLS\_DHE\_RSA\_WITH\_AES\_128\_CBC\_SHA as defined in RFC 3268
- TLS\_DHE\_RSA\_WITH\_AES\_256\_CBC\_SHA as defined in RFC 3268
- TLS\_ECDHE\_RSA\_WITH\_AES\_128\_CBC\_SHA as defined in RFC 4492
- TLS\_ECDHE\_RSA\_WITH\_AES\_256\_CBC\_SHA as defined in RFC 4492
- TLS\_ECDHE\_ECDSA\_WITH\_AES\_128\_CBC\_SHA as defined in RFC 4492
- TLS\_ECDHE\_ECDSA\_WITH\_AES\_256\_CBC\_SHA as defined in RFC 4492
- TLS\_RSA\_WITH\_AES\_128\_CBC\_SHA256 as defined in RFC 5246
- TLS\_RSA\_WITH\_AES\_256\_CBC\_SHA256 as defined in RFC 5246



- TLS\_DHE\_RSA\_WITH\_AES\_128\_CBC\_SHA256 as defined in RFC 5246
- TLS\_DHE\_RSA\_WITH\_AES\_256\_CBC\_SHA256 as defined in RFC 5246
- TLS\_RSA\_WITH\_AES\_128\_GCM\_SHA256 as defined in RFC 5288
- TLS\_RSA\_WITH\_AES\_256\_GCM\_SHA384 as defined in RFC 5288
- TLS\_DHE\_RSA\_WITH\_AES\_128\_GCM\_SHA256 as defined in RFC 5288
- TLS\_DHE\_RSA\_WITH\_AES\_256\_GCM\_SHA384 as defined in RFC 5288
- TLS\_ECDHE\_ECDSA\_WITH\_AES\_128\_CBC\_SHA256 as defined in RFC 5289
- TLS\_ECDHE\_ECDSA\_WITH\_AES\_256\_CBC\_SHA384 as defined in RFC 5289
- TLS\_ECDHE\_ECDSA\_WITH\_AES\_128\_GCM\_SHA256 as defined in RFC 5289
- TLS\_ECDHE\_ECDSA\_WITH\_AES\_256\_GCM\_SHA384 as defined in RFC 5289
- TLS\_ECDHE\_RSA\_WITH\_AES\_128\_GCM\_SHA256 as defined in RFC 5289
- TLS\_ECDHE\_RSA\_WITH\_AES\_256\_GCM\_SHA384 as defined in RFC 5289
- TLS\_ECDHE\_RSA\_WITH\_AES\_128\_CBC\_SHA256 as defined in RFC 5289
- TLS\_ECDHE\_RSA\_WITH\_AES\_256\_CBC\_SHA384 as defined in RFC 5289

List 1: List of supported TLS-related ciphersuites

#### **A.2.2.1. FCS\_TLSC\_EXT.1 TLS Client Protocol Without Mutual Authentication**

**FCS\_TLSC\_EXT.1.1** The TSF shall implement [selection: TLS 1.2 (RFC 5246), TLS 1.1 (RFC 4346)] and reject all other TLS and SSL versions. The TLS implementation will support the following ciphersuites:

[selection:

select supported ciphersuites from List 1] and no other ciphersuites.

#### ***Application Note 104***

*The ciphersuites to be tested in the evaluated configuration are limited by this requirement and must be selected from the ciphersuites defined in List 1. The ST author should select the ciphersuites that are supported. Even though RFC 5246 mandates implementation of specific ciphers, there is no requirement to implement TLS\_RSA\_WITH\_AES\_128\_CBC\_SHA in order to claim conformance to this cPP.*

*These requirements will be revisited as new TLS versions are standardized by the IETF.*

*In a future version of this cPP TLS v1.2 will be required for all TOEs.*

**FCS\_TLSC\_EXT.1.2** The TSF shall verify that the presented identifier matches [selection: the reference identifier per RFC 6125 section 6, IPv4 address in CN or SAN, IPv6 address in the CN or SAN, IPv4 address in SAN, IPv6 address in the SAN, the identifier per RFC 5280 Appendix A using [selection: id-at-commonName, id-at-countryName, id-at-dnQualifier, id-at-generationQualifier, id-at-givenName, id-at-initials, id-at-localityName, id-at-name, id-at-organizationalUnitName, id-at-organizationName, id-at-pseudonym, id-at-serialNumber, id-at-stateOrProvinceName, id-at-

surname, id-at-title] and no other attribute types].

### **Application Note 105**

*Where TLS is used for connections to/from non-TOE entities (relevant to FTP\_ITC and FTP\_TRP), the ST author shall select RFC 6125. For distributed TOEs (TLS connections relevant to FPT\_ITT), the ST author may select either RFC 6125 or RFC 5280. If RFC 5280 is selected, the selection is completed by listing the AttributeType (e.g. 'id-at-serialNumber') as defined in RFC 5280 Appendix A. The selection should only list those attributes that are significant (i.e. those which are used by the client for reference identifier matching), though the Subject field (DN) may contain other attribute types that are not significant for the purpose of reference identifier matching. In the TSS the ST author describes which attribute type, or combination of attributes types, are used by the client to match the presented identifier with the configured identifier. The ST author selects "the reference identifier per RFC 6125 section 6" for TOEs that support FQDN, SRV, and URI identifiers.*

*The ST author selects "IPv4..." and/or "IPv6..." based on the IP versions the TOE supports. The ST author selects "CN or SAN" when IP addresses are supported in the "CN" or "SAN" when the TOE mandates the presence of the SAN. When "CN or SAN" is selected, the TOE only checks the CN when the certificate does not contain the SAN extension.*

*The rules for verification of identity are described in Section 6 of RFC 6125. Additionally, IP address identifiers may be supported in the SAN or CN. The reference identifier is established by the Administrator (e.g. entering a URL into a web browser or clicking a link), by configuration (e.g. configuring the name of a mail server or authentication server), or by an application (e.g. a parameter of an API) depending on the application service. Based on a singular reference identifier's source domain or IP address and application service type (e.g. HTTP, SIP, LDAP), the client establishes all reference identifiers which are acceptable, such as a Common Name for the Subject Name field of the certificate and a (case-insensitive) DNS name, URI name, and Service Name for the Subject Alternative Name field. The client then compares this list of all acceptable reference identifiers to the presented identifiers in the TLS server's certificate.*

*The preferred method for verification is the Subject Alternative Name using DNS names, URI names, or Service Names. Verification using the Common Name may be supported for the purposes of backwards compatibility. When the SAN extension is present in a certificate, the CN must be ignored.*

*Finally, the client should avoid constructing reference identifiers using wildcards. However, if the presented identifiers include wildcards and the TOE supports wildcard, the client must follow the best practices regarding matching; these best practices are captured in the evaluation activity. The exception being, the use of wildcards is not supported when using IP address as the reference identifier*

**FCS\_TLSC\_EXT.1.3** When establishing a trusted channel, by default the TSF shall not establish a trusted channel if the server certificate is invalid. The TSF shall also [selection:

- Not implement any administrator override mechanism
- require administrator authorization to establish the connection if the TSF fails to [selection: match the reference identifier, validate certificate path, validate expiration date, determine the revocation status] of the presented server certificate

].

#### **Application Note 106**

*‘Revocation status’ refers to an OCSP or CRL response that indicates the presented certificate is invalid. Inability to make a connection to determine validity shall be handled as specified in FIA\_X509\_EXT.2.2. If the revocation status of a certificate received by the TOE is ambiguous (e.g. ‘unknown’), this should be treated similar to the situation where no connection could be established to the revocation server and the option ‘determine the revocation status’ could be chosen for this.*

*The purpose of the explicit selection in the SFR is to prevent the TOE providing an override mechanism for situations other than specified in the selection (e.g. one or more certificates in the certification path have been revoked and this status is known to the TOE).*

*If TLS is selected in FTP\_ITC, then certificate validity is tested in accordance with testing performed for FIA\_X509\_EXT.1/Rev.*

*If TLS is selected in FPT\_ITT, then certificate validity is tested in accordance with testing performed for FIA\_X509\_EXT.1/ITT.*

**FCS\_TLSC\_EXT.1.4** The TSF shall [selection: not present the Supported Elliptic Curves/Supported Groups Extension, present the Supported Elliptic Curves/Supported Groups Extension with the following curves/groups: [selection: secp256r1, secp384r1, secp521r1, ffdhe2048, ffdhe3072, ffdhe4096, ffdhe6144, ffdhe8192] and no other curves/groups] in the Client Hello.

#### **Application Note 107**

*If ciphersuites with elliptic curves were selected in FCS\_TLSC\_EXT.1.1, a selection of one or more curves is required. If no ciphersuites with elliptic curves were selected in FCS\_TLSC\_EXT.1.1, then “not present the Support Elliptic Curves/Supported Groups Extension” should be selected.*

*This requirement limits the elliptic curves allowed for authentication and key agreement to the NIST curves from FCS\_COP.1/SigGen and FCS\_CKM.1 and FCS\_CKM.2. This extension is required for clients supporting Elliptic Curve ciphersuites.*

*If ciphersuites with DHE key agreement were selected FCS\_TLSC\_EXT.1.1 and the TOE supports TLS FFC groups (e.g. ffdhe2048), this extension is required. This extension is not required if the TOE only supports non-TLS FFC groups (e.g. Group 14).*

#### **A.2.2.2. FCS\_TLSS\_EXT.1 TLS Server Protocol Without Mutual Authentication**

**FCS\_TLSS\_EXT.1.1** The TSF shall implement [selection: TLS 1.2 (RFC 5246), TLS 1.1 (RFC 4346)] and reject all other TLS and SSL versions. The TLS implementation will support the following ciphersuites:

[selection: select supported ciphersuites from List 1] and no other ciphersuites.

#### **Application Note 108**

*The ciphersuites to be tested in the evaluated configuration are limited by this requirement and must be selected from the ciphersuites defined in List 1. The ST author should select the optional*

*ciphersuites that are supported. Even though RFC 5246 mandates implementation of specific ciphers, there is no requirement to implement TLS\_RSA\_WITH\_AES\_128\_CBC\_SHA in order to claim conformance to this cPP.*

*These requirements will be revisited as new TLS versions are standardized by the IETF.*

*In a future version of this cPP TLS v1.2 will be required for all TOEs.*

**FCS\_TLSS\_EXT.1.2** The TSF shall deny connections from clients requesting SSL 2.0, SSL 3.0, TLS 1.0 and [selection: TLS 1.1, TLS 1.2, none].

#### ***Application Note 109***

*All SSL versions and TLS v1.0 are denied. Any TLS versions not selected in FCS\_TLSS\_EXT.1.1 should be selected here. (If 'none' is the selection for this element then the ST author may omit the words "and none".)*

**FCS\_TLSS\_EXT.1.3** The TSF shall perform key establishment for TLS using [selection: RSA with key size [selection: 2048 bits, 3072 bits, 4096 bits], Diffie-Hellman parameters with size [selection: 2048 bits, 3072 bits, 4096 bits, 6144 bits, 8192 bits], Diffie-Hellman groups [selection: ffdhe2048, ffdhe3072, ffdhe4096, ffdhe6144, ffdhe8192, no other groups], ECDHE curves [selection: secp256r1, secp384r1, secp521r1] and no other curves]].

#### ***Application Note 110***

*The appropriate options shall be selected in the ST according to the key establishment options supported by the TOE. FMT\_SMF.1 requires the configuration of the key agreement parameters to establish the security strength of the TLS connection.*

**FCS\_TLSS\_EXT.1.4** The TSF shall support [selection: no session resumption or session tickets, session resumption based on session IDs according to RFC 4346 (TLS1.1) or RFC 5246 (TLS1.2), session resumption based on session tickets according to RFC 5077].

#### ***Application Note 111***

*If the TOE does not support session resumption or session tickets, select 'no session resumption or session tickets'. If the TOE supports session resumption based on session IDs according to RFC 4346 (TLS1.1) or RFC 5246 (TLS1.2), select 'session resumption based on session IDs according to RFC 4346 (TLS1.1) or RFC 5246 (TLS1.2)'. If the TOE supports session resumption based on session tickets according to RFC 5077, select 'session resumption based on session tickets according to RFC 5077'.*

### **A.2.3. FCS\_SSHC\_EXT & FCS\_SSHS\_EXT SSH Protocol**

SSH is not a required component of this cPP. If a TOE implements SSH, a corresponding selection in FTP\_ITC.1, FPT\_ITT.1 and/or FTP\_TRP.1/Admin should have been made that defines what the SSH protocol is implemented to protect.

A TOE may act as the client or the server in an SSH session. The requirement has been separated into SSH Client (FCS\_SSHC\_EXT) and SSH Server (FCS\_SSHS\_EXT) requirements to allow for these differences.

## A.2.4. FCS\_SSHC\_EXT.1 SSH Client Protocol

**FCS\_SSHC\_EXT.1.1** The TSF shall implement the SSH protocol in accordance with: RFCs 4251, 4252, 4253, 4254, [selection: 4256, 4344, 5647, 5656, 6187, 6668, 8268, 8308 section 3.1, 8332].

### *Application Note 90*

*The following mapping is provided as a guide to ST authors to ensure the appropriate RFC selections are made:*

- RFC 4256 – Select if keyboard-interactive authentication is available
- RFC 4344 – Select if AES-128-CTR or AES-256-CTR modes are available
- RFC 5647 – Select if AEAD\_AES\_128\_GCM or AEAD\_AES\_256\_GCM are available
- RFC 5656 – Select if elliptical curve cryptography is available
- RFC 6187 – Select if X.509 certificates are available for public key algorithms
- RFC 6668 – Select if HMAC-SHA-2 algorithms are available
- RFC 8268 – Select if FFC DH groups with SHA-2 are available
- RFC 8308 Section 3.1 – Select if RFC 8332 is selected
- RFC 8332 – Select if SHA-2 is available with ssh-rsa selection for public key algorithms

*If the negotiated encryption algorithm is one of the [aes\\*-gcm@openssh.com](https://cvsweb.openbsd.org/cgi-bin/cvsweb/src/usr.bin/ssh/PROTOCOL?rev=1.31) algorithms, then the MAC field is ignored during negotiation and implicitly selects AES-GCM for the MAC. However once negotiated the connection is conformant with RFC 5647 and this should be selected when using [aes\\*-gcm@openssh.com](https://cvsweb.openbsd.org/cgi-bin/cvsweb/src/usr.bin/ssh/PROTOCOL?rev=1.31) algorithms. [aes\\*-gcm@openssh.com](https://cvsweb.openbsd.org/cgi-bin/cvsweb/src/usr.bin/ssh/PROTOCOL?rev=1.31) is specified in Section 1.6 of the OpenSSH Protocol Specification (<https://cvsweb.openbsd.org/cgi-bin/cvsweb/src/usr.bin/ssh/PROTOCOL?rev=1.31>).*

*The ST author selects which of the additional RFCs to which conformance is being claimed. An SSH product can implement additional RFCs, but only those listed in the selection can be claimed as conformant under common criteria. The RFC selections for this requirement need to be consistent with selections in later elements of this Package (e.g., cryptographic algorithms permitted). RFC 4253 indicates that certain cryptographic algorithms are “REQUIRED”. This means that the implementation must include support, not that the algorithms must be enabled for use. Ensuring that algorithms indicated as “REQUIRED” but not listed in the later elements of this component are implemented is out of scope of the evaluation activity for this requirement.*

**FCS\_SSHC\_EXT.1.2** The TSF shall ensure that the SSH protocol implementation supports the following authentication methods as described in RFC 4252: public key-based, [selection: password-based, no other method].

**FCS\_SSHC\_EXT.1.3** The TSF shall ensure that, as described in RFC 4253, packets greater than [assignment: number of bytes] bytes in an SSH transport connection are dropped.

### *Application Note 91*

*RFC 4253 provides for the acceptance of ‘large packets’ with the caveat that the packets should be of ‘reasonable length’ or dropped. The assignment should be filled in by the ST author with the maximum*

*packet size accepted, thus defining 'reasonable length' for the TOE.*

**FCS\_SSHC\_EXT.1.4** The TSF shall ensure that the SSH transport implementation uses the following encryption algorithms and rejects all other encryption algorithms: [selection: aes128-cbc, aes256-cbc, aes128-ctr, aes256-ctr, AEAD\_AES\_128\_GCM, AEAD\_AES\_256\_GCM, [aes128-gcm@openssh.com](mailto:aes128-gcm@openssh.com), [aes256-gcm@openssh.com](mailto:aes256-gcm@openssh.com)].

#### ***Application Note 92***

*RFC 5647 specifies the use of the AEAD\_AES\_128\_GCM and AEAD\_AES\_256\_GCM algorithms in SSH. As described in RFC 5647, AEAD\_AES\_128\_GCM and AEAD\_AES\_256\_GCM can only be chosen as encryption algorithms when the same algorithm is being used as the MAC algorithm. Corresponding FCS\_COP entries are included in the ST for the algorithms selected here.*

**FCS\_SSHC\_EXT.1.5** The TSF shall ensure that the SSH public-key based authentication implementation uses [selection: ssh-rsa, rsa-sha2-256, rsa-sha2-512, ecdsa-sha2-nistp256, x509v3-ssh-rsa, ecdsa-sha2-nistp384, ecdsa-sha2-nistp521, x509v3-ecdsa-sha2-nistp256, x509v3-ecdsa-sha2-nistp384, x509v3-ecdsa-sha2-nistp521, x509v3-rsa2048-sha256] as its public key algorithm(s) and rejects all other public key algorithms.

#### ***Application Note 93***

*If x509v3-ssh-rsa, x509v3-ecdsa-sha2-nistp256, x509v3-ecdsa-sha2-nistp384, x509v3-ecdsa-sha2-nistp521 or x509v3-rsa2048-sha256 are selected, then the list of trusted certification authorities must be selected in FCS\_SSHC\_EXT.1.9 and the FIA\_X509\_EXT SFRs in Appendix B are applicable.*

*It is recommended to configure the TOE to reject presented RSA keys with a key length below 2048 bit. RFC 8332 specifies the use of rsa-sha2-256 or rsa-sha2-512 in SSH.*

*Public-key or certificate-based client authentication within the SSH protocol is based on demonstrated possession of a private key matching a public key associated with a given authorized account on a system.*

*If x509v3-based authentication is claimed, the ST shall also include the appropriate FIA\_X509\_EXT SFRs.*

*SSH client implementations that claim to support x509v3-based public key authentication algorithms are expected to be able to parse server certificates that comply with RFC 6187 Section 4 recommendations.*

**FCS\_SSHC\_EXT.1.6** The TSF shall ensure that the SSH transport implementation uses [selection: hmac-sha1, hmac-sha1-96, hmac-sha2-256, hmac-sha2-512, AEAD\_AES\_128\_GCM, AEAD\_AES\_256\_GCM, implicit] as its data integrity MAC algorithm(s) and rejects all other MAC algorithm(s).

#### ***Application Note 94***

*\*RFC 5647 specifies the use of the AEAD\_AES\_128\_GCM and AEAD\_AES\_256\_GCM algorithms in SSH. As described in RFC 5647, AEAD\_AES\_128\_GCM and AEAD\_AES\_256\_GCM can only be chosen as MAC algorithms when the same algorithm is being used as the encryption algorithm. RFC 6668 specifies the use of the sha2 algorithms in SSH.*

The ST author selects “implicit” when, and only when, `aes*-gcm@openssh.com` is selected as an encryption algorithm. When `aes*-gcm@openssh.com` is negotiated as the encryption algorithm, the MAC algorithm field is ignored and GCM is implicitly used as the MAC. “implicit” is not an SSH algorithm identifier and will not be seen on the wire; however, the negotiated MAC might be decoded as “implicit”.

**FCS\_SSHC\_EXT.1.7** The TSF shall ensure that [selection: diffie-hellman-group14-sha1, diffie-hellman-group15-sha512, ecdh-sha2-nistp256] and [selection: diffie-hellman-group14-sha256, diffie-hellman-group16-sha512, diffie-hellman-group17-sha512, diffie-hellman-group18-sha512, ecdh-sha2-nistp384, ecdh-sha2-nistp521, no other methods] are the only allowed key exchange methods used for the SSH protocol.

**FCS\_SSHC\_EXT.1.8** The TSF shall ensure that within SSH connections, the same session keys are used for a threshold of no longer than one hour, and each encryption key is used to protect no more than one gigabyte of data. After any of the thresholds are reached, a rekey needs to be performed.

#### **Application Note 95**

*This SFR defines two thresholds - one for the maximum time span the same session keys can be used and the other one for the maximum amount of data that can be transmitted using the same session keys. Both thresholds need to be implemented and a rekey needs to be performed on whichever threshold is reached first. For the maximum transmitted data threshold, the encrypted traffic per encryption key needs to be counted. It is also acceptable to count the totally transmitted data per encryption key, the total encrypted traffic for incoming and outgoing data or the total transmitted incoming and outgoing data because the encrypted traffic per encryption key will always be lower or equal to the other options. The rekey requirement applies to all session keys (encryption, integrity protection) for incoming and outgoing traffic.*

*It is acceptable for a TOE to implement lower thresholds than the maximum values defined in the SFR.*

*For any configurable threshold related to this requirement the guidance documentation needs to specify how the threshold can be configured. The allowed values must either be specified in the guidance documentation and must be lower or equal to the thresholds specified in this SFR or the TOE must not accept values beyond the thresholds specified in this SFR.*

**FCS\_SSHC\_EXT.1.9** The TSF shall ensure that the SSH client authenticates the identity of the SSH server using a local database associating each host name with its corresponding public key and [selection: a list of trusted certification authorities, no other methods] as described in RFC 4251 section 4.1.

#### **Application Note 96**

*The list of trusted certification authorities can only be selected if x509v3 -ssh-rsa, x509v3-ecdsa-sha2-nistp256, x509v3-ecdsa-sha2-nistp384, x509v3-ecdsa-sha2-nistp521 or x509v3-rsa2048-sha256 are selected in FCS\_SSHC\_EXT.1.5.*

#### **A.2.4.1. FCS\_SSHS\_EXT.1 SSH Server Protocol**

**FCS\_SSHS\_EXT.1.1** The TSF shall implement the SSH protocol in accordance with: RFCs 4251, 4252, 4253, 4254, [selection: 4256, 4344, 5647, 5656, 6187, 6668, 8268, 8308 section 3.1, 8332].



### **Application Note 97**

*The mapping provided in Application Note 90 may be used as a guide here as well to ensure the appropriate RFC selections are made.*

*If the negotiated encryption algorithm is one of the [aes\\*-gcm@openssh.com](https://cvsweb.openbsd.org/cgi-bin/cvsweb/src/usr.bin/ssh/PROTOCOL?rev=1.31) algorithms, then the MAC field is ignored during negotiation and implicitly selects AES-GCM for the MAC. However once negotiated the connection is conformant with RFC 5647 and this should be selected when using [aes\\*-gcm@openssh.com](https://cvsweb.openbsd.org/cgi-bin/cvsweb/src/usr.bin/ssh/PROTOCOL?rev=1.31) algorithms. [aes\\*-gcm@openssh.com](https://cvsweb.openbsd.org/cgi-bin/cvsweb/src/usr.bin/ssh/PROTOCOL?rev=1.31) is specified in Section 1.6 of the OpenSSH Protocol Specification (<https://cvsweb.openbsd.org/cgi-bin/cvsweb/src/usr.bin/ssh/PROTOCOL?rev=1.31>).*

*The ST author selects which of the additional RFCs to which conformance is being claimed. An SSH product can implement additional RFCs, but only those listed in the selection can be claimed as conformant under common criteria. The RFC selections for this requirement need to be consistent with selections in later elements of this Package (e.g., cryptographic algorithms permitted). RFC 4253 indicates that certain cryptographic algorithms are “REQUIRED”. This means that the implementation must include support, not that the algorithms must be enabled for use. Ensuring that algorithms indicated as “REQUIRED” but not listed in the later elements of this component are implemented is out of scope of the evaluation activity for this requirement.*

**FCS\_SSHS\_EXT.1.2** The TSF shall ensure that the SSH protocol implementation supports the following authentication methods as described in RFC 4252: public key-based, [selection: password-based, no other method].

### **Application Note 98**

*If the TOE supports password-based authentication, the option 'password-based' must be selected. If the TOE supports only public key-based authentication, the option 'no other method' must be chosen.*

**FCS\_SSHS\_EXT.1.3** The TSF shall ensure that, as described in RFC 4253, packets greater than [assignment: number of bytes] bytes in an SSH transport connection are dropped.

### **Application Note 99**

*RFC 4253 provides for the acceptance of ‘large packets’ with the caveat that the packets should be of ‘reasonable length’ or dropped. The assignment should be filled in by the ST author with the maximum packet size accepted, thus defining ‘reasonable length’ for the TOE.*

**FCS\_SSHS\_EXT.1.4** The TSF shall ensure that the SSH transport implementation uses the following encryption algorithms and rejects all other encryption algorithms: [selection: aes128-cbc, aes256-cbc, aes128-ctr, aes256-ctr, AEAD\_AES\_128\_GCM, AEAD\_AES\_256\_GCM, [aes128-gcm@openssh.com](https://cvsweb.openbsd.org/cgi-bin/cvsweb/src/usr.bin/ssh/PROTOCOL?rev=1.31), [aes256-gcm@openssh.com](https://cvsweb.openbsd.org/cgi-bin/cvsweb/src/usr.bin/ssh/PROTOCOL?rev=1.31)].

### **Application Note 100**

*RFC 5647 specifies the use of the AEAD\_AES\_128\_GCM and AEAD\_AES\_256\_GCM algorithms in SSH. As described in RFC 5647, AEAD\_AES\_128\_GCM and AEAD\_AES\_256\_GCM can only be chosen as encryption algorithms when the same algorithm is being used as the MAC algorithm. Corresponding FCS\_COP entries are included in the ST for the algorithms selected here.*



**FCS\_SSHS\_EXT.1.5** The TSF shall ensure that the SSH public-key based authentication implementation uses [selection: ssh-rsa, rsa-sha2-256, rsa-sha2-512, ecdsa-sha2-nistp256, x509v3-ssh-rsa, ecdsa-sha2-nistp384, ecdsa-sha2-nistp521, x509v3-ecdsa-sha2-nistp256, x509v3-ecdsa-sha2-nistp384, x509v3-ecdsa-sha2-nistp521, x509v3-rsa2048-sha256] as its public key algorithm(s) and rejects all other public key algorithms.

#### ***Application Note 101***

*If x509v3-ssh-rsa, x509v3-ecdsa-sha2-nistp256, x509v3-ecdsa-sha2-nistp384, x509v3-ecdsa-sha2-nistp521 or x509v3-rsa2048-sha256 are selected, then the FIA\_X509\_EXT SFRs in Appendix B are applicable.*

*It is recommended to configure the TOE to reject presented RSA keys with a key length below 2048 bit. RFC 8332 specifies the use of rsa-sha2-256 or rsa-sha2-512 in SSH.*

*Public-key or certificate-based client authentication within the SSH protocol is based on the demonstrated possession of a private key matching a public key associated with a given authorized account on a system.*

*If x509v3-based authentication is claimed, the ST shall also include the appropriate FIA\_X509\_EXT SFRs.*

*An SSH server implementation that claims to support x509v3-based public key authentication algorithms is expected to comply with RFC 6187 Section 4 recommendations when identifying itself with an x.509v3 certificate to SSH clients.*

**FCS\_SSHS\_EXT.1.6** The TSF shall ensure that the SSH transport implementation uses [selection: hmac-sha1, hmac-sha1-96, hmac-sha2-256, hmac-sha2-512, AEAD\_AES\_128\_GCM, AEAD\_AES\_256\_GCM, implicit] as its MAC algorithm(s) and rejects all other MAC algorithm(s).

#### ***Application Note 102***

*RFC 5647 specifies the use of the AEAD\_AES\_128\_GCM and AEAD\_AES\_256\_GCM algorithms in SSH. As described in RFC 5647, AEAD\_AES\_128\_GCM and AEAD\_AES\_256\_GCM can only be chosen as MAC algorithms when the same algorithm is being used as the encryption algorithm. RFC 6668 specifies the use of the sha2 algorithms in SSH.*

*The ST author selects “implicit” when, and only when, [aes\\*-gcm@openssh.com](#) is selected as an encryption algorithm. When [aes\\*-gcm@openssh.com](#) is negotiated as the encryption algorithm, the MAC algorithm field is ignored and GCM is implicitly used as the MAC. “implicit” is not an SSH algorithm identifier and will not be seen on the wire; however, the negotiated MAC might be decoded as “implicit”.*

**FCS\_SSHS\_EXT.1.7** The TSF shall ensure that [selection: diffie-hellman-group14-sha1, diffie-hellman-group15-sha512, ecdh-sha2-nistp256] and [selection: diffie-hellman-group14-sha256, diffie-hellman-group16-sha512, diffie-hellman-group17-sha512, diffie-hellman-group18-sha512, ecdh-sha2-nistp384, ecdh-sha2-nistp521, no other methods] are the only allowed key exchange methods used for the SSH protocol.

**FCS\_SSHS\_EXT.1.8** The TSF shall ensure that within SSH connections, the same session keys are

used for a threshold of no longer than one hour, and each encryption key is used to protect no more than one gigabyte of data. After any of the thresholds are reached, a rekey needs to be performed.

### ***Application Note 103***

*This SFR defines two thresholds - one for the maximum time span the same session keys can be used and the other one for the maximum amount of data that can be transmitted using the same session keys. Both thresholds need to be implemented and a rekey needs to be performed on whichever threshold is reached first. For the maximum transmitted data threshold, the encrypted traffic per encryption key needs to be counted. It is also acceptable to count the totally transmitted data per encryption key, the total encrypted traffic for incoming and outgoing data or the total transmitted incoming and outgoing data because the encrypted traffic per encryption key will always be lower or equal to the other options. The rekey requirement applies to all session keys (encryption, integrity protection) for incoming and outgoing traffic.*

*It is acceptable for a TOE to implement lower thresholds than the maximum values defined in the SFR.*

*For any configurable threshold related to this requirement the guidance documentation needs to specify how the threshold can be configured. The allowed values must either be specified in the guidance documentation and must be lower or equal to the thresholds specified in this SFR or the TOE must not accept values beyond the thresholds specified in this SFR.*

## **A.2.5. FCS\_HTTPS\_EXT.1 Extended: HTTPS selected**

(selected in FTP\_ITC.1.1, FTP\_TRP.1.1)  
Hierarchical to: No other components.  
Dependencies: FCS\_TLS\_EXT.1 Extended: TLS selected.

**FCS\_HTTPS\_EXT.1.1** The TSF shall implement the HTTPS protocol that complies with RFC 2818.

### ***Application Note:***

*The ST author must provide enough detail to determine how the implementation is complying with the standard(s) identified; this can be done either by adding elements to this component, or by additional detail in the TSS.*

**FCS\_HTTPS\_EXT.1.2** The TSF shall implement HTTPS using TLS as specified in FCS\_TLS\_EXT.1.

## **A.2.6. FCS\_COP.1/KeyedHash Cryptographic Operation (Keyed Hash Algorithm)**

**FCS\_COP.1.1/KeyedHash** 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, implicit*] and cryptographic key sizes [assignment: *key size (in bits) used in HMAC*] and message digest sizes [selection: **160, 256, 384, 512**] bits that meet the following: *ISO/IEC 9797-2:2011, Section 7 “MAC Algorithm 2”*.

### ***Application Note 15***

The key size [k] in the assignment 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  $L2 \leq k \leq L1$ . Select 'implicit' in cases where keyed-hash message authentication is done implicitly (e.g. SSH using AES in GCM mode).

### A.2.7. FIA\_PSK\_EXT.1 Extended: Pre-Shared Key Composition

(selected with FCS\_IPSEC\_EXT.1.4)

Hierarchical to: No other components.

Dependencies: FCS\_RBG\_EXT.1 Extended: Cryptographic Operation (Random Bit Generation)

#### **Application Note:**

The TOE must support pre-shared keys for use in the IPsec protocol. There are two types of pre-shared keys—text-based (which are required) and bit-based (which are optional)—supported by the TOE, as specified in the requirements below. The first type is referred to as “text-based pre-shared keys”, which refer to pre-shared keys that are entered by users as a string of characters from a standard character set, similar to a password. Such pre-shared keys must be conditioned so that the string of characters is transformed into a string of bits, which is then used as the key.

The second type is referred to as “bit-based pre-shared keys” (for lack of a standard term); this refers to keys that are either generated by the TSF on a command from the administrator, or input in “direct form” by an administrator. “Direct form” means that the input is used directly as the key, with no “conditioning” as was the case for text-based pre-shared keys. An example would be a string of hex digits that represent the bits that comprise the key.

The requirements below mandate that the TOE must support text-based pre-shared keys and optionally support bit-based pre-shared keys, although generation of the bit-based pre-shared keys may be done either by the TOE or in the Operational Environment.

**FIA\_PSK\_EXT.1.1** The TSF shall be able to use pre-shared keys for IPsec.

**FIA\_PSK\_EXT.1.2** The TSF shall be able to accept text-based pre-shared keys that are:

- 22 characters in length and [selection: [assignment: *other supported lengths*], *no other lengths*];
- composed of any combination of upper and lower case letters, numbers, and special characters (that include: “!”, “@”, “#”, “\$”, “%”, “^”, “&”, “\*”, “(”, and “”).

**FIA\_PSK\_EXT.1.3** The TSF shall condition the text-based pre-shared keys by using [selection: *SHA-1*, *SHA-256*, *SHA-512*, [assignment: *method of conditioning text string*]] and be able to [selection: *use no other pre-shared keys*; *accept bit-based pre-shared keys*; *generate bit-based pre-shared keys using the random bit generator specified in FCS\_RBG\_EXT.1*].

#### **Application Note:**

For the length of the text-based pre-shared keys, a common length (22 characters) is required to help promote interoperability. If other lengths are supported they should be listed in the assignment; this assignment can also specify a range of values (e.g., “lengths from 5 to 55 characters”) as well.

*In the second selection for FIA\_PSK\_EXT.1.3, the ST author fills in the method by which the text string entered by the administrator is “conditioned” into the bit string used as the key. This can be done by using one of the specified hash functions, or some other method through the assignment statement. If “bit-based pre-shared keys” is selected, the ST author specifies whether the TSF merely accepts bit-based pre-shared keys, or is capable of generating them. If it generates them, the requirement specified that they must be generated using the RBG specified by the requirements. If the use of bit-based pre-shared keys is not supported, the ST author chooses “use no other pre-shared keys”.*

## **A.2.8. FCS\_DTLSC\_EXT & FCS\_DTLSS\_EXT DTLS Protocol**

Datagram TLS (DTLS) is not a required component of the cPP. If a TOE implements DTLS, a corresponding selection in FTP\_ITC.1, FTP\_TRP.1/Admin, or FPT\_ITT.1 should be made to define what the DTLS protocol is implemented to protect. If a corresponding option to support DTLS has been selected in at least one of the SFRs named above, the corresponding selection-based DTLS-related SFRs should be added to the ST from chap. B.3.1.1 (i.e. FCS\_DTLSC\_EXT.1 and/or FCS\_DTLSS\_EXT.1). The SFRs therein cover only the minimum DTLS-related requirements without support for mutual authentication. The support for mutual authentication is optional when using DTLS. If a TOE implements DTLS with mutual authentication the corresponding optional SFRs should be added to the ST from chap. A.7.1.1 (i.e. FCS\_DTLSC\_EXT.2 and/or FCS\_DTLSS\_EXT.2) in addition to the corresponding SFRs from chap.B.3.1.1.

The decision whether to include the support for protocol-level mutual authentication in the scope of the evaluation is regarded as part of the TOE boundary definition. These SFRs can be included in a conforming ST at the discretion of the ST author, even if the conformance statement of the cPP requires exact conformance. It is not mandatory to implement mutually authenticated DTLS in order to conform to this cPP.

A TOE may act as the client, the server, or both in DTLS sessions. The requirement has been separated into DTLS Client (FCS\_DTLSC\_EXT) and DTLS Server (FCS\_DTLSS\_EXT) requirements to allow for these differences.

If the TOE acts as the client during the claimed DTLS sessions, the ST author should claim the corresponding FCS\_DTLSC\_EXT requirements.

To ensure audit requirements are properly met, a DTLS receiver may need to monitor the DTLS connection state at the application layer. When no data is received from a DTLS connection for a long time (where the application decides what ‘long’ means), the receiver should send a close\_notify alert message and close the connection.

If the TOE acts as the server during the claimed DTLS sessions, the ST author should claim the corresponding FCS\_DTLSS\_EXT requirements. In this case the TOE needs to claim at least the FCS\_DTLSS\_EXT.1 requirements in chap. B.3.1.1 (no support for mutual authentication). If the TOE acts as DTLS server and in addition also supports mutual authentication, the FCS\_DTLSS\_EXT.2 requirements in chap. A.7.1.1 need to be claimed in addition. If the TOE acts as both a client and server during the claimed DTLS sessions, the ST author should claim the corresponding FCS\_DTLSC\_EXT and FCS\_DTLSS\_EXT requirements.

#### A.2.8.1. FCS\_DTLSC\_EXT.1 DTLS Client Protocol Without Mutual Authentication

**FCS\_DTLSC\_EXT.1.1** The TSF shall implement [selection: DTLS 1.2 (RFC 6347), DTLS 1.0 (RFC 4347)] supporting the following ciphersuites:

[selection:

- select supported ciphersuites from List 1] and no other ciphersuites.

].

#### **Application Note 63**

*The ciphersuites to be tested in the evaluated configuration are limited by this requirement and must be selected from the ciphersuites defined in List 1, chap..B.3.1.6. The ST author should select the ciphersuites that are supported. Even though RFC 5246 and RFC 6347 mandate implementation of specific ciphers, there is no requirement to implement TLS\_RSA\_WITH\_AES\_128\_CBC\_SHA in order to claim conformance to this cPP.*

*These requirements will be revisited as new DTLS versions are standardized by the IETF.*

*In a future version of this cPP DTLS v1.2 will be required for all TOEs.*

*FCS\_DTLSC\_EXT.1 should only be used if the TOE transmits application-layer data to an external entity using a trusted channel provided by DTLS without receiving application data that needs to be protected.*

**FCS\_DTLSC\_EXT.1.2** The TSF shall verify that the presented identifier matches [selection: the reference identifier per RFC 6125 section 6, IPv4 address in CN or SAN, IPv6 address in the CN or SAN, IPv4 address in SAN, IPv6 address in the SAN, the identifier per RFC 5280 Appendix A using [selection: id-at-commonName, id-at-countryName, id-at-dnQualifier, id-at-generationQualifier, id-at-givenName, id-at-initials, id-at-localityName, id-at-name, id-at-organizationalUnitName, id-at-organizationName, id-at-pseudonym, id-at-serialNumber, id-at-stateOrProvinceName, id-at-surname, id-at-title] and no other attribute types].

#### **Application Note 64**

*Where DTLS is used for connections to or from non-TOE entities (relevant to FTP\_ITC and FTP\_TRP) the ST author shall select RFC 6125. For distributed TOEs (DTLS connections relevant to FPT\_ITT), the ST author may select either RFC 6125 or RFC 5280. If RFC 5280 is selected, the selection is completed by listing the AttributeType (e.g. 'id-at-serialNumber') as defined in RFC 5280 Appendix A. The selection should only list those attributes that are significant (i.e. those which are used by the client for reference identifier matching), though the Subject field (DN) may contain other attribute types that are not significant for the purpose of reference identifier matching. In the TSS, the ST author describes which attribute type, or combination of attributes types, are used by the client to match the presented identifier with the configured identifier. The ST author selects "the reference identifier per RFC 6125 section 6" for TOEs that support FQDN, SRV, and URI identifiers.*

*The ST author selects "IPv4..." and/or "IPv6..." based on the IP versions the TOE supports. The ST author selects "CN or SAN" when IP addresses are supported in the "CN" or "SAN" when the TOE mandates the presence of the SAN. When "CN or SAN" is selected, the TOE only checks the CN when*

*the certificate does not contain the SAN extension.*

*The rules for verification of identity are described in Section 6 of RFC 6125. Additionally, IP address identifiers may be supported in the SAN or CN. The reference identifier is established by the Administrator (e.g. entering a URL into a web browser or clicking a link), by configuration (e.g. configuring the name of a mail server or authentication server), or by an application (e.g. a parameter of an API) depending on the application service. Based on a singular reference identifier's source domain or IP address and application service type (e.g. HTTP, SIP, LDAP), the client establishes all reference identifiers which are acceptable, such as a Common Name for the Subject Name field of the certificate and a (case-insensitive) DNS name, URI name, and Service Name for the Subject Alternative Name field. The client then compares this list of all acceptable reference identifiers to the presented identifiers in the TLS server's certificate.*

*The preferred method for verification is the Subject Alternative Name using DNS names, URI names, or Service Names. Verification using the Common Name may be supported for the purposes of backwards compatibility. When the SAN extension is present in a certificate, the CN must be ignored.*

*Finally, the client should avoid constructing reference identifiers using wildcards. However, if the presented identifiers include wildcards and the TOE supports wildcard, the client must follow the best practices regarding matching; these best practices are captured in the evaluation activity. The exception being, the use of wildcards is not supported when using IP address as the reference identifier.*

**FCS\_DTLSC\_EXT.1.3** When establishing a trusted channel, by default the TSF shall not establish a trusted channel if the server certificate is invalid. The TSF shall also [selection:

- Not implement any administrator override mechanism
- require administrator authorization to establish the connection if the TSF fails to [selection: match the reference identifier, validate certificate path, validate expiration date, determine the revocation status] of the presented server certificate

].

#### **Application Note 65**

*'Revocation status' refers to an OCSP or CRL response that indicates the presented certificate is invalid. Inability to make a connection to determine validity shall be handled as specified in FIA\_X509\_EXT.2.2. If the revocation status of a certificate received by the TOE is ambiguous (e.g. 'unknown'), this should be treated similar to the situation where no connection could be established to the revocation server and the option 'determine the revocation status' could be chosen for this.*

*The purpose of the explicit selection in the SFR is to prevent the TOE from providing an override mechanism for situations other than specified in the selection (e.g. one or more certificates in the certification path have been revoked and this status is known to the TOE).*

*If DTLS is selected in FTP\_ITC then certificate validity is tested in accordance with testing performed for FIA\_X509\_EXT.1/Rev.*

*If DTLS is selected in FPT\_ITT, then certificate validity is tested in accordance with testing performed for FIA\_X509\_EXT.1/ITT.*

**FCS\_DTLSC\_EXT.1.4** The TSF shall [selection: not present the Supported Elliptic Curves/Supported Groups Extension, present the Supported Elliptic Curves/Supported Groups Extension with the following curves/groups: [selection: secp256r1, secp384r1, secp521r1, ffdhe2048, ffdhe3072, ffdhe4096, ffdhe6144, ffdhe8192] and no other curves/groups] in the Client Hello.

#### ***Application Note 66***

*If ciphersuites with elliptic curves were selected in FCS\_DTLSC\_EXT.1.1, a selection of one or more curves is required. If no ciphersuites with elliptic curves were selected in FCS\_DTLSC\_EXT.1.1, then “not present the Supported Elliptic Curves Extension” should be selected.*

*This requirement limits the elliptic curves allowed for authentication and key agreement to the NIST curves from FCS\_COP.1/SigGen and FCS\_CKM.1 and FCS\_CKM.2. This extension is required for clients supporting Elliptic Curve ciphersuites.*

*If ciphersuites with DHE key agreement were selected FCS\_DTLSC\_EXT.1.1 and the TOE supports TLS FFC groups (e.g. ffdhe2048), this extension is required. This extension is not required if the TOE only supports non-TLS FFC groups (e.g. Group 14).*

#### **A.2.8.2. FCS\_DTLSS\_EXT.1 DTLS Server Protocol Without Mutual Authentication**

**FCS\_DTLSS\_EXT.1.1** The TSF shall implement [selection: DTLS 1.2 (RFC 6347), DTLS 1.0 (RFC 4347)] supporting the following ciphersuites:

[selection:

- select supported ciphersuites from List 1] and no other ciphersuites.

#### ***Application Note 67***

*The ciphersuites to be tested in the evaluated configuration are limited by this requirement and must be selected from the ciphersuites defined in List 1, chap. B.3.1.6. The ST author should select the ciphersuites that are supported. Even though RFC 5246 and RFC 6347 mandate implementation of specific ciphers, there is no requirement to implement TLS\_RSA\_WITH\_AES\_128\_CBC\_SHA in order to claim conformance to this cPP.*

*These requirements will be revisited as new DTLS versions are standardized by the IETF.*

*In a future version of this cPP DTLS v1.2 will be required for all TOEs.*

**FCS\_DTLSS\_EXT.1.2** The TSF shall deny connections from clients requesting none.

#### ***Application Note 68***

*This version of the cPP does not require the TOE to deny DTLS v1.0. In a future version of this cPP DTLS v1.0 will be required to be denied for all TOEs.*

**FCS\_DTLSS\_EXT.1.3** The TSF shall not proceed with a connection handshake attempt if the DTLS Client fails validation.

#### ***Application Note 69***

*The process to validate the DTLS client is specified in section 4.2.1 of RFC 6347 (DTLS 1.2) and RFC 4347 (DTLS 1.0). The TOE validates the DTLS client during Connection Establishment (Handshaking) and prior to the TSF sending a Server Hello message. After receiving a ClientHello, the DTLS Server sends a HelloVerifyRequest along with a cookie. The cookie is a signed message using the keyed hash function specified in FCS\_COP.1/KeyedHash. The DTLS Client then sends another ClientHello with the cookie attached. If the DTLS server successfully verifies the signed cookie, the Client is not using a spoofed IP address.*

**FCS\_DTLSS\_EXT.1.4** The TSF shall perform key establishment for TLS using [selection: RSA with key size [selection: 2048 bits, 3072 bits, 4096 bits], Diffie-Hellman parameters with size [selection: 2048 bits, 3072 bits, 4096 bits, 6144 bits, 8192 bits], Diffie-Hellman groups [selection: ffdhe2048, ffdhe3072, ffdhe4096, ffdhe6144, ffdhe8192, no other groups], ECDHE curves [selection: secp256r1, secp384r1, secp521r1] and no other curves].

#### ***Application Note 70***

*The appropriate options shall be selected in the ST according to the key establishment options supported by the TOE. FMT\_SMF.1 requires the configuration of the key agreement parameters to establish the security strength of the DTLS connection.*

**FCS\_DTLSS\_EXT.1.5** The TSF shall [selection: terminate the DTLS session, silently discard the record] if a message received contains an invalid MAC.

#### ***Application Note 71***

*The Message Authentication Code (MAC) is negotiated during DTLS handshake phase and is used to protect integrity of messages received from the sender during DTLS data exchange. If MAC verification fails, the session must be terminated, or the record must be silently discarded.*

**FCS\_DTLSS\_EXT.1.6** The TSF shall detect and silently discard replayed messages for:

- DTLS records previously received.
- DTLS records too old to fit in the sliding window.

#### ***Application Note 72***

*Replay Detection is described in section 4.1.2.6 of DTLS 1.2 (RFC 6347) and section 4.1.2.5 of DTLS 1.0 (RFC 4347). For each received record, the receiver verifies the record contains a sequence number that is within the sliding receive window and does not duplicate the sequence number of any other record received during the session. "Silently Discard" means the TOE discards the packet without responding.*

**FCS\_DTLSS\_EXT.1.7** The TSF shall support [selection: no session resumption or session tickets, session resumption based on session IDs according to RFC 4346 (TLS1.1) or RFC 5246 (TLS1.2), session resumption based on session tickets according to RFC 5077].

#### ***Application Note 73***

*If the TOE does not support session resumption or session tickets, select 'no session resumption or session tickets'. If the TOE supports session resumption based on session IDs according to RFC 4346 (TLS1.1) or RFC 5246 (TLS1.2), select 'session resumption based on session IDs according to RFC 4346*



(TLS1.1) or RFC 5246 (TLS1.2)'. If the TOE supports session resumption based on session tickets according to RFC 5077, select 'session resumption based on session tickets according to RFC 5077'.

## A.3. Trusted Update

### A.3.1. FCS\_COP.1/Hash Cryptographic Operation (Hash Algorithm)

**FCS\_COP.1.1/Hash** The TSF shall perform cryptographic hashing services in accordance with a specified cryptographic algorithm [selection: *SHA-1, SHA-256, SHA-384, SHA-512*] ~~and~~ cryptographic key sizes [assignment: cryptographic key sizes] ~~and~~  **message digest sizes** [selection: **160, 256, 384, 512**] bits that meet the following: *ISO/IEC 10118-3:2004*.

#### **Application Note 14**

*Developers are strongly encouraged to implement updated protocols that support the SHA-2 family; until updated protocols are supported, this cPP allows support for SHA-1 implementations in compliance with SP 800-131A. In a future version of this cPP, SHA-256 will be the minimum requirement for all TOEs.*

*The hash selection should be consistent with the overall strength of the algorithm used for FCS\_COP.1/DataEncryption and FCS\_COP.1/SigGen (for example, SHA 256 for 128-bit keys).*

## A.4. Passphrase-based Key Entry

The SFRs in this section are to be incorporated in the ST to support the optional Passphrase-based Key Entry function.

### A.4.1. FCS\_PCC\_EXT.1 Extended: Cryptographic Password Construct and Conditioning

(for 0. STORAGE\_ENCRYPTION)

Hierarchical to: No other components

Dependencies: FCS\_COP.1(h) Cryptographic Operation (for keyed-hash message authentication)

**FCS\_PCC\_EXT.1.1** A password used by the TSF to generate a password authorization factor shall enable up to [assignment: *positive integer of 64 or more*] characters in the set of {upper case characters, lower case characters, numbers, and [assignment: *other supported special characters*]} and shall perform Password-based Key Derivation Functions in accordance with a specified cryptographic algorithm [HMAC-[selection: *SHA-256, SHA-384, SHA-512*]], with [assignment: *positive integer of 1000 or more*] iterations, and output cryptographic key sizes [selection: *128, 256*] bits that meet the following: [NIST SP 800-132].

#### **Application Note:**

*This SFR is conditionally required if the manual entry of a drive encryption passphrase is supported by the TOE.*

## A.4.2. FCS\_KDF\_EXT Extended: Cryptographic Key Derivation

(for 0. STORAGE\_ENCRYPTION)

Hierarchical to: No other components

Dependencies: FCS\_COP.1(h) Cryptographic Operation (for keyed-hash message authentication),

[if selected: FCS\_RBG\_EXT.1 Extended: Cryptographic Operation (Random Bit Generation)]

**FCS\_KDF\_EXT.1.1** The TSF shall accept [selection: *a RNG generated submask as specified in FCS\_RBG\_EXT.1, a conditioned password submask, imported submask*] to derive an intermediate key, as defined in [selection: *NIST SP 800-108 [selection: *KDF in Counter Mode, KDF in Feedback Mode, KDF in Double-Pipeline Iteration Mode*], NIST SP 800-132*], using the keyed-hash functions specified in FCS\_COP.1(h), such that the output is at least of equivalent security strength (in number of bits) to the BEV.

## A.4.3. FCS\_COP.1(h) Cryptographic Operation (for keyed-hash message authentication)

(selected with FCS\_PCC\_EXT.1, FCS\_KDF\_EXT.1.1)

Hierarchical to: No other components.

Dependencies: [~~FDP\_ITC.1 Import of user data without security attributes, or FDP\_ITC.2 Import of user data with security attributes, or~~

FCS\_CKM.1(b) Cryptographic key generation (Symmetric Keys)]

FCS\_COP.1/Hash Cryptographic operation (Hash Algorithm),

FCS\_CKM\_EXT.4 Extended: Cryptographic Key Material Destruction

**FCS\_COP.1.1(h) Refinement:** The TSF shall perform [keyed-hash message authentication] in accordance with [selection: *HMAC-SHA-1, HMAC-SHA-256, HMAC-SHA-512*] and cryptographic key sizes [assignment: *key size (in bits) used in HMAC*] that meet the following: [ISO/IEC 9797-2:2011, Section 7 “MAC Algorithm 2”; ISO/IEC 10118].

### Application Note:

*The key size [k] in the assignment 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  $L2 \leq k \leq L1$ .*

## A.4.4. FCS\_SNI\_EXT.1 Extended: Cryptographic Operation (Salt, Nonce, and Initialization Vector Generation)

(selected with FCS\_PCC\_EXT.1, FCS\_KDF\_EXT.1.1)

Hierarchical to: No other components

Dependencies: FCS\_RBG\_EXT.1 Extended: Cryptographic Operation (Random Bit Generation)

**FCS\_SNI\_EXT.1.1** The TSF shall only use salts that are generated by a RNG as specified in

FCS\_RBG\_EXT.1.

**FCS\_SNI\_EXT.1.2** The TSF shall only use unique nonces with a minimum size of [64] bits.

**FCS\_SNI\_EXT.1.3** The TSF shall create IVs in the following manner: [

- CBC: IVs shall be non-repeating,
- CCM: Nonce shall be non-repeating.
- XTS: No IV. Tweak values shall be non-negative integers, assigned consecutively, and starting at an arbitrary non-negative integer,
- GCM: IV shall be non-repeating. The number of invocations of GCM shall not exceed  $2^{32}$  for a given secret key.

].

***Application Note:***

*This SFR is conditionally required if the manual entry of a drive encryption passphrase is supported by the TOE.*

## **A.5. Identification and Authentication (FIA)**

### **A.5.1. Authentication using X.509 certificates (Extended – FIA\_X509\_EXT)**

X.509 certificate-based authentication is required if IPsec or TLS communications are claimed for FPT\_ITT, FTP\_ITC.1 or FTP\_TRP. These SFRs are also required if FPT\_TUD\_EXT.2 is claimed. If SSH client communications are claimed and any x509 algorithms are claimed in FCS\_SSHC\_EXT.1.5 or FCS\_SSHS\_EXT.1.5, these SFRs are required. In the case of the TOE only acting as the SSH server or acting as the client, but not claiming any x509 algorithms in FCS\_SSHC\_EXT.1.5 or FCS\_SSHS\_EXT.1.5, these SFRs are optional.

Although the functionality in FIA\_X509\_EXT.1/Rev and FIA\_X509\_EXT.2 is always required when using X.509 certificate-based authentication, the TOE only needs to be able to generate a Certification Request if the TOE needs to present an X.509 certificate to another endpoint via the TSF for authentication (i.e. if at least one of the following SFRs is included in the ST: FCS\_DTLSC\_EXT.2, FCS\_DTLSS\_EXT.1, FCS\_DTLSS\_EXT.2, FCS\_IPSEC\_EXT.1, FCS\_SSHC\_EXT.1.5 (applicable only if at least one of the x509v3-\* ciphers is selected), FCS\_SSHS\_EXT.1.5 (applicable only if at least one of the x509v3-\* ciphers is selected), FCS\_TLSC\_EXT.2, FCS\_TLSS\_EXT.1, FCS\_TLSS\_EXT.2).. Therefore FIA\_X509\_EXT.3 only needs to be added to the ST in this case. If the TOE does not need to present an X.509 certificate to another endpoint via the TSF for authentication (e.g. a client not supporting mutual authentication) the use of FIA\_X509\_EXT.3 is optional.

#### **A.5.1.1. FIA\_X509\_EXT.1 X.509 Certificate Validation**

FIA\_X509\_EXT.1/Rev X.509 Certificate Validation

**FIA\_X509\_EXT.1.1/Rev** The TSF shall validate certificates in accordance with the following rules:

- RFC 5280 certificate validation and certification path validation supporting a minimum path

length of three certificates.

- The certification path must terminate with a trusted CA certificate designated as a trust anchor.
- The TSF shall validate a certification path by ensuring that all CA certificates in the certification path contain the basicConstraints extension with the CA flag set to TRUE.
- The TSF shall validate the revocation status of the certificate using [selection: the Online Certificate Status Protocol (OCSP) as specified in RFC 6960, a Certificate Revocation List (CRL) as specified in RFC 5280 Section 6.3, Certificate Revocation List (CRL) as specified in RFC 5759 Section 5].
- The TSF shall validate the extendedKeyUsage field according to the following rules:

- Certificates used for trusted updates and executable code integrity verification shall have the Code Signing purpose (id-kp 3 with OID 1.3.6.1.5.5.7.3.3) in the extendedKeyUsage field.
- Server certificates presented for TLS shall have the Server Authentication purpose (id-kp 1 with OID 1.3.6.1.5.5.7.3.1) in the extendedKeyUsage field.
- Client certificates presented for TLS shall have the Client Authentication purpose (id-kp 2 with OID 1.3.6.1.5.5.7.3.2) in the extendedKeyUsage field.
- OCSP certificates presented for OCSP responses shall have the OCSP Signing purpose (id-kp 9 with OID 1.3.6.1.5.5.7.3.9) in the extendedKeyUsage field.

**FIA\_X509\_EXT.1.2/Rev** The TSF shall only treat a certificate as a CA certificate if the basicConstraints extension is present and the CA flag is set to TRUE.

### **Application Note 112**

*FIA\_X509\_EXT.1.1/Rev lists the rules for validating certificates. The ST author selects whether revocation status is verified using OCSP or CRLs. The trusted channel/path protocols may require that certificates are used; this use may require that specific certificate extensions must be present and checked. If the TOE supports functionality that does not use any of the possible values listed in the specific certificate extension, then it is reasonable to process such certificate as the relevant part of the SFR is considered trivially satisfied. However, this does not mean that it is allowable to accept certificates with inappropriate extension values simply because a specific security function is not implemented by the TOE. For example, the TOE should not successfully authenticate a web server that presents an X.509v3 certificate that has extendedKeyUsage set to only OCSPSigning, even if the TOE does not implement OCSP revocation checking. The TOE shall be capable of supporting a minimum path length of three certificates. That is, the TOE shall support a hierarchy comprising of at least a self-signed root CA certificate, a subordinate CA certificate, and a leaf certificate. The chain validation is expected to terminate with a trust anchor. This means the validation can terminate with any trusted CA certificate designated as a trust anchor. This CA certificate must be loaded into the trust store ('certificate store', 'trusted CA Key Store' or similar) managed by the TOE trust store. If the TOE's trust store supports loading of multiple hierarchical CA certificates or certificate chains, the TOE must clearly indicate all certificates that it considers trust anchors.*

*The validation of X.509v3 leaf certificates comprises several steps:*

a) A Certificate Revocation Check refers to the process of determining the current revocation status of an otherwise structurally valid certificate. This must be performed every time a certificate is used for authentication. This check must be performed for each certificate in the chain up to, but not including, the trust anchor. This means that CA certificates that are not trust anchors, and leaf certificates in the chain, must be checked. It is not required to check the revocation status of any CA certificate designated a trust anchor, however if such check is performed it must be handled consistently with how other certificates are checked.

b) An expiration check must be performed. This check must be conducted for each certificate in the chain, up to and including the trust anchor.

c) The continuity of the chain must be checked, showing that the signature on each certificate that is presented to the TOE is valid and the chain terminates at the trust anchor.

d) The presence of relevant extensions in each certificate in the chain such as the extendedKeyUsage parameters of the leaf certificate must correspond to SFR-relevant functionality. For example, a peer acting as a web server should have TLS Web Server Authentication listed as an extendedKeyUsage parameter of its X.509v3 certificate. It shall be checked that the relevant extensions in each certificate in the chain such as the extendedKeyUsage parameters of the leaf certificate correspond to the SFR-relevant functionality they are used with.

*It is expected that revocation checking is performed when a certificate is used in an authentication step. It is expected that revocation checking is performed on both leaf and intermediate CA certificates when a leaf certificate is presented to the TOE as part of the certificate chain during authentication. Revocation checking of any CA certificate designated a trust anchor is not required.*

*If the TOE implements mutual authentication or acts as a server, there is no expectation of performing any checks on TOE's own leaf certificate during authentication.*

*FIA\_X509\_EXT.1.2/Rev applies to certificates that are used and processed by the TSF and restricts the certificates that may be added as trusted CA certificates.*

*The ST author must include FIA\_X509\_EXT.1/Rev in all instances except when only SSH is selected within FTP\_ITC.1 or FPT\_ITT.1, and implementation is limited to public-key authentication that does not rely on X.509 certificates. Additionally, FIA\_X509\_EXT.1/Rev must also be included if FPT\_TUD\_EXT is included in the ST.*

#### **A.5.1.2. FIA\_X509\_EXT.2 X.509 Certificate Authentication**

**FIA\_X509\_EXT.2.1** The TSF shall use X.509v3 certificates as defined by RFC 5280 to support authentication for [selection: DTLS, HTTPS, IPsec, SSH, TLS, no protocols] and [selection: code signing for system software updates[assignment: other uses], no additional uses].

**FIA\_X509\_EXT.2.2** When the TSF cannot establish a connection to determine the validity of a certificate, the TSF shall [selection: *allow the Administrator to choose whether to accept the certificate in these cases, accept the certificate, not accept the certificate*].

### **Application Note 113**

*In FIA\_X509\_EXT.2.1, the ST author's selection includes IPsec, TLS, or HTTPS if these protocols are included in FTP\_ITC.1.1 or FPT\_ITT.1. SSH should be included if authentication other than ssh-rsa, ecdsa-sha2-nistp256, ecdsa-sha2-nistp384, and/or ecdsa-sha2-nistp521 is selected in FCS\_SSHC\_EXT.1.5 or FCS\_SSHS\_EXT.1.5. The ST author selects "code signing for system software updates" when "X.509 certificate" is selected in FPT\_TUD\_EXT.1.3.*

*Often a connection must be established to check the revocation status of a certificate - either to download a CRL or to perform a lookup using OCSP. In FIA\_X509\_EXT.2.2 the selection is used to describe the behaviour in the event that such a connection cannot be established (for example, due to a network error). If the TOE has determined the certificate is valid according to all other rules in FIA\_X509\_EXT.1/Rev, the behaviour indicated in the selection determines the validity. The TOE must not accept the certificate if it fails any of the other validation rules in FIA\_X509\_EXT.1/Rev. If the Administrator-configured option is selected by the ST Author, the ST Author also selects the corresponding function in FMT\_SMF.1. The selection should be consistent with the validation requirements in FCS\_IPSEC\_EXT.1.14, FCS\_TLSC\_EXT.1.3 and FCS\_TLSC\_EXT.2.3.*

*If the TOE is distributed and FIA\_X509\_EXT.1/ITT is selected, then certificate revocation checking is optional. This is due to additional authorization actions being performed in the enabling and disabling of the intra-TOE trusted channel as defined in FCO\_CPC\_EXT.1. In this case, a connection is not required to determine certificate validity and this SFR is trivially satisfied.*

*The ST author must include FIA\_X509\_EXT.2 in all instances except when only SSH is selected within FTP\_ITC.1 or FPT\_ITT.1 and ssh-rsa, ecdsa-sha2-nistp256, ecdsa-sha2-nistp384, and/or ecdsa-sha2-nistp521 authentication is also selected. Additionally, FIA\_X509\_EXT.2 must also be included if FPT\_TUD\_EXT.2 is included in the ST.*

### **A.5.1.3. FIA\_X509\_EXT.3 X.509 Certificate Requests**

Although the functionality in FIA\_X509\_EXT.1/Rev and FIA\_X509\_EXT.2 is always required when using X.509 certificate-based authentication, the TOE only needs to be able to generate a Certification Request if the TOE needs to present an X.509 certificate to another endpoint via the TSF for authentication (i.e. if at least one of the following SFRs is included in the ST: FCS\_DTLSC\_EXT.2, FCS\_DTLSS\_EXT.1, FCS\_DTLSS\_EXT.2, FCS\_IPSEC\_EXT.1, FCS\_SSHC\_EXT.1.5 (applicable only if at least one of the x509v3-\* ciphers is selected), FCS\_SSHS\_EXT.1.5 (applicable only if at least one of the x509v3-\* ciphers is selected), FCS\_TLSC\_EXT.2, FCS\_TLSS\_EXT.1, FCS\_TLSS\_EXT.2). Therefore FIA\_X509\_EXT.3 only needs to be added to the ST in this case. If the TOE does not need to present an X.509 certificate to another endpoint via the TSF for authentication (e.g. a client not supporting mutual authentication) the use of FIA\_X509\_EXT.3 is optional. This element must be included in the ST if X.509 certificates are used as part of FTP\_ITC.1, FTP\_TRP.1/Admin, or FPT\_ITT.1 where the TOE authenticating itself to external IT entities, administrators, or distributed components.

**FIA\_X509\_EXT.3.1** The TSF shall generate a Certificate Request as specified by RFC 2986 and be able

to provide the following information in the request: public key and [selection: *device-specific information, Common Name, Organization, Organizational Unit, Country*].

#### ***Application Note 114***

*The public key is the public key portion of the public-private key pair generated by the TOE as specified in FCS\_CKM.1.*

**FIA\_X509\_EXT.3.2** The TSF shall validate the chain of certificates from the Root CA upon receiving the CA Certificate Response.

## **Appendix B: Conditionally Mandatory Requirements**

The following are security functional requirements that are mandatory if the TOE configuration meets the condition(s) specified in section 1.3.1.2 [BV: broken reference to "Conditionally Mandatory Uses"].

### **B.1. Confidential Data on Nonvolatile Storage Devices**

#### **B.1.1. FPT\_KYP\_EXT.1 Extended: Protection of Key and Key Material**

(for O.KEY\_MATERIAL)  
Hierarchical to: No other components.  
Dependencies: FCS\_KYC\_EXT.1 Extended: Key Chaining

**FPT\_KYP\_EXT.1.1 Refinement:** The TSF shall not store plaintext keys that are part of the keychain specified by FCS\_KYC\_EXT.1 in any Nonvolatile Storage Device.

#### **B.1.2. FCS\_KYC\_EXT.1 Extended: Key Chaining**

(for O.STORAGE\_ENCRYPTION)  
Hierarchical to: No other components.  
Dependencies: [FCS\_COP.1(e) Cryptographic operation (Key Wrapping),  
FCS\_SMC\_EXT.1 Extended: Submask Combining,  
FCS\_COP.1(f) Cryptographic operation (Key Encryption),  
FCS\_KDF\_EXT.1 Cryptographic Operation (Key Derivation),  
and/or  
FCS\_COP.1(i) Cryptographic operation (Key Transport)]

#### ***Application Note:***

*This SFR forms a keychain that terminates either with a DEK or a BEV to unlock a self-encrypting drive. If passwords are not used, it can be a keychain of one, with no intermediate keys forming the DEK or BEV, provided that key is protected. For example, if the DEK for an SED is not stored on the*

*SED and is released on power-up, a keychain of one is allowed.*

**FCS\_KYC\_EXT.1.1** The TSF shall maintain a key chain of: [selection: one, using a submask as the BEV or DEK; intermediate keys originating from one or more submask(s) to the BEV or DEK using the following method(s): [selection: key wrapping as specified in FCS\_COP.1(e), key combining as specified in FCS\_SMC\_EXT.1, key encryption as specified in FCS\_COP.1(f), key derivation as specified in FCS\_KDF\_EXT.1, key transport as specified in FCS\_COP.1(i)]] while maintaining an effective strength of [selection: 128 bits, 256 bits].

***Application Note:***

*Key Chaining is the method of using multiple layers of encryption keys to ultimately secure the BEV (Border Encryption Value). The number of intermediate keys will vary – from one (e.g., taking the conditioned password authorization factor and directly using it as the BEV) to many. This applies to all keys that contribute to the ultimate wrapping or derivation of the BEV; including those in areas of protected storage (e.g. TPM stored keys, comparison values).*

*Multiple key chains to the BEV are allowed, as long as all chains meet the key chain requirement.*

*Once the ST Author has selected a method to create the chain (either by unwrapping or encrypting keys), they pull the appropriate requirement out of this appendix. It is allowable for an implementation to use for any or all methods.*

*The method the TOE uses to chain keys and manage/protect them is described in the Key Management Description; see Key Management Description for more information.*

### **B.1.3. FDP\_DSK\_EXT.1 Extended: Protection of Data on Disk**

(for 0.STORAGE\_ENCRYPTION)

Hierarchical to: No other components.

Dependencies: FCS\_COP.1(d) Cryptographic operation (AES Data Encryption/Decryption).

**FDP\_DSK\_EXT.1.1** The TSF shall [selection: perform encryption in accordance with FCS\_COP.1(d), use a self-encrypting Nonvolatile Storage Device that is separately CC certified to conform to the FDE EE cPP], such that any Nonvolatile Storage Device contains no plaintext User Document Data and no plaintext Confidential TSF Data.

***Application Note:***

*If the self-encrypting device option is selected, the device must be certified in conformance to the current Full Disk Encryption Protection Profile. The ST Author should consult with a CC Scheme for advice on approved Protection Profiles.*

**FDP\_DSK\_EXT.1.2** The TSF shall encrypt all protected data without user intervention.

***Application Note:***

*The intent of this requirement is to specify that encryption of any confidential data will not depend on a user electing to protect that data. The encryption specified in FDP\_DSK\_EXT.1 occurs transparently*



to the user and the decision to protect the data is outside the discretion of the user.

If a vendor makes the selection "use a self-encrypting Nonvolatile Storage Device that is separately CC certified to conform to the FDE EE cPP" in FDP\_DSK\_EXT.1.1, testing is not required as SED testing is performed within the FDE EE cPP already.

The TSS, KMD, and test sections only apply to parts of the TOE which fall under the selection "perform encryption in accordance with FCS\_COP.1(d)".

## B.2. PSTN Fax-Network Separation

### B.2.1. FDP\_FXS\_EXT.1 Extended: Fax separation

(for 0.FAX\_NET\_SEPARATION)  
Hierarchical to: No other components.  
Dependencies: No dependencies.

**FDP\_FXS\_EXT.1.1** The TSF shall prohibit communication via the fax interface, except transmitting or receiving User Data using fax protocols.

*Application note:*

*FDP\_FXS\_EXT.1 is required if fax-net separation is performed by the TSF.*

## B.3. Network Communications

### B.3.1. FTP\_TRP.1(b) Trusted path (for Non-administrators)

(for 0.COMMS\_PROTECTION)  
Hierarchical to: No other components.  
Dependencies: [FCS\_IPSEC\_EXT.1 Extended: IPsec selected, or  
FCS\_TLS\_EXT.1 Extended: TLS selected, or  
FCS\_SSH\_EXT.1 Extended: SSH selected, or  
FCS\_HTTPS\_EXT.1 Extended: HTTPS selected].

**FTP\_TRP.1.1(b) Refinement:** The TSF shall use [selection, choose at least one of: IPsec, SSH, TLS, TLS/HTTPS] to provide a trusted communication path between itself and remote users that is logically distinct from other communication paths and provides assured identification of its end points and protection of the communicated data from disclosure and detection of modification of the communicated data.

**FTP\_TRP.1.2(b) Refinement:** The TSF shall permit [selection: the TSF, remote users] to initiate communication via the trusted path

**FTP\_TRP.1.3(b) Refinement:** The TSF shall require the use of the trusted path for initial user authentication and all remote user actions.

### **Application Note:**

*This requirement ensures that authorized remote users initiate all communication with the TOE via a trusted path, and that all communications with the TOE by remote users is performed over this path. The data passed in this trusted communication path are encrypted as defined the protocol chosen in the first selection. The ST author chooses the mechanism or mechanisms supported by the TOE, and then ensures the detailed requirements in Appendix D.2 corresponding to their selection are copied to the ST if not already present.*

## **Appendix C: Optional Requirements**

ST authors are free to choose none, some or all SFRs defined in this chapter. Just the fact that a product supports a certain functionality does not mandate to add any SFR defined in this chapter.

### **C.1. Image Overwrite**

The SFRs in this section are to be incorporated in the ST to support the optional Image Overwrite function.

#### **C.1.1. FDP\_RIP.1(a) Subset residual information protection**

(for 0.IMAGE\_OVERWRITE)  
Hierarchical to: No other components.  
Dependencies: No dependencies.

**FDP\_RIP.1.1(a) Refinement:** The TSF shall ensure that any previous information content of a resource is made unavailable **by overwriting data** upon the **deallocation of the resource** from the following objects: **D.USER.DOC**.

### **C.2. Purge Data**

The SFRs in this section are to be incorporated in the ST to support the optional Purge Data function.

#### **C.2.1. FDP\_RIP.1(b) Subset residual information protection**

(for 0.PURGE\_DATA)  
Hierarchical to: No other components.  
Dependencies: No dependencies.

**FDP\_RIP.1.1(b) Refinement:** The TSF shall ensure that any previous **customer-supplied** information content of a resource is made unavailable upon the **request of an Administrator** to the following objects: **D.USER, D.TSF**.

## C.3. Asymmetric Key Generation

The SFR in this section is used if the TOE generates asymmetric key pairs for communications.

### C.3.1. FCS\_CKM.1(a) Cryptographic Key Generation

**FCS\_CKM.1(a).1** The TSF shall generate **asymmetric** cryptographic keys in accordance with a specified cryptographic key generation algorithm: [selection:

- *RSA schemes using cryptographic key sizes of 2048-bit or greater that meet the following: FIPS PUB 186-4, “Digital Signature Standard (DSS)”, Appendix B.3;*
- *ECC schemes using ‘NIST curves’ [selection: P-256, P-384, P-521] that meet the following: FIPS PUB 186-4, “Digital Signature Standard (DSS)”, Appendix B.4;*
- *FFC schemes using cryptographic key sizes of 2048-bit or greater that meet the following: FIPS PUB 186-4, “Digital Signature Standard (DSS)”, Appendix B.1*
- *FFC Schemes using ‘safe-prime’ groups that meet the following: “NIST Special Publication 800-56A Revision 3, Recommendation for Pair-Wise Key Establishment Schemes Using Discrete Logarithm Cryptography” and [selection: RFC 3526, RFC 7919].*

] <del>and specified cryptographic key sizes [assignment: cryptographic key sizes] that meet the following: [assignment: list of standards]</del>.

#### **Application Note 9**

*The ST author selects all key generation schemes used for key establishment (including generation of ephemeral keys) and device authentication. When key generation is used for key establishment, the schemes in FCS\_CKM.2.1 and selected cryptographic protocols must match the selection. When key generation is used for device authentication, other than SSH-RSA, ECDSA-SHA2-NISTP256, ECDSA-SHA2-NISTP384 and ECDSA-SHA2-NISTP521, the public key is expected to be associated with an X.509v3 certificate.*

*If the TOE acts as a receiver in the key establishment schemes and is not configured to support mutual authentication, the TOE does not need to implement key generation.*

*In a distributed TOE, if the TOE component acts as a receiver in the key establishment scheme, the TOE does not need to implement key generation.*

## C.4. Cryptographic Support (FCS)

### C.4.1. FCS\_DTLSC\_EXT & FCS\_DTLSS\_EXT DTLS Protocol

Datagram TLS (DTLS) is not a required component of the NDcPP. If a TOE implements DTLS, a corresponding selection in FTP\_ITC.1, FTP\_TRP.1/Admin, or FPT\_ITT.1 should be made to define what the DTLS protocol is implemented to protect. If a corresponding option to support DTLS has been selected in at least one of the SFRs named above, the corresponding selection-based DTLS-related SFRs should be added to the ST from chap. B.3.1.1 (i.e. FCS\_DTLSC\_EXT.1 and/or FCS\_DTLSS\_EXT.1). The SFRs therein cover only the minimum DTLS-related requirements without

support for mutual authentication. The support for mutual authentication is optional when using DTLS. If a TOE implements DTLS with mutual authentication the corresponding optional SFRs should be added to the ST from chap. A.7.1.1 (i.e. FCS\_DTLSC\_EXT.2 and/or FCS\_DTLSS\_EXT.2) in addition to the corresponding SFRs from chap.B.3.1.1.

A TOE may act as the client, the server, or both in DTLS sessions. The requirement has been separated into DTLS Client (FCS\_DTLSC\_EXT) and DTLS Server (FCS\_DTLSS\_EXT) requirements to allow for these differences.

If the TOE acts as the client during the claimed DTLS sessions, the ST author should claim the corresponding FCS\_DTLSC\_EXT requirements.

To ensure audit requirements are properly met, a DTLS receiver may need to monitor the DTLS connection state at the application layer. When no data is received from a DTLS connection for a long time (where the application decides what "long" means), the receiver should send a close\_notify alert message and close the connection.

If the TOE acts as the server during the claimed DTLS sessions, the ST author should claim the corresponding FCS\_DTLSS\_EXT requirements. In this case the TOE needs to claim at least the FCS\_DTLSS\_EXT.1 requirements in chap. B.3.1.1 (no support for mutual authentication). If the TOE acts as DTLS server and in addition also supports mutual authentication, the FCS\_DTLSS\_EXT.2 requirements in chap. A.7.1.1 also need to be claimed in addition. If the TOE acts as both a client and server during the claimed TLS sessions, the ST author should claim the corresponding FCS\_TLSC\_EXT and FCS\_TLSS\_EXT requirements.

#### **C.4.1.1. FCS\_DTLSC\_EXT.2 DTLS Client Support for Mutual Authentication**

**FCS\_DTLSC\_EXT.2.1** The TSF shall support mutual authentication using X.509v3 certificates.

##### ***Application Note 49***

*The use of X.509v3 certificates for DTLS is addressed in FIA\_X509\_EXT.2.1. This requirement adds that the client must be capable of presenting a certificate to a DTLS server for DTLS mutual authentication.*

**FCS\_DTLSC\_EXT.2.2** The TSF shall [selection: terminate the DTLS session, silently discard the record] if a message received contains an invalid MAC.

##### ***Application Note 50***

*The Message Authentication Code (MAC) is negotiated during the DTLS handshake phase and is used to protect the integrity of messages received from the sender during DTLS data exchange. If MAC verification fails, the session must be terminated, or the record must be silently discarded.*

**FCS\_DTLSC\_EXT.2.3** The TSF shall detect and silently discard replayed messages for:

- DTLS records previously received.
- DTLS records too old to fit in the sliding window.

##### ***Application Note 51***

*Replay Detection is described in section 4.1.2.6 of DTLS 1.2 (RFC 6347) and section 4.1.2.5 of DTLS 1.0*

(RFC 4347). For each received record, the receiver verifies the record contains a sequence number that is within the sliding receive window and does not duplicate the sequence number of any other record received during the session.

*"Silently Discard" means the TOE discards the packet without responding.*

#### **C.4.1.2. FCS\_DTLSS\_EXT.2 DTLS Server Support for Mutual Authentication**

**FCS\_DTLSS\_EXT.2.1** The TSF shall support mutual authentication of DTLS clients using X.509v3 certificates.

##### ***Application Note 52***

*The use of X.509v3 certificates for DTLS is addressed in FIA\_X509\_EXT.2.1. This requirement adds that this use must include support for client-side certificates for DTLS mutual authentication.*

**FCS\_DTLSS\_EXT.2.2** When establishing a trusted channel, by default the TSF shall not establish a trusted channel if the client certificate is invalid. The TSF shall also [selection:

- Not implement any administrator override mechanism
- require administrator authorization to establish the connection if the TSF fails to [selection: match the reference identifier, validate certificate path, validate expiration date, determine the revocation status] of the presented client certificate

].

##### ***Application Note 53***

*'Revocation status' refers to an OCSP or CRL response that indicates the presented certificate is invalid. Inability to make a connection to determine validity shall be handled as specified in FIA\_X509\_EXT.2.2.*

*If DTLS is selected in FTP\_ITC, then certificate validity is tested in accordance with testing performed for FIA\_X509\_EXT.1/Rev.*

*If DTLS is selected in FPT\_ITT, then certificate validity is tested in accordance with testing performed for FIA\_X509\_EXT.1/ITT.*

**FCS\_DTLSS\_EXT.2.3** The TSF shall not establish a trusted channel if the distinguished name (DN) or Subject Alternative Name (SAN) contained in a certificate does not match the expected identifier for the client.

##### ***Application Note 54***

*The client identifier may be in the Subject field or the Subject Alternative Name extension of the certificate. The expected identifier may either be configured, may be compared to the Domain Name, IP address, username, or email address used by the peer, or may be passed to a directory server for comparison.*

# Appendix D: Extended Component Definitions

This appendix contains the definitions for the extended requirements that are used in the cPP, including those used in [Appendix G, Consistency Rationale](#) and [Appendix A, Selection-Based Requirements](#).

(Note: formatting conventions for selections and assignments in this chapter are those in [\[CC2\]](#).)

## D.1. (FAU)

### D.1.1. FAU\_STG\_EXT Extended: External Audit Trail Storage

#### D.1.1.1. Family Behaviour

This family defines requirements for the TSF to ensure that secure transmission of audit data from TOE to an External IT Entity.

#### D.1.1.2. Component Leveling

*Component leveling*

```
+-----+
|                                     | +---+
| FAU_STG_EXT External Audit Trail Storage +--->| 1 |
|                                     | +---+
+-----+
```

**FAU\_STG\_EXT.1** External Audit Trail Storage requires the TSF to use a trusted channel implementing a secure protocol.

#### D.1.1.3. Management:

The following actions could be considered for the management functions in FMT:

- The TSF shall have the ability to configure the cryptographic functionality.

#### D.1.1.4. Audit

The following actions should be auditable if FAU\_GEN Security Audit Data Generation is included in the PP/ST:

- There are no auditable events foreseen.

#### D.1.1.5. FAU\_STG\_EXT.1 Extended: Protected Audit Trail Storage

Hierarchical to: No other components.  
Dependencies: FAU\_GEN.1 Audit data generation,  
FTP\_ITC.1 Inter-TSF trusted channel

FAU\_STG\_EXT.1.1 The TSF shall be able to transmit the generated audit data to an External IT Entity using a trusted channel according to FTP\_ITC.1.

D.1.1.6. Rationale

The TSF is required that the transmission of generated audit data to an External IT Entity which relies on a non-TOE audit server for storage and review of audit records. The storage of these audit records and the ability to allow the administrator to review these audit records is provided by the Operational Environment in that case. The Common Criteria does not provide a suitable SFR for the transmission of audit data to an External IT Entity.

This extended component protects the audit records, and it is therefore placed in the FAU class with a single component.

D.2. (FCS)

D.2.1. FCS\_CKM\_EXT Extended: Cryptographic Key Management

D.2.1.1. Family Behaviour

This family addresses the management aspects of cryptographic keys. Especially, this extended component is intended for cryptographic key destruction.

D.2.1.2. Component Leveling

Component leveling



FCS\_CKM\_EXT.4 Cryptographic Key Material Destruction ensures not only keys but also key materials that are no longer needed are destroyed by using an approved method.

D.2.1.3. Management:

The following actions could be considered for the management functions in FMT:

- There are no management actions foreseen.

#### D.2.1.4. Audit

The following actions should be auditable if FAU\_GEN Security Audit Data Generation is included in the PP/ST:

- There are no auditable events foreseen.

#### D.2.1.5. FCS\_CKM\_EXT.4 Extended: Cryptographic Key Material Destruction

Hierarchical to: No other components.

Dependencies: [FCS\_CKM.1(a) Cryptographic Key Generation (for asymmetric keys), or FCS\_CKM.1(b) Cryptographic key generation (Symmetric Keys)],  
FCS\_CKM.4 Cryptographic key destruction

FCS\_CKM\_EXT.4.1 The TSF shall destroy all plaintext secret and private cryptographic keys and cryptographic critical security parameters when no longer needed.

#### D.2.1.6. Rationale

Cryptographic Key Material Destruction is to ensure the keys and key materials that are no longer needed are destroyed by using an approved method, and the Common Criteria does not provide a suitable SFR for the Cryptographic Key Material Destruction.

This extended component protects the cryptographic key and key materials against exposure, and it is therefore placed in the FCS class with a single component.

### D.2.2. FCS\_HTTPS\_EXT Extended: HTTPS selected

#### D.2.2.1. Family Behaviour

Components in this family define requirements for protecting remote management sessions between the TOE and a Security Administrator. This family describes how HTTPS will be implemented. This is a new family defined for the FCS Class.

#### D.2.2.2. Component Leveling

*Component leveling*

```
+-----+
|                                     | +---+
| FCS_HTTPS_EXT HTTPS selected      | +--->| 1 |
|                                     | +---+
+-----+
```

FCS\_HTTPS\_EXT.1 HTTPS selected, requires that HTTPS be implemented according to RFC 2818 and supports TLS.



### D.2.2.3. Management

The following actions could be considered for the management functions in FMT:

- There are no management actions foreseen.

### D.2.2.4. Audit

The following actions should be auditable if FAU\_GEN Security Audit Data Generation is included in the PP/ST:

- Failure of HTTPS session establishment

### D.2.2.5. FCS\_HTTPS\_EXT.1 Extended: HTTPS selected

Hierarchical to: No other components.  
Dependencies: ~~No dependencies~~ FCS\_TLS\_EXT.1 Extended: TLS selected

FCS\_HTTPS\_EXT.1.1 The TSF shall implement the HTTPS protocol that complies with RFC 2818.

FCS\_HTTPS\_EXT.1.2 The TSF shall implement HTTPS using TLS as specified in FCS\_TLS\_EXT.1.

### D.2.2.6. Rationale

HTTPS is one of the secure communication protocols, and the Common Criteria does not provide a suitable SFR for the communication protocols using cryptographic algorithms.

This extended component protects the communication data using cryptographic algorithms, and it is therefore placed in the FCS class with a single component.

## D.2.3. FCS\_IPSEC\_EXT Extended: IPsec selected

### D.2.3.1. Family Behaviour

This family addresses requirements for protecting communications using IPsec.

### D.2.3.2. Component Leveling

*Component leveling*

```
+-----+
|                                     | +---+
| FCS_IPSEC_EXT IPsec               | +--->| 1 |
|                                     | +---+
+-----+
```

FCS\_IPSEC\_EXT.1 IPsec requires that IPsec be implemented as specified.

### D.2.3.3. Management

The following actions could be considered for the management functions in FMT:

- There are no management actions foreseen.

### D.2.3.4. Audit

The following actions should be auditable if FAU\_GEN Security Audit Data Generation is included in the PP/ST:

- Failure to establish an IPsec SA

### D.2.3.5. FCS\_IPSEC\_EXT.1 Extended: IPsec selected

Hierarchical to: No other components.

Dependencies: FIA\_PSK\_EXT.1 Extended: Pre-Shared Key Composition

FCS\_CKM.1(a) Cryptographic Key Generation (for asymmetric keys)

FCS\_COP.1/DataEncryption Cryptographic Operation (Symmetric encryption/decryption)

FCS\_COP.1/SigGen Cryptographic Operation (for signature generation/verification)

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

FCS\_COP.1/KeyedHash Cryptographic Operation (for keyed-hash message authentication)

FCS\_RBG\_EXT.1 Extended: Cryptographic Operation (Random Bit Generation)

FCS\_IPSEC\_EXT.1.1 The TSF shall implement the IPsec architecture as specified in RFC 4301.

FCS\_IPSEC\_EXT.1.2 The TSF shall implement [selection: tunnel mode, transport mode].

FCS\_IPSEC\_EXT.1.3 The TSF shall have a nominal, final entry in the SPD that matches anything that is otherwise unmatched, and discards it.

FCS\_IPSEC\_EXT.1.4 The TSF shall implement the IPsec protocol ESP as defined by RFC 4303 using [selection: *the cryptographic algorithms AES-CBC-128 (as specified by RFC 3602) together with a Secure Hash Algorithm (SHA)-based HMAC, AES-CBC-256 (as specified by RFC 3602) together with a Secure Hash Algorithm (SHA)-based HMAC, AES-GCM-128 as specified in RFC 4106, AES-GCM-256 as specified in RFC 4106*].

FCS\_IPSEC\_EXT.1.5 The TSF shall implement the protocol: [selection: *IKEv1 using Main Mode for Phase 1 exchanges, as defined in RFCs 2407, 2408, 2409, RFC 4109, [selection: no other RFCs for extended sequence numbers, RFC 4304 for extended sequence numbers], and [selection: no other RFCs for hash functions, RFC 4868 for hash functions]; IKEv2 as defined in RFCs 5996 [selection: with no support for NAT traversal, with mandatory support for NAT traversal as specified in section 2.23], and [selection: no other RFCs for hash functions, RFC 4868 for hash functions]*].

FCS\_IPSEC\_EXT.1.6 The TSF shall ensure the encrypted payload in the [selection: *IKEv1, IKEv2*] protocol uses the cryptographic algorithms AES-CBC-128, AES-CBC-256 as specified in RFC 3602 and [selection: *AES-GCM-128, AES-GCM-256 as specified in RFC 5282, no other algorithm*].

FCS\_IPSEC\_EXT.1.7 The TSF shall ensure that IKEv1 Phase 1 exchanges use only main mode.

FCS\_IPSEC\_EXT.1.8 The TSF shall ensure that [selection: *IKEv2 SA lifetimes can be established based on [selection: number of packets/number of bytes; length of time, where the time values can be limited to: 24 hours for Phase 1 SAs and 8 hours for Phase 2 SAs]; IKEv1 SA lifetimes can be established based on [selection: number of packets/number of bytes; length of time, where the time values can be limited to: 24 hours for Phase 1 SAs and 8 hours for Phase 2 SAs]]].*

FCS\_IPSEC\_EXT.1.9 The TSF shall ensure that all IKE protocols implement DH Groups 14 (2048-bit MODP), and [selection: 24 (2048-bit MODP with 256-bit POS), 19 (256-bit Random ECP), 20 (384-bit Random ECP, 5 (1536-bit MODP)), [assignment: other DH groups that are implemented by the TOE], no other DH groups].

FCS\_IPSEC\_EXT.1.10 The TSF shall ensure that all IKE protocols perform Peer Authentication using the [selection: RSA, ECDSA] algorithm and Pre-shared Keys.

#### D.2.3.6. Rationale

IPsec is one of the secure communication protocols, and the Common Criteria does not provide a suitable SFR for the communication protocols using cryptographic algorithms.

This extended component protects the communication data using cryptographic algorithms, and it is therefore placed in the FCS class with a single component.

### D.2.4. FCS\_KDF\_EXT Extended: Cryptographic Key Derivation

#### D.2.4.1. Family Behaviour

This family specifies the means by which an intermediate key is derived from a specified set of submasks.

#### D.2.4.2. Component Leveling

*Component leveling*

```

+-----+
|                                     | +---+
| FCS_KDF_EXT Cryptographic Key Derivation +--->| 1 |
|                                     | +---+
+-----+
```

FCS\_KDF\_EXT.1 Cryptographic Key Derivation requires the TSF to derive intermediate keys from submasks using the specified hash functions.

#### D.2.4.3. Management

The following actions could be considered for the management functions in FMT:

- There are no management actions foreseen.

#### D.2.4.4. Audit

The following actions should be auditable if FAU\_GEN Security Audit Data Generation is included in the PP/ST:

- There are no auditable events foreseen.

#### D.2.4.5. FCS\_KDF\_EXT.1 Extended: Cryptographic Key Derivation

Hierarchical to: No other components  
Dependencies: FCS\_COP.1(h) Cryptographic Operation (for keyed-hash message authentication),  
[if selected: FCS\_RBG\_EXT.1 Extended: Cryptographic Operation (Random Bit Generation)]

FCS\_KDF\_EXT.1.1 The TSF shall accept [selection: *a RNG generated submask as specified in FCS\_RBG\_EXT.1, a conditioned password submask, imported submask*] to derive an intermediate key, as defined in [selection: *NIST SP 800-108 [selection: *KDF in Counter Mode, KDF in Feedback Mode, KDF in Double-Pipeline Iteration Mode*], NIST SP 800-132*], using the keyed-hash functions specified in FCS\_COP.1(h), such that the output is at least of equivalent security strength (in number of bits) to the BEV.

#### D.2.4.6. Rationale

The TSF is required to specify the means by which an intermediate key is derived from a specified set of submasks using the specified hash functions.

This extended component protects the Data Encryption Keys using cryptographic algorithms in the maintained key chains, and it is therefore placed in the FCS class with a single component.

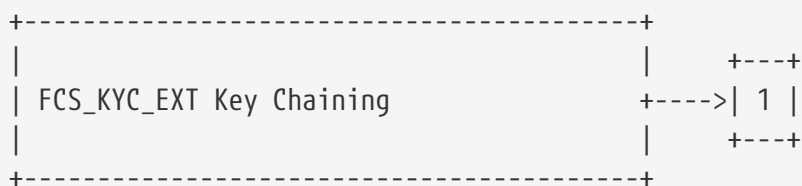
### D.2.5. FCS\_KYC\_EXT Extended: Cryptographic Operation (Key Chaining)

#### D.2.5.1. Family Behaviour

This family provides the specification to be used for using multiple layers of encryption keys to ultimately secure the protected data encrypted on the storage.

#### D.2.5.2. Component Leveling

*Component leveling*



FCS\_KYC\_EXT Key Chaining, requires the TSF to maintain a key chain and specifies the characteristics of that chain.

### D.2.5.3. Management

The following actions could be considered for the management functions in FMT:

- There are no management actions foreseen.

### D.2.5.4. Audit

The following actions should be auditable if FAU\_GEN Security Audit Data Generation is included in the PP/ST:

- There are no auditable events foreseen.

### D.2.5.5. FCS\_KYC\_EXT.1 Extended: Key Chaining

Hierarchical to: No other components.  
Dependencies: [FCS\_COP.1(e) Cryptographic operation (Key Wrapping), FCS\_SMC\_EXT.1 Extended: Submask Combining, FCS\_COP.1(i) Cryptographic operation (Key Transport), FCS\_KDF\_EXT.1 Cryptographic Operation (Key Derivation), and/or FCS\_COP.1(f) Cryptographic operation (Key Encryption)].

FCS\_KYC\_EXT.1.1 The TSF shall maintain a key chain of: [selection: *one, using a submask as the BEV or DEK; intermediate keys originating from one or more submask(s) to the BEV or DEK using the following method(s):* [selection: *key wrapping as specified in FCS\_COP.1(e), key combining as specified in FCS\_SMC\_EXT.1, key encryption as specified in FCS\_COP.1(f), key derivation as specified in FCS\_KDF\_EXT.1, key transport as specified in FCS\_COP.1(i)*]] while maintaining an effective strength of [selection: *128 bits, 256 bits*].

### D.2.5.6. Rationale

Key Chaining ensures that the TSF maintains the key chain, and also specifies the characteristics of that chain. However, the Common Criteria does not provide a suitable SFR for the management of multiple layers of encryption key to protect encrypted data.

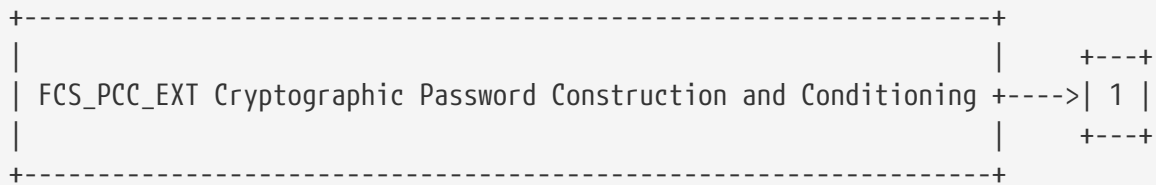
This extended component protects the TSF data using cryptographic algorithms, and it is therefore placed in the FCS class with a single component.

## D.2.6. FCS\_PCC\_EXT Extended: Cryptographic Password Construction and Conditioning

### D.2.6.1. Family Behaviour

This family ensures that passwords used to produce the BEV are robust (in terms of their composition) and are conditioned to provide an appropriate-length bit string.

### D.2.6.2. Component Leveling



FCS\_PCC\_EXT.1 Cryptographic Password Construction and Conditioning, requires the TSF to accept passwords of a certain composition and condition them appropriately.

### D.2.6.3. Management

No specific management functions are identified

#### D.2.6.4. Audit

There are no auditable events foreseen.

#### D.2.6.5. FCS\_PCC\_EXT.1 Extended: Cryptographic Password Construction and Conditioning

Hierarchical to: No other components  
Dependencies: FCS\_COP.1(h) Cryptographic Operation (for keyed-hash message authentication)

FCS\_PCC\_EXT.1.1 A password used by the TSF to generate a password authorization factor shall enable up to [assignment: *positive integer of 64 or more*] characters in the set of {upper case characters, lower case characters, numbers, and [assignment: *other supported special characters*]} and shall perform Password-based Key Derivation Functions in accordance with a specified cryptographic algorithm [*HMAC-[selection: SHA-256, SHA-384, SHA-512]*], with [assignment: *positive integer of 1000 or more*] iterations, and output cryptographic key sizes [selection: 128, 256] bits that meet the following: [assignment: *PBKDF recommendation or specification*].

#### D.2.6.6. Rationale

The TSF is required to ensure that passwords used to produce the BEV are robust (in terms of their composition) and are conditioned to provide an appropriate-length bit string.

This extended component protects the Data Encryption Keys using cryptographic algorithms and Robust BEV in the maintained key chains, and it is therefore placed in the FCS class with a single component.

### D.2.7. FCS\_RBG\_EXT Extended: Cryptographic Operation (Random Bit Generation)

#### D.2.7.1. Family Behaviour

Components in this family address the requirements for random bit/number generation. This is a

new family defined for the FCS class.

#### D.2.7.2. Component Leveling

*Component leveling*



FCS\_RBG\_EXT.1 Random Bit Generation requires random bit generation to be performed in accordance with selected standards and seeded by an entropy source.

#### D.2.7.3. Management

The following actions could be considered for the management functions in FMT:

- There are no management actions foreseen.

#### D.2.7.4. Audit

The following actions should be auditable if FAU\_GEN Security Audit Data Generation is included in the PP/ST:

- Minimal: failure of the randomization process

#### D.2.7.5. FCS\_RBG\_EXT.1 Extended: Random Bit Generation

Hierarchical to: No other components.  
Dependencies: No dependencies.

**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 that accumulates entropy from [selection: [assignment: *number of software-based sources*] *software-based noise source*, [assignment: *number of platform-based sources*] *platform-based noise source*] with a minimum of [selection: *128 bits*, *192 bits*, *256 bits*] of entropy at least equal to the greatest security strength, according to ISO/IEC 18031:2011 Table C.1 “Security Strength Table for Hash Functions”, of the keys and hashes that it will generate.

#### D.2.7.6. Rationale

Random bits/number will be used by the SFRs for key generation and destruction, and the Common Criteria does not provide a suitable SFR for the random bit generation.

This extended component ensures the strength of encryption keys, and it is therefore placed in the FCS class with a single component.

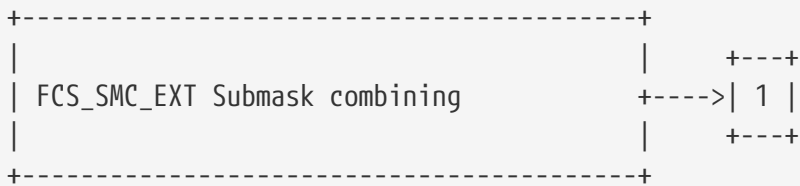
### D.2.8. FCS\_SMC\_EXT Extended: Submask Combining

#### D.2.8.1. Family Behaviour

This family defines the means by which submasks are combined, if the TOE supports more than one submask being used to derive or protect the BEV.

#### D.2.8.2. Component Leveling

*Component leveling*



FCS\_SMC\_EXT.1 Submask combining requires the TSF to combine the submasks in a predictable fashion.

#### D.2.8.3. Management

The following actions could be considered for the management functions in FMT:

- There are no management actions foreseen.

#### D.2.8.4. Audit

The following actions should be auditable if FAU\_GEN Security Audit Data Generation is included in the PP/ST:

- There are no auditable events foreseen.

#### D.2.8.5. FCS\_SMC\_EXT.1 Extended: Submask Combining

Hierarchical to: No other components.  
Dependencies: FCS\_COP.1/Hash Cryptographic operation (Hash Algorithm)

FCS\_SMC\_EXT.1.1 The TSF shall combine submasks using the following method [selection: *exclusive OR (XOR)*, *SHA-256*, *SHA-512*] to generate an intermediary key or BEV.

#### D.2.8.6. Rationale

Submask Combining is to ensure the TSF combine the submasks in order to derive or protect the BEV.



This extended component protects the TSF data using cryptographic algorithms, and it is therefore placed in the FCS class with a single component.

### D.2.9. FCS\_SNI\_EXT Extended: Cryptographic Operation (Salt, Nonce, and Initialization Vector Generation)

#### D.2.9.1. Family Behaviour

This family ensures that salts, nonces, and IVs are well formed.

#### D.2.9.2. Component Leveling

*Component leveling*

```
+-----+
----+
|
| +---+
| FCS_SNI_EXT Cryptographic Operation (Salt, Nonce, and Initialization Vector
Generation) +---->| 1 |
|
| +---+
+-----+
----+
```

FCS\_SNI\_EXT.1 Cryptographic Operation (Salt, Nonce, and Initialization Vector Generation), requires the generation of salts, nonces, and IVs to be used by the cryptographic components of the TOE to be performed in the specified manner.

#### D.2.9.3. Management

No specific management functions are identified

#### D.2.9.4. Audit

There are no auditable events foreseen.

#### D.2.9.5. FCS\_SNI\_EXT.1 Extended: Cryptographic Operation (Salt, Nonce, and Initialization Vector Generation)

Hierarchical to: No other components  
Dependencies: FCS\_RBG\_EXT.1 Extended: Cryptographic Operation (Random Bit Generation)

FCS\_SNI\_EXT.1.1 The TSF shall only use salts that are generated by a RNG as specified in FCS\_RBG\_EXT.1.

FCS\_SNI\_EXT.1.2 The TSF shall only use unique nonces with a minimum size of [64] bits.

FCS\_SNI\_EXT.1.3 The TSF shall create IVs in the following manner: [

CBC: IVs shall be non-repeating,

CCM: Nonce shall be non-repeating.

XTS: No IV. Tweak values shall be non-negative integers, assigned consecutively, and starting at an arbitrary non-negative integer,

GCM: IV shall be non-repeating. The number of invocations of GCM shall not exceed  $2^{32}$  for a given secret key.

].

#### **D.2.9.6. Rationale**

The TSF is required to ensure that the generation of salts, nonces, and IVs to be used by the cryptographic components of the TOE is to be performed in the specified manner.

This extended component protects the communication data and storage data using cryptographic algorithms with specified Salt, Nonce and Initialization Vector Generation, and it is therefore placed in the FCS class with a single component.

### **D.2.10. FCS\_SSHC\_EXT.1 SSH Client**

#### **D.2.10.1. Family Behaviour**

The component in this family addresses the ability for a client to use SSH to protect data between the client and a server using the SSH protocol.

#### **D.2.10.2. Component levelling**

FCS\_SSHC\_EXT.1 SSH Client requires that the client side of SSH be implemented as specified.

#### **D.2.10.3. Management: FCS\_SSHC\_EXT.1**

The following actions could be considered for the management functions in FMT:

- There are no management activities foreseen.

#### **D.2.10.4. Audit: FCS\_SSHC\_EXT.1**

The following actions should be considered for audit if FAU\_GEN Security audit data generation is included in the PP/ST:

- Failure of SSH session establishment
- SSH session establishment
- SSH session termination

#### D.2.10.5. FCS\_SSHC\_EXT.1

Hierarchical to: No other components

Dependencies: FCS\_CKM.1Cryptographic Key Generation

FCS\_CKM.2 Cryptographic Key Establishment

FCS\_COP.1/DataEncryption Cryptographic operation (AES Data encryption/decryption)

FCS\_COP.1/SigGen Cryptographic operation (Signature Generation and Verification)

FCS\_COP.1/Hash Cryptographic operation (Hash Algorithm)

FCS\_COP.1/KeyedHash Cryptographic operation (Keyed Hash Algorithm)

FCS\_RBG\_EXT.1 Random Bit Generation

**FCS\_SSHC\_EXT.1.1** The TSF shall implement the SSH protocol in accordance with: RFCs 4251, 4252, 4253, 4254, [selection: 4256, 4344, 5647, 5656, 6187, 6668, 8268, 8308 section 3.1, 8332].

**FCS\_SSHC\_EXT.1.2** The TSF shall ensure that the SSH protocol implementation supports the following authentication methods as described in RFC 4252: public key-based, [selection: password-based, no other method].

**FCS\_SSHC\_EXT.1.3** The TSF shall ensure that, as described in RFC 4253, packets greater than [assignment: number of bytes] bytes in an SSH transport connection are dropped.

**FCS\_SSHC\_EXT.1.4** The TSF shall ensure that the SSH transport implementation uses the following encryption algorithms and rejects all other encryption algorithms: [assignment: list of encryption algorithms].

**FCS\_SSHC\_EXT.1.5** The TSF shall ensure that the SSH public-key based authentication implementation uses [selection: ssh-rsa, rsa-sha2-256, rsa-sha2-512, ecdsa-sha2-nistp256, x509v3-ssh-rsa, ecdsa-sha2-nistp384, ecdsa-sha2-nistp521, x509v3-ecdsa-sha2-nistp256, x509v3-ecdsa-sha2-nistp384, x509v3-ecdsa-sha2-nistp521, x509v3-rsa2048-sha256] as its public key algorithm(s) and rejects all other public key algorithms

**FCS\_SSHC\_EXT.1.6** The TSF shall ensure that the SSH transport implementation uses [assignment: list of data integrity MAC algorithms] as its data integrity MAC algorithm(s) and rejects all other MAC algorithm(s).

**FCS\_SSHC\_EXT.1.7** The TSF shall ensure that [assignment: list of key exchange methods] are the only allowed key exchange methods used for the SSH protocol.

**FCS\_SSHC\_EXT.1.8** The TSF shall ensure that within SSH connections, the same session keys are used for a threshold of no longer than one hour, and each encryption key is used to protect no more than one gigabyte of data. After any of the thresholds are reached, a rekey needs to be performed.

**FCS\_SSHC\_EXT.1.9** The TSF shall ensure that the SSH client authenticates the identity of the SSH server using a local database associating each host name with its corresponding public key and [selection: a list of trusted certification authorities, no other methods] as described in RFC 4251 section 4.1.

## D.2.11. FCS\_SSHS\_EXT.1 SSH Server Protocol

### D.2.11.1. Family Behaviour

The component in this family addresses the ability for a server to offer SSH to protect data between a client and the server using the SSH protocol.

### D.2.11.2. Component levelling

FCS\_SSHS\_EXT.1 SSH Server requires that the server side of SSH be implemented as specified.

### D.2.11.3. Management: FCS\_SSHS\_EXT.1

The following actions could be considered for the management functions in FMT:

- There are no management activities foreseen.

### D.2.11.4. Audit: FCS\_SSHS\_EXT.1

The following actions should be considered for audit if FAU\_GEN Security audit datageneration is included in the PP/ST:

- Failure of SSH session establishment
- SSH session establishment
- SSH session termination

### D.2.11.5. FCS\_SSHS\_EXT.1

Hierarchical to: No other components

Dependencies: FCS\_CKM.1 Cryptographic Key Generation

FCS\_CKM.2 Cryptographic Key Establishment

FCS\_COP.1/DataEncryption Cryptographic operation (AES Data encryption/decryption)

FCS\_COP.1/SigGen Cryptographic operation (Signature Generation and Verification)

FCS\_COP.1/Hash Cryptographic operation (Hash Algorithm)

FCS\_COP.1/KeyedHash Cryptographic operation (Keyed Hash Algorithm)

FCS\_RBG\_EXT.1 Random Bit Generation

**FCS\_SSHS\_EXT.1.1** The TSF shall implement the SSH protocol in accordance with: RFCs 4251, 4252, 4253, 4254, [selection: 4256, 4344, 5647, 5656, 6187, 6668, 8268, 8308 section 3.1, 8332].

**FCS\_SSHS\_EXT.1.2** The TSF shall ensure that the SSH protocol implementation supports the following authentication methods as described in RFC 4252: public key-based, [selection: password-based, no other method].

**FCS\_SSHS\_EXT.1.3** The TSF shall ensure that, as described in RFC 4253, packets greater than [assignment: number of bytes] bytes in an SSH transport connection are dropped. FCS\_SSHS\_EXT SSH Server Protocol 1 collaborative Protection Profile for Network Devices

**FCS\_SSHS\_EXT.1.4** The TSF shall ensure that the SSH transport implementation uses the following

encryption algorithms and rejects all other encryption algorithms: [assignment: encryption algorithms].

**FCS\_SSHS\_EXT.1.5** The TSF shall ensure that the SSH public-key based authentication implementation uses [selection: ssh-rsa, rsa-sha2-256, rsa-sha2-512, ecdsa-sha2-nistp256, x509v3-ssh-rsa, ecdsa-sha2-nistp384, ecdsa-sha2-nistp521, x509v3-ecdsa-sha2-nistp256, x509v3-ecdsa-sha2-nistp384, x509v3-ecdsa-sha2-nistp521, x509v3-rsa2048-sha256] as its public key algorithm(s) and rejects all other public key algorithms.

**FCS\_SSHS\_EXT.1.6** The TSF shall ensure that the SSH transport implementation uses [assignment: list of MAC algorithms] as its MAC algorithm(s) and rejects all other MAC algorithm(s).

**FCS\_SSHS\_EXT.1.7** The TSF shall ensure that [assignment: list of key exchange methods] are the only allowed key exchange methods used for the SSH protocol.

**FCS\_SSHS\_EXT.1.8** The TSF shall ensure that within SSH connections, the same session keys are used for a threshold of no longer than one hour, and each encryption key is used to protect no more than one gigabyte of data. After any of the thresholds are reached, a rekey needs to be performed.

## **D.2.12. FCS\_TLSC\_EXT TLS Client Protocol**

### **D.2.12.1. Family Behaviour**

The component in this family addresses the ability for a client to use TLS to protect data between the client and a server using the TLS protocol.

### **D.2.12.2. Component levelling**

**FCS\_TLSC\_EXT.1** TLS Client requires that the client side of TLS be implemented as specified.

**FCS\_TLSC\_EXT.2** TLS Client requires that the client side of the TLS implementation include mutual authentication.

### **D.2.12.3. Management: FCS\_TLSC\_EXT.1, FCS\_TLSC\_EXT.2**

The following actions could be considered for the management functions in FMT:

- There are no management activities foreseen.

### **D.2.12.4. Audit: FCS\_TLSC\_EXT.1, FCS\_TLSC\_EXT.2**

The following actions should be considered for audit if FAU\_GEN Security audit data generation is included in the PP/ST:

- Failure of TLS session establishment
- TLS session establishment
- TLS session termination

#### D.2.12.5. FCS\_TLSC\_EXT.1 TLS Client Protocol without Mutual Authentication

Hierarchical to: No other components  
Dependencies: FCS\_CKM.1 Cryptographic Key Generation  
FCS\_CKM.2 Cryptographic Key Establishment  
FCS\_COP.1/DataEncryption Cryptographic operation (AES Data encryption/decryption)  
FCS\_COP.1/SigGen Cryptographic operation (Signature Generation and Verification)  
FCS\_COP.1/Hash Cryptographic operation (Hash Algorithm)  
FCS\_COP.1/KeyedHash Cryptographic operation (Keyed Hash Algorithm)  
FCS\_RBG\_EXT.1 Random Bit Generation  
FIA\_X509\_EXT.1 X.509 Certificate Validation  
FIA\_X509\_EXT.2 X.509 Certificate Authentication

**FCS\_TLSC\_EXT.1.1** The TSF shall implement [selection: TLS 1.2 (RFC 5246), TLS 1.1 (RFC 4346)] and reject all other TLS and SSL versions. The TLS implementation will support the following ciphersuites:

- [assignment: list of optional ciphersuites and reference to RFC in which each is defined] and no other ciphersuites.

**FCS\_TLSC\_EXT.1.2** The TSF shall verify that the presented identifier matches [selection: the reference identifier per RFC 6125 section 6, IPv4 address in CN or SAN, IPv6 address in the CN or SAN, IPv4 address in SAN, IPv6 address in the SAN, the identifier per RFC 5280 Appendix A using [selection: id-at-commonName, id-at-countryName, id-at-dnQualifier, id-at-generationQualifier, id-at-givenName, id-at-initials, id-at-localityName, id-at-name, id-at-organizationalUnitName, id-at-organizationName, id-at-pseudonym, id-at-serialNumber, id-at-stateOrProvinceName, id-at-surname, id-at-title] and no other attribute types].

**FCS\_TLSC\_EXT.1.3** When establishing a trusted channel, by default the TSF shall not establish a trusted channel if the server certificate is invalid. The TSF shall also [selection:

- Not implement any administrator override mechanism
- require administrator authorization to establish the connection if the TSF fails to [selection: match the reference identifier, validate certificate path, validate expiration date, determine the revocation status] of the presented server certificate

].

**FCS\_TLSC\_EXT.1.4** The TSF shall [selection: not present the Supported Elliptic Curves/Supported Groups Extension, present the Supported Elliptic Curves/Supported Groups Extension with the following curves/groups: [selection: secp256r1, secp384r1, secp521r1, ffdhe2048, ffdhe3072, ffdhe4096, ffdhe6144, ffdhe8192] and no other curves/groups] in the Client Hello.

#### D.2.12.6. FCS\_TLSC\_EXT.2 TLS Client Support for Mutual Authentication

Hierarchical to: No other components  
Dependencies: FCS\_CKM.1 Cryptographic Key Generation  
FCS\_CKM.2 Cryptographic Key Establishment  
FCS\_COP.1/DataEncryption Cryptographic operation (AES Data encryption/decryption)  
FCS\_COP.1/SigGen Cryptographic operation (Signature Generation and Verification)  
FCS\_COP.1/Hash Cryptographic operation (Hash Algorithm)  
FCS\_COP.1/KeyedHash Cryptographic operation (Keyed Hash Algorithm)  
FCS\_RBG\_EXT.1 Random Bit Generation  
FCS\_TLSC\_EXT.1 TLS Client Protocol without mutual authentication  
FIA\_X509\_EXT.1 X.509 Certificate Validation  
FIA\_X509\_EXT.2 X.509 Certificate Authentication

**FCS\_TLSC\_EXT.2.1** The TSF shall support TLS communication with mutual authentication using X.509v3 certificates.

## **D.2.13. FCS\_TLSS\_EXT TLS Server Protocol**

### **D.2.13.1. Family Behaviour**

The component in this family addresses the ability for a server to use TLS to protect data between a client and the server using the TLS protocol.

### **D.2.13.2. Component levelling**

FCS\_TLSS\_EXT.1 TLS Server requires that the server side of TLS be implemented as specified.

FCS\_TLSS\_EXT.2: TLS Server requires the mutual authentication be included in the TLS implementation.

### **D.2.13.3. Management: FCS\_TLSS\_EXT.1, FCS\_TLSS\_EXT.2**

The following actions could be considered for the management functions in FMT:

- There are no management activities foreseen.

### **D.2.13.4. Audit: FCS\_TLSS\_EXT.1, FCS\_TLSS\_EXT.2**

The following actions should be considered for audit if FAU\_GEN Security audit data generation is included in the PP/ST:

- Failure of TLS session establishment
- TLS session establishment
- TLS session termination

### **D.2.13.5. FCS\_TLSS\_EXT.1 TLS Server Protocol without Mutual Authentication**

Hierarchical to: No other components  
Dependencies: FCS\_CKM.1 Cryptographic Key Generation  
FCS\_CKM.2 Cryptographic Key Establishment  
FCS\_COP.1/DataEncryption Cryptographic operation (AES Data encryption/decryption)  
FCS\_COP.1/SigGen Cryptographic operation (Signature Generation and Verification)  
FCS\_COP.1/Hash Cryptographic operation (Hash Algorithm)  
FCS\_COP.1/KeyedHash Cryptographic operation (Keyed Hash Algorithm)  
FCS\_RBG\_EXT.1 Random Bit Generation  
FIA\_X509\_EXT.1 X.509 Certificate Validation  
FIA\_X509\_EXT.2 X.509 Certificate Authentication

**FCS\_TLSS\_EXT.1.1** The TSF shall implement [selection: TLS 1.2 (RFC 5246), TLS 1.1 (RFC 4346)] and reject all other TLS and SSL versions. The TLS implementation will support the following ciphersuites:

- [assignment: list of optional ciphersuites and reference to RFC in which each is defined] and no other ciphersuites.

**FCS\_TLSS\_EXT.1.2** The TSF shall deny connections from clients requesting SSL 2.0, SSL 3.0, TLS 1.0 and [selection: TLS 1.1, TLS 1.2, none].

**FCS\_TLSS\_EXT.1.3** The TSF shall perform key establishment for TLS using [selection: RSA with key size [selection: 2048 bits, 3072 bits, 4096 bits], Diffie-Hellman parameters with size [selection: 2048 bits, 3072 bits, 4096 bits, 6144 bits, 8192 bits], Diffie-Hellman groups [selection: ffdhe2048, ffdhe3072, ffdhe4096, ffdhe6144, ffdhe8192, no other groups], ECDHE curves [selection: secp256r1, secp384r1, secp521r1] and no other curves]].

**FCS\_TLSS\_EXT.1.4** The TSF shall support [selection: no session resumption or session tickets, session resumption based on session IDs according to RFC 4346 (TLS1.1) or RFC 5246 (TLS1.2), session resumption based on session tickets according to RFC 5077].

#### **D.2.13.6. FCS\_TLSS\_EXT.2 TLS Server Support for Mutual Authentication**

Hierarchical to: No other components  
Dependencies: FCS\_CKM.1 Cryptographic Key Generation  
FCS\_CKM.2 Cryptographic Key Establishment  
FCS\_COP.1/DataEncryption Cryptographic operation (AES Data encryption/decryption)  
FCS\_COP.1/SigGen Cryptographic operation (Signature Generation and Verification)  
FCS\_COP.1/Hash Cryptographic operation (Hash Algorithm)  
FCS\_COP.1/KeyedHash Cryptographic operation (Keyed Hash Algorithm)  
FCS\_RBG\_EXT.1 Random Bit Generation  
FCS\_TLSS\_EXT.1 TLS Server Protocol without mutual authentication  
FIA\_X509\_EXT.1 X.509 Certificate Validation  
FIA\_X509\_EXT.2 X.509 Certificate Authentication

**FCS\_TLSS\_EXT.2.1** The TSF shall support TLS communication with mutual authentication of TLS clients using X.509v3 certificates.



**FCS\_TLSS\_EXT.2.2** When establishing a trusted channel, by default the TSF shall not establish a trusted channel if the client certificate is invalid. The TSF shall also [selection:

- Not implement any administrator override mechanism
- require administrator authorization to establish the connection if the TSF fails to [selection: match the reference identifier, validate certificate path, validate expiration date, determine the revocation status] of the presented client certificate

].

**FCS\_TLSS\_EXT.2.3** The TSF shall not establish a trusted channel if the identifier contained in a certificate does not match an expected identifier for the client. If the identifier is a Fully Qualified Domain Name (FQDN), then the TSF shall match the identifiers according to RFC 6125, otherwise the TSF shall parse the identifier from the certificate and match the identifier against the expected identifier of the client as described in the TSS.

## **D.2.14. FCS\_DTLSC\_EXT DTLS Client Protocol**

### **D.2.14.1. Family Behaviour**

The component in this family addresses the ability for a client to use DTLS to protect data between the client and a server using the DTLS protocol.

### **D.2.14.2. Component levelling**

**FCS\_DTLSC\_EXT.1** DTLS Client requires that the client side of DTLS be implemented as specified.

**FCS\_DTLSC\_EXT.2** DTLS Client requires that the client side of the DTLS implementation include mutual authentication.

### **D.2.14.3. Management: FCS\_DTLSC\_EXT.1, FCS\_DTLSC\_EXT.2**

The following actions could be considered for the management functions in FMT:

- There are no management activities foreseen.

### **D.2.14.4. Audit: FCS\_DTLSC\_EXT.1, FCS\_DTLSC\_EXT.2**

The following actions should be considered for audit if FAU\_GEN Security audit data generation is included in the PP/ST:

- Failure of DTLS session establishment
- DTLS session establishment
- DTLS session termination

### **D.2.14.5. FCS\_DTLSC\_EXT.1 DTLS Client Protocol**

Hierarchical to: No other components  
Dependencies: FCS\_CKM.1 DataEncryption1 Cryptographic Key Generation  
FCS\_CKM.2 Cryptographic Key Establishment  
FCS\_COP.1/DataEncryption Cryptographic operation (AES Data encryption/decryption)  
FCS\_COP.1/SigGen1SigGen Cryptographic operation (Signature Generation and Verification)  
FCS\_COP.1/Hash Cryptographic operation (Hash Algorithm)  
FCS\_COP.1/KeyedHash Cryptographic operation (Keyed Hash Algorithm)  
FCS\_RBG\_EXT.1 Random Bit Generation  
FIA\_X509\_EXT.1 X.509 Certificate Validation  
FIA\_X509\_EXT.2 X.509 Certificate Authentication

**FCS\_DTLSC\_EXT.1.1** The TSF shall implement [selection: DTLS 1.2 (RFC 6347), DTLS 1.0 (RFC 4347)] supporting the following ciphersuites:

- [assignment: List of optional ciphersuites and reference to RFC in which each is defined].

**FCS\_DTLSC\_EXT.1.2** The TSF shall verify that the presented identifier matches [selection: the reference identifier per RFC 6125 section 6, IPv4 address in CN or SAN, IPv6 address in the CN or SAN, IPv4 address in SAN, IPv6 address in the SAN, the identifier per RFC 5280 Appendix A using [selection: id-at-commonName, id-at-countryName, id-at-dnQualifier, id-at-generationQualifier, id-at-givenName, id-at-initials, id-at-localityName, id-at-name, id-at-organizationalUnitName, id-at-organizationName, id-at-pseudonym, id-at-serialNumber, id-at-stateOrProvinceName, id-at-surname, id-at-title] and no other attribute types].

**FCS\_DTLSC\_EXT.1.3** When establishing a trusted channel, by default the TSF shall not establish a trusted channel if the server certificate is invalid. The TSF shall also [selection:

- Not implement any administrator override mechanism
- require administrator authorization to establish the connection if the TSF fails to [selection: match the reference identifier, validate certificate path, validate expiration date, determine the revocation status] of the presented server certificate

].

**FCS\_DTLSC\_EXT.1.4** The TSF shall [selection: not present the Supported Elliptic Curves/Supported Groups Extension, present the Supported Elliptic Curves/Supported Groups Extension with the following curves/groups: [selection: secp256r1, secp384r1, secp521r1, ffdhe2048, ffdhe3072, ffdhe4096, ffdhe6144, ffdhe8192] and no other curves/groups] in the Client Hello.

#### **D.2.14.6. FCS\_DTLSC\_EXT.2 DTLS Client Support for Mutual Authentication**

Hierarchical to: No other components  
Dependencies: FCS\_CKM.1/DataEncryption Cryptographic Key Generation  
FCS\_CKM.2 Cryptographic Key Establishment  
FCS\_COP.1/DataEncryption Cryptographic operation (AES Data encryption/decryption)  
FCS\_COP.1/SigGen Cryptographic operation (Signature Generation and Verification)  
FCS\_COP.1/Hash Cryptographic operation (Hash Algorithm)  
FCS\_COP.1/KeyedHash Cryptographic operation (Keyed Hash Algorithm)  
FCS\_RBG\_EXT.1 Random Bit Generation  
FCS\_DTLSC\_EXT.1 DTLS Client Protocol  
FIA\_X509\_EXT.1 X.509 Certificate Validation  
FIA\_X509\_EXT.2 X.509 Certificate Authentication

**FCS\_DTLSC\_EXT.2.1** The TSF shall support mutual authentication using X.509v3 certificates.

**FCS\_DTLSC\_EXT.2.2** The TSF shall [selection: terminate the DTLS session, silently discard the record] if a message received contains an invalid MAC.

**FCS\_DTLSC\_EXT.2.3** The TSF shall detect and silently discard replayed messages for:

- DTLS records previously received;
- DTLS records too old to fit in the sliding window.

## **D.2.15. FCS\_DTLSS\_EXT DTLS Server Protocol**

### **D.2.15.1. Family Behaviour**

The component in this family addresses the ability for a server to use DTLS to protect data between a client and the server using the DTLS protocol.

### **D.2.15.2. Component levelling**

**FCS\_DTLSS\_EXT.1** DTLS Server requires that the server side of TLS be implemented as specified.

**FCS\_DTLSS\_EXT.2:** DTLS Server requires that mutual authentication be included in the DTLS implementation.

### **D.2.15.3. Management: FCS\_DTLSS\_EXT.1, FCS\_DTLSS\_EXT.2**

The following actions could be considered for the management functions in FMT:

- There are no management activities foreseen.

### **D.2.15.4. Audit: FCS\_DTLSS\_EXT.1, FCS\_DTLSS\_EXT.2**

The following actions should be considered for audit if FAU\_GEN Security audit data generation is included in the PP/ST:

- Failure of DTLS session establishment.
- DTLS session establishment

- DTLS session termination

#### **D.2.15.5. FCS\_DTLSS\_EXT.1 DTLS Server Protocol**

Hierarchical to: No other components  
 Dependencies: FCS\_CKM.1 Cryptographic Key Generation  
 FCS\_CKM.2 Cryptographic Key Establishment  
 FCS\_COP.1//DataEncryption Cryptographic operation (AES Data encryption/decryption)  
 FCS\_COP.1//SigGen Cryptographic operation (Signature Generation and Verification)  
 FCS\_COP.1/Hash Cryptographic operation (Hash Algorithm)  
 FCS\_COP.1/KeyedHash Cryptographic operation (Keyed Hash Algorithm)  
 FCS\_RBG\_EXT.1 Random Bit Generation  
 FIA\_X509\_EXT.1 X.509 Certificate Validation  
 FIA\_X509\_EXT.2 X.509 Certificate Authentication

**FCS\_DTLSS\_EXT.1.1** The TSF shall implement [selection: DTLS 1.2 (RFC 6347), DTLS 1.0 (RFC 4347)] supporting the following ciphersuites:

- [assignment: List of optional ciphersuites and reference to RFC in which each is defined]

**FCS\_DTLSS\_EXT.1.2** The TSF shall deny connections from clients requesting [assignment: list of protocol versions].

**FCS\_DTLSS\_EXT.1.3** The TSF shall not proceed with a connection handshake attempt if the DTLS Client fails validation.

**FCS\_DTLSS\_EXT.1.4** The TSF shall perform key establishment for TLS using [selection: RSA with key size [selection: 2048 bits, 3072 bits, 4096 bits], Diffie-Hellman parameters with size [selection: 2048 bits, 3072 bits, 4096 bits, 6144 bits, 8192 bits], Diffie-Hellman groups [selection: ffdhe2048, ffdhe3072, ffdhe4096, ffdhe6144, ffdhe8192, no other groups], ECDHE curves [selection: secp256r1, secp384r1, secp521r1] and no other curves].

**FCS\_DTLSS\_EXT.1.5** The TSF shall [selection: terminate the DTLS session, silently discard the record] if a message received contains an invalid MAC.

**FCS\_DTLSS\_EXT.1.6** The TSF shall detect and silently discard replayed messages for:

- DTLS records previously received.
- DTLS Records too old to fit in the sliding window.

**FCS\_DTLSS\_EXT.1.7** The TSF shall support [selection: no session resumption or session tickets, session resumption based on session IDs according to RFC 4346 (TLS1.1) or RFC 5246 (TLS1.2), session resumption based on session tickets according to RFC 5077].

#### **D.2.15.6. FCS\_DTLSS\_EXT.2 DTLS Server Support for Mutual Authentication**

Hierarchical to: No other components  
 Dependencies: FCS\_CKM.1 Cryptographic Key Generation  
 FCS\_CKM.2 Cryptographic Key Establishment  
 FCS\_COP.1/DataEncryption Cryptographic operation (AES Data encryption/decryption)  
 FCS\_COP.1/SigGen Cryptographic operation (Signature Generation and Verification)  
 FCS\_COP.1/Hash Cryptographic operation (Hash Algorithm)  
 FCS\_COP.1/KeyedHash Cryptographic operation (Keyed Hash Algorithm)  
 FCS\_RBG\_EXT.1 Random Bit Generation  
 FCS\_DTLSS\_EXT.1 DTLS Server Protocol

**FCS\_DTLSS\_EXT.2.1** The TSF shall support mutual authentication of DTLS clients using X.509v3 certificates.

**FCS\_DTLSS\_EXT.2.2** When establishing a trusted channel, by default the TSF shall not establish a trusted channel if the client certificate is invalid. The TSF shall also [selection:

- Not implement any administrator override mechanism
- require administrator authorization to establish the connection if the TSF fails to [selection: match the reference identifier, validate certificate path, validate expiration date, determine the revocation status] of the presented client certificate

].

**FCS\_DTLSS\_EXT.2.3** The TSF shall not establish a trusted channel if the distinguished name (DN) or Subject Alternative Name (SAN) contained in a certificate does not match the expected identifier for the client.

## D.3. (FDP)

### D.3.1. FDP\_DSK\_EXT Extended: Protection of Data on Disk

#### D.3.1.1. Family Behaviour

This family is to mandate the encryption of all protected data written to the storage.

#### D.3.1.2. Component Leveling

*Component leveling*

```

+-----+
|                                     | +---+
| FDP_DSK_EXT Protection of Data on Disk +--->| 1 |
|                                     | +---+
+-----+
  
```

**FDP\_DSK\_EXT.1** Extended: Protection of Data on Disk, requires the TSF to encrypt all the Confidential TSF and User Data stored on the Nonvolatile Storage Devices in order to avoid storing these data in plaintext on the devices.

#### D.3.1.3. Management

The following actions could be considered for the management functions in FMT:

- There are no management actions foreseen.

#### D.3.1.4. Audit

The following actions should be auditable if FAU\_GEN Security Audit Data Generation is included in the PP/ST:

- There are no auditable events foreseen.

#### D.3.1.5. FDP\_DSK\_EXT.1 Extended: Protection of Data on Disk

Hierarchical to: No other components.

Dependencies: FCS\_COP.1(d) Cryptographic operation (AES Data Encryption/Decryption)

FDP\_DSK\_EXT.1.1 The TSF shall [selection: *perform encryption in accordance with FCS\_COP.1(d), use a self-encrypting Nonvolatile Storage Device that is separately CC certified to conform to the FDE EE cPP*] such that any Nonvolatile Storage Device contains no plaintext User Document Data and no plaintext confidential TSF Data.

FDP\_DSK\_EXT.1.2 The TSF shall encrypt all protected data without user intervention.

#### D.3.1.6. Rationale

Extended: Protection of Data on Disk is to specify that encryption of any confidential data without user intervention, and the Common Criteria does not provide a suitable SFR for the Protection of Data on Disk.

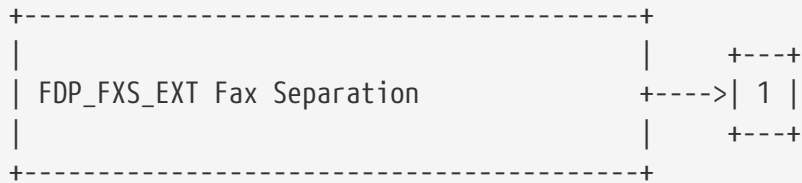
This extended component protects the Data on Disk, and it is therefore placed in the FDP class with a single component.

### D.3.2. FDP\_FXS\_EXT Extended: Fax Separation

#### D.3.2.1. Family Behaviour

This family addresses the requirements for separation between Fax PSTN line and the LAN to which TOE is connected.

#### D.3.2.2. Component Leveling



FDP\_FXS\_EXT.1 Fax Separation, requires the fax interface cannot be used to create a network bridge between a PSTN and a LAN to which TOE is connected.

#### D.3.2.3. Management

The following actions could be considered for the management functions in FMT:

- There are no management actions foreseen.

#### D.3.2.4. Audit

The following actions should be auditable if FAU\_GEN Security Audit Data Generation is included in the PP/ST:

- There are no auditable events foreseen.

#### D.3.2.5. FDP\_FXS\_EXT.1 Extended: Fax separation

Hierarchical to: No other components.  
Dependencies: No dependencies.

FDP\_FXS\_EXT.1.1 The TSF shall prohibit communication via the fax interface, except transmitting or receiving User Data using fax protocols.

#### D.3.2.6. Rationale

Fax Separation is to protect a LAN against attack from PSTN line, and the Common Criteria does not provide a suitable SFR for the Protection of TSF or User Data.

This extended component protects the TSF Data or User Data, and it is therefore placed in the FDP class with a single component.

## D.4. (FIA)

### D.4.1. FIA\_PMG\_EXT Extended: Password Management

#### D.4.1.1. Family Behaviour

This family defines requirements for the attributes of passwords used by administrative users to ensure that strong passwords and passphrases can be chosen and maintained.

#### D.4.1.2. Component Leveling

##### Component leveling

```
+-----+
|                                     | +---+
| FIA_PMG_EXT Password management | +--->| 1 |
|                                     | +---+
+-----+
```

FIA\_PMG\_EXT.1 Password management requires the TSF to support passwords with varying composition requirements, minimum lengths, maximum lifetime, and similarity constraints.

#### D.4.1.3. Management

The following actions could be considered for the management functions in FMT:

- There are no management actions foreseen.

#### D.4.1.4. Audit

The following actions should be auditable if FAU\_GEN Security Audit Data Generation is included in the PP/ST:

- There are no auditable events foreseen.

#### D.4.1.5. FIA\_PMG\_EXT.1 Extended: Password management

Hierarchical to: No other components.  
Dependencies: No dependencies.

FIA\_PMG\_EXT.1.1 The TSF shall provide the following password management capabilities for User passwords:

- Passwords shall be able to be composed of any combination of upper and lower case letters, numbers, and the following special characters: [selection: “!”, “@”, “#”, “\$”, “%”, “^”, “&”, “\*”, “(”, “)”, [assignment: *other characters*]];
- Minimum password length shall be settable by an Administrator, and have the capability to require passwords of 15 characters or greater.

#### D.4.1.6. Rationale

Password Management is to ensure the strong authentication between the endpoints of communication, and the Common Criteria does not provide a suitable SFR for the Password Management.

This extended component protects the TOE by means of password management, and it is therefore placed in the FIA class with a single component.



## D.4.2. FIA\_PSK\_EXT Extended: Pre-Shared Key Composition

### D.4.2.1. Family Behaviour

This family defines requirements for the TSF to ensure the ability to use pre-shared keys for IPsec.

### D.4.2.2. Component Leveling

*Component leveling*



FIA\_PSK\_EXT.1 Pre-Shared Key Composition, ensures authenticity and access control for updates.

### D.4.2.3. Management

The following actions could be considered for the management functions in FMT:

- There are no management actions foreseen.

### D.4.2.4. Audit

The following actions should be auditable if FAU\_GEN Security Audit Data Generation is included in the PP/ST:

- There are no auditable events foreseen.

### D.4.2.5. FIA\_PSK\_EXT.1 Extended: Pre-Shared Key Composition

Hierarchical to: No other components.  
Dependencies: FCS\_RBG\_EXT.1 Extended: Cryptographic Operation (Random Bit Generation).

FIA\_PSK\_EXT.1.1 The TSF shall be able to use pre-shared keys for IPsec.

FIA\_PSK\_EXT.1.2 The TSF shall be able to accept text-based pre-shared keys that are:

- 22 characters in length and [selection: [assignment: *other supported lengths*], no other lengths];
- composed of any combination of upper and lower case letters, numbers, and special characters (that include: “!”, “@”, “#”, “\$”, “%”, “^”, “&”, “\*”, “(”, and “)”).

FIA\_PSK\_EXT.1.3 The TSF shall condition the text-based pre-shared keys by using [selection: *SHA-1*, *SHA-256*, *SHA-512*, [assignment: *method of conditioning text string*]] and be able to [selection: *use no other pre-shared keys*; *accept bit-based pre-shared keys*; *generate bit-based pre-shared keys using the random bit generator specified in FCS\_RBG\_EXT.1*].

#### **D.4.2.6. Rationale**

Pre-shared Key Composition is to ensure the strong authentication between the endpoints of communications, and the Common Criteria does not provide a suitable SFR for the Pre-shared Key Composition.

This extended component protects the TOE by means of strong authentication, and it is therefore placed in the FIA class with a single component.

### **D.4.3. Authentication using X.509 certificates (FIA\_X509\_EXT)**

#### **D.4.3.1. Family Behaviour**

This family defines the behaviour, management, and use of X.509 certificates for functions to be performed by the TSF. Components in this family require validation of certificates according to a specified set of rules, use of certificates for authentication for protocols and integrity verification, and the generation of certificate requests.

#### **D.4.3.2. Component levelling**

FIA\_X509\_EXT.1 X509 Certificate Validation, requires the TSF to check and validate certificates in accordance with the RFCs and rules specified in the component.

FIA\_X509\_EXT.2 X509 Certificate Authentication, requires the TSF to use certificates to authenticate peers in protocols that support certificates, as well as for integrity verification and potentially other functions that require certificates.

FIA\_X509\_EXT.3 X509 Certificate Requests, requires the TSF to be able to generate Certificate Request Messages and validate responses.

#### **D.4.3.3. Management: FIA\_X509\_EXT.1, FIA\_X509\_EXT.2, FIA\_X509\_EXT.3**

The following actions could be considered for the management functions in FMT:

- Remove imported X.509v3 certificates
- Approve import and removal of X.509v3 certificates
- Initiate certificate requests

#### **D.4.3.4. Audit: FIA\_X509\_EXT.1, FIA\_X509\_EXT.2, FIA\_X509\_EXT.3**

The following actions should be auditable if FAU\_GEN Security audit data generation is included in the PP/ST:

- Minimal: No specific audit requirements are specified.

#### **D.4.3.5. FIA\_X509\_EXT.1 X.509 Certificate Validation**

Hierarchical to: No other components  
Dependencies: FIA\_X509\_EXT.2 X.509 Certificate Authentication

**FIA\_X509\_EXT.1.1** The TSF shall validate certificates in accordance with the following rules:

- RFC 5280 certificate validation and certification path validation.
- The certification path must terminate with a trusted CA certificate designated as a trust anchor.
- The TSF shall validate a certification path by ensuring that all CA certificates in the certification path contain the basicConstraints extension with the CA flag set to TRUE.
- The TSF shall validate the revocation status of the certificate using [selection: *the Online Certificate Status Protocol (OCSP) as specified in RFC 6960, a Certificate Revocation List (CRL) as specified in RFC 5280 Section 6.3, Certificate Revocation List (CRL) as specified in RFC 5759 Section 5, no revocation method*]
- The TSF shall validate the extendedKeyUsage field according to the following rules: [assignment: *rules that govern contents of the extendedKeyUsage field that need to be verified*].

**FIA\_X509\_EXT.1.2** The TSF shall only treat a certificate as a CA certificate if the basicConstraints extension is present and the CA flag is set to TRUE.

#### **D.4.3.6. FIA\_X509\_EXT.2 X509 Certificate Authentication**

Hierarchical to: No other components  
Dependencies: FIA\_X509\_EXT.1 X.509 Certificate Validation

**FIA\_X509\_EXT.2.1** The TSF shall use X.509v3 certificates as defined by RFC 5280 to support authentication for [selection: *DTLS, HTTPS, IPsec, TLS, SSH, [assignment: other protocols], no protocols*], and [selection: *code signing for system software updates [assignment: other uses], no additional uses*].

**FIA\_X509\_EXT.2.2** When the TSF cannot establish a connection to determine the validity of a certificate, the TSF shall [selection: *allow the Administrator to choose whether to accept the certificate in these cases, accept the certificate, not accept the certificate*].

#### **D.4.3.7. FIA\_X509\_EXT.3 X.509 Certificate Requests**

Hierarchical to: No other components  
Dependencies: FCS\_CKM.1 Cryptographic Key Generation  
FIA\_X509\_EXT.1 X.509 Certificate Validation

**FIA\_X509\_EXT.3.1** The TSF shall generate a Certificate Request as specified by RFC 2986 and be able to provide the following information in the request: public key and [selection: *device-specific information, Common Name, Organization, Organizational Unit, Country, [assignment: other information]*].

**FIA\_X509\_EXT.3.2** The TSF shall validate the chain of certificates from the Root CA upon receiving the CA Certificate Response.

## D.5. (FPT)

### D.5.1. FPT\_KYP\_EXT Extended: Protection of Key and Key Material

#### D.5.1.1. Family Behaviour

This family addresses the requirements for keys and key materials to be protected if and when written to nonvolatile storage.

#### D.5.1.2. Component Leveling

*Component leveling*

```
+-----+
|                                     | +---+
| FPT_KYP_EXT Protection of key and key material +--->| 1 |
|                                     | +---+
+-----+
```

FPT\_KYP\_EXT.1 Extended: Protection of key and key material, requires the TSF to ensure that no plaintext key or key materials are written to nonvolatile storage.

#### D.5.1.3. Management

The following actions could be considered for the management functions in FMT:

- There are no management actions foreseen.

#### D.5.1.4. Audit

The following actions should be auditable if FAU\_GEN Security Audit Data Generation is included in the PP/ST:

- There are no auditable events foreseen.

#### D.5.1.5. FPT\_KYP\_EXT.1 Extended: Protection of Key and Key Material

```
Hierarchical to:    No other components.
Dependencies:      FCS_KYC_EXT.1 Extended: Key Chaining
```

FPT\_KYP\_EXT.1.1 The TSF shall not store plaintext keys that are part of the keychain specified by FCS\_KYC\_EXT.1 in any Nonvolatile Storage Device, and not store any such plaintext key on a device that uses the key for its encryption.

#### D.5.1.6. Rationale

Protection of Key and Key Material is to ensure that no plaintext key or key material are written to nonvolatile storage, and the Common Criteria does not provide a suitable SFR for the protection of

key and key material.

This extended component protects the TSF data, and it is therefore placed in the FPT class with a single component.

## D.5.2. FPT\_SKP\_EXT Extended: Protection of TSF Data

### D.5.2.1. Family Behaviour

This family addresses the requirements for managing and protecting the TSF data, such as cryptographic keys. This is a new family modelled as the FPT Class.

### D.5.2.2. Component Leveling

*Component leveling*

```
+-----+
|                                     | +---+
| FPT_SKP_EXT Protection of TSF Data | +--->| 1 |
|                                     | +---+
+-----+
```

FPT\_SKP\_EXT.1 Protection of TSF Data (for reading all symmetric keys), requires preventing symmetric keys from being read by any user or subject. It is the only component of this family.

### D.5.2.3. Management

The following actions could be considered for the management functions in FMT:

- There are no management actions foreseen.

### D.5.2.4. Audit

The following actions should be auditable if FAU\_GEN Security Audit Data Generation is included in the PP/ST:

- There are no auditable events foreseen.

### D.5.2.5. FPT\_SKP\_EXT.1 Extended: Protection of TSF Data

Hierarchical to: No other components.  
Dependencies: No dependencies.

FPT\_SKP\_EXT.1.1 The TSF shall prevent reading of all pre-shared keys, symmetric keys, and private keys.

### D.5.2.6. Rationale

Protection of TSF Data is to ensure the pre-shared keys, symmetric keys and private keys are

protected securely, and the Common Criteria does not provide a suitable SFR for the protection of such TSF data.

This extended component protects the TOE by means of strong authentication using Pre-shared Key, and it is therefore placed in the FPT class with a single component.

### D.5.3. FPT\_TST\_EXT Extended: TSF testing

#### D.5.3.1. Family Behaviour

This family addresses the requirements for self-testing the TSF for selected correct operation.

#### D.5.3.2. Component Leveling

*Component leveling*

```

+-----+
|          |          +---+
| FPT_TST_EXT TSF testing  +--->| 1 |
|          |          +---+
+-----+
```

FPT\_TST\_EXT.1 TSF testing requires a suite of self-testing to be run during initial start-up in order to demonstrate correct operation of the TSF.

#### D.5.3.3. Management

The following actions could be considered for the management functions in FMT:

- There are no management actions foreseen.

#### D.5.3.4. Audit

The following actions should be auditable if FAU\_GEN Security Audit Data Generation is included in the PP/ST:

- There are no auditable events foreseen.

#### D.5.3.5. FPT\_TST\_EXT.1 Extended: TSF testing

Hierarchical to: No other components.  
Dependencies: No dependencies.

FPT\_TST\_EXT.1.1 The TSF shall run a suite of self-tests during initial start-up (and power on) to demonstrate the correct operation of the TSF.

#### D.5.3.6. Rationale

TSF testing is to ensure the TSF can be operated correctly, and the Common Criteria does not

provide a suitable SFR for the TSF testing. In particular, there is no SFR defined for TSF testing.

This extended component protects the TOE, and it is therefore placed in the FPT class with a single component.

## D.5.4. FPT\_TUD\_EXT Extended: Trusted Update

### D.5.4.1. Family Behaviour

This family defines requirements for the TSF to ensure that only administrators can update the TOE firmware/software, and that such firmware/software is authentic.

### D.5.4.2. Component Leveling

*Component leveling*

```
+-----+
|                                     | +---+
| FPT_TUD_EXT Trusted Update         | +--->| 1 |
|                                     | +---+
+-----+
```

FPT\_TUD\_EXT.1 Trusted Update, ensures authenticity and access control for updates.

### D.5.4.3. Management

The following actions could be considered for the management functions in FMT:

- There are no management actions foreseen.

### D.5.4.4. Audit

The following actions should be auditable if FAU\_GEN Security Audit Data Generation is included in the PP/ST:

- There are no auditable events foreseen.

### D.5.4.5. FPT\_TUD\_EXT.1 Trusted Update

Hierarchical to: No other components.  
Dependencies: [FCS\_COP.1/SigGen Cryptographic Operation (for signature generation/verification),  
FCS\_COP.1/Hash Cryptographic operation (Hash Algorithm)].

FPT\_TUD\_EXT.1.1 The TSF shall provide authorized administrators the ability to query the current version of the TOE firmware/software.

FPT\_TUD\_EXT.1.2 The TSF shall provide authorized administrators the ability to initiate updates to TOE firmware/software.

FPT\_TUD\_EXT.1.3 The TSF shall provide a means to verify firmware/software updates to the TOE using a digital signature mechanism and [selection: published hash, no other functions] prior to installing those updates.

#### **D.5.4.6. Rationale**

Firmware/software is a form of TSF Data, and the Common Criteria does not provide a suitable SFR for the management of firmware/software. In particular, there is no SFR defined for importing TSF Data.

This extended component protects the TOE, and it is therefore placed in the FPT class with a single component.

## **Appendix E: Entropy Documentation and Assessment**

This appendix describes the required supplementary information for each entropy source used by the TOE.

The documentation of the entropy source(s) should be detailed enough that, after reading, the evaluator will thoroughly understand the entropy source and why it can be relied upon to provide sufficient entropy. This documentation should include multiple detailed sections: design description, entropy justification, operating conditions, and health testing. This documentation is not required to be part of the TSS.

### **E.1. Design Description**

Documentation shall include the design of each entropy source as a whole, including the interaction of all entropy source components. Any information that can be shared regarding the design should also be included for any third-party entropy sources that are included in the product.

The documentation will describe the operation of the entropy source to include how entropy is produced, and how unprocessed (raw) data can be obtained from within the entropy source for testing purposes. The documentation should walk through the entropy source design indicating where the entropy comes from, where the entropy output is passed next, any post-processing of the raw outputs (hash, XOR, etc.), if/where it is stored, and finally, how it is output from the entropy source. Any conditions placed on the process (e.g., blocking) should also be described in the entropy source design. Diagrams and examples are encouraged.

This design must also include a description of the content of the security boundary of the entropy source and a description of how the security boundary ensures that an adversary outside the boundary cannot affect the entropy rate.

If implemented, the design description shall include a description of how third-party applications can add entropy to the RBG. A description of any RBG state saving between power-off and power-on shall be included.



## E.2. Entropy Justification

There should be a technical argument for where the unpredictability in the source comes from and why there is confidence in the entropy source delivering sufficient entropy for the uses made of the RBG output (by this particular TOE). This argument will include a description of the expected min-entropy rate (i.e. the minimum entropy (in bits) per bit or byte of source data) and explain that sufficient entropy is going into the TOE randomizer seeding process. This discussion will be part of a justification for why the entropy source can be relied upon to produce bits with entropy.

The amount of information necessary to justify the expected min-entropy rate depends on the type of entropy source included in the product.

For developer-provided entropy sources, in order to justify the min-entropy rate, it is expected that a large number of raw source bits will be collected, statistical tests will be performed, and the min-entropy rate determined from the statistical tests. While no particular statistical tests are required at this time, it is expected that some testing is necessary in order to determine the amount of min-entropy in each output.

For third-party provided entropy sources, in which the TOE vendor has limited access to the design and raw entropy data of the source, the documentation will indicate an estimate of the amount of min-entropy obtained from this third-party source. It is acceptable for the vendor to “assume” an amount of min-entropy, however, this assumption must be clearly stated in the documentation provided. In particular, the min-entropy estimate must be specified and the assumption included in the ST.

Regardless of the type of entropy source, the justification will also include how the DRBG is initialized with the entropy stated in the ST, for example by verifying that the min-entropy rate is multiplied by the amount of source data used to seed the DRBG or that the rate of entropy expected based on the amount of source data is explicitly stated and compared to the statistical rate. If the amount of source data used to seed the DRBG is not clear or the calculated rate is not explicitly related to the seed, the documentation will not be considered complete.

The entropy justification shall not include any data added from any third-party application or from any state saving between restarts.

## E.3. Operating Conditions

The entropy rate may be affected by conditions outside the control of the entropy source itself. For example, voltage, frequency, temperature, and elapsed time after power-on are just a few of the factors that may affect the operation of the entropy source. As such, documentation will also include the range of operating conditions under which the entropy source is expected to generate random data. Similarly, documentation shall describe the conditions under which the entropy source is no longer guaranteed to provide sufficient entropy. Methods used to detect failure or degradation of the source shall be included.

## E.4. Health Testing

More specifically, all entropy source health tests and their rationale will be documented. This will

include a description of the health tests, the rate and conditions under which each health test is performed (e.g., at start up, continuously, or on-demand), the expected results for each health test, TOE behaviour upon entropy source failure, and rationale indicating why each test is believed to be appropriate for detecting one or more failures in the entropy source.

## Appendix F: Key Management Document

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 diagram(s). This documentation is not required to be part of the TSS - it can be submitted as a separate document and marked as developer proprietary.

### F.1. Key Management Description

The description will provide the following information for all keys in the key chain:

- The purpose of the key
- If the key is stored in non-volatile memory
- How and when the key is protected
- How and when the key is derived
- The strength of the key
- When or if the key would be no longer needed, along with a justification
- How and when the key may be shared
- Key destruction description

The description will also describe the following topics:

- A description of all authorization factors that are supported by the product and how each factor is handled, including any conditioning and combining performed.
- If validation is implemented, the process for validation shall be described, noting what value is used for validation and the process used to perform the validation. It shall describe how this process ensures no keys in the key chain are weakened or exposed by this process.
- The authorization process that leads to the decryption of the FEK(s). This section shall detail the key chain used by the product. It shall describe which keys are used in the protection of the FEK(s) and how they meet the encryption or derivation requirements including the direct chain from the initial authorization to the FEK(s). It shall also include any values that add into that key chain or interact with the key chain and the protections that ensure those values do not weaken or expose the overall strength of the key chain.
- The diagram and essay will clearly illustrate the key hierarchy to ensure that at no point the chain could be broken without a cryptographic exhaust or all of the initial authorization values and the effective strength of the FEK(s) is maintained throughout the key chain.
- A description of the data encryption engine, its components, and details about its

implementation (e.g. initialization of the product, drivers, libraries (if applicable), logical interfaces for encryption/decryption, and how resources to be encrypted are identified. The description should also include the data flow from the device's host interface to the device's persistent media storing the data, information on those conditions in which the data bypasses the data encryption engine. The description should be detailed enough to verify all platforms ensure that when the user enables encryption, the product encrypts all selected resources.

- The process for destroying keys when they are no longer needed by describing the storage location of all keys and the protection of all keys stored in non-volatile memory.

## F.2. Key Management Diagram:

- The diagram will include all keys from the initial authorization factor(s) to the FEK(s) and any keys or values that contribute into the chain. It must list the cryptographic strength of each key and indicate how each key along the chain is protected with either options from key chaining requirement. The diagram should indicate the input used to derive or decrypt each key in the chain.
- A functional (block) diagram showing the main components (such as memories and processors) the initial steps needed for the activities the TOE performs to ensure it encrypts the targeted resources when a user or administrator first provisions the product.

# Appendix G: Consistency Rationale

Table 8. Consistency Rationale for threats and OSPs

Threats/OSPs	Consistency Rationale

Table 9. Consistency Rationale for Assumptions

Assumptions	Consistency Rationale

## G.1. Consistency of Objectives

The objectives for the biometric system and its operational environment are consistent with the [\[MDFPP\]](#) based on the following rationale:

Table 10. Consistency Rationale for TOE Objectives

TOE Objectives	Consistency Rationale

Table 11. Consistency Rationale for Environmental Objectives

Environmental Objectives	Consistency Rationale

## G.2. Consistency of Requirements

# Appendix H: SFR List

This table is provided as a reference of all SFRs included in this cPP.

The Type column has the following definitions:

## Mandatory [R]

The requirement is mandatory for inclusion in the ST.

## Conditionally Mandatory [C]

The requirement is conditionally mandatory for inclusion in the ST.

## Optional [O]

The requirement is optional for inclusion in the ST.

## Selection [S]

The requirement inclusion is determined by selections in other requirements in the ST.

## [U]

The SFR plays a supporting role to other SFRs.

Table 12. Security Functional Requirements

Objective/SFR	O.ACESS_CONTROLS	O.ADMIN_ROLES	O.AUDIT	O.COMMSPROTECTION	O.FAUX_SEPARATION	O.IMAGE_OVERWRITE	O.KEY_MATERIAL	O.PURGEDATA	O.STORAGE_ENCRYPTION	O.TSF_SELF_TEST	O.UPDATE_VERIFICATION	O.USER_AUTHORIZATION	O.USER_I&A
FAU_GEN.1			R										
FAU_GEN.2			R										
FAU_SAR.1			O										
FAU_SAR.2			O										
FAU_STG.1			O										
FAU_STG.4			O										
FAU_STG_EXT.1			R										

FCS_C KM.1( a)			R									
FCS_C KM.1( b)			R				S					
FCS_C KM.4			U			O	U					
FCS_C KM_E XT.4			U			O	U					
FCS_C OP.1/ DataE ncryp tion			R									
FCS_C OP.1/ SigGe n			S					S				
FCS_C OP.1/ Hash							U	S				
FCS_C OP.1( d)							U					
FCS_C OP.1( e)							U					
FCS_C OP.1(f )							U					
FCS_C OP.1/ Keye dHas h			S									
FCS_C OP.1( h)							O					
FCS_C OP.1(i )							U					

FCS_HTTP_S_EXT.1			S									
FCS_IPSEC_EXT.1			S									
FCS_KDF_EXT.1							O					
FCS_KYC_EXT.1							C					
FCS_PCC_EXT.1							O					
FCS_RBG_EXT.1			U				U					
FCS_SMC_EXT.1							S					
FCS_SNI_EXT.1							S					
FCS_SH_EXT.1			S									
FCS_TLS_EXT.1			S									
FDP_ACC.1	R									R		
FDP_ACF.1	R									R		
FDP_DSK_EXT.1							C					
FDP_FXS_EXT.1				C								

FDP_ RIP.1( a)					O							
FDP_ RIP.1( b)							O					
FIA_A FL.1											U	
FIA_A TD.1										U		
FIA_P MG_E XT.1											R	
FIA_P SK_E XT.1				S								
FIA_U AU.1											R	
FIA_U AU.7											R	
FIA_U ID.1											R	
FIA_U SB.1											R	
FMT_ MOF. 1		R										
FMT_ MSA. 1	U										R	
FMT_ MSA. 3	U										R	
FMT_ MTD. 1	U											
FMT_ SMF.1	U	R									R	
FMT_ SMR. 1	U	R									R	

FPT_KYP_EXT.1							C						
FPT_SKP_EXT.1				R									
FPT_STM.1			U										
FPT_ST_EXT.1								R					
FPT_TUD_EXT.1									R				
FTA_SL.3											R		
FTP_ITC.1			U	R									
FTP_TRP.1(a)				R									
FTP_TRP.1(b)				R									

## Appendix I: Glossary

For the purpose of this cPP, the following terms and definitions given in *some specific references* apply. If the same terms and definitions are given in those references, terms and definitions that fit the context of this cPP take precedence.

### Address Book

Electronic storage mechanism that equates names of persons or physical locations with machine-usable destinations (e.g., fax telephone numbers, email addresses, Uniform Resource Locators).

### Administrator

A User who has been specifically granted the authority to manage some portion or all of the TOE and whose actions may affect the security policies of the TOE. Administrators may possess special privileges that provide capabilities to override portions of security policies. [2600.1]

### Asset

Entities that the owner of the TOE presumably places value upon. [CC]



**Assumption**

Physical, technical, and administrative conditions or requirements of the Operational Environment that must be upheld in order for the TOE to provide security functionality.

**Border Encryption Value**

A secret value passed to a storage encryption component such as a self-encrypting storage device [CPP\_FDE\_EE\_V2.0]

**Commercial Off-The-Shelf**

Products that are both commercial and sold in substantial quantities in the commercial marketplace, and that can be procured or utilized under government contract in the same precise form as available to the general public. [FAR]

**Conditionally Mandatory Uses**

One of the uses described in section 1.3.1.2 which, if present in the TOE, must be included in its evaluated configuration.

**Confidential (TSF) Data**

Assets for which either disclosure or alteration by a User who is not an Administrator or the owner of the data would have an effect on the operational security of the TOE. [2600.1]

**Create**

Assigning a value or content to data in a storage device. Note that in the case of document processing jobs, the outcome is that the job is initiated

**Credentials**

A form of authentication data that specifies basic identifying information about a User or application. Credentials may be bound in some way to the individual to whom they were issued, or they may be bearer Credentials. The former are necessary for identification, while the latter may be acceptable for some forms of authorization. [2600]

**Decommission**

The act of retiring an HCD from active use in the Operational Environment. It may also involve a change in geographic location and/or ownership.

**Delete**

Dereferencing or otherwise making unavailable data in a storage device. Note that in the case of document processing jobs, the outcome is that the job is terminated.

**Document**

A medium and the information recorded on it that generally has permanence and can be read by a person or a machine. [610.12]

**Document Processing**

Printing, scanning, or copying a Document.

**Document Processing Job**

A User request to the TOE to perform a Document Processing operation on a Document.

**External Authentication**

Identification and authentication mechanism that uses services of External IT Entities to authenticate TOE Users.

**External IT Entity**

An External Entity that is an IT device (not a human). [CC] defines “External Entity”

**(Unit)**

The smallest subassembly that can be swapped in the field to repair a fault. [IEEE]

**Hardcopy Device**

A system producing or utilizing a physical embodiment of an electronic document or image. These systems include printers, scanners, fax machines, digital copiers, MFPs (multifunction peripherals), MFDs (multifunction devices), “all-in-ones” and other similar products. [2600]

**Intermediate Key**

A key used in a point between the initial user authorization and the DEK. [CPP\_FDE\_EE\_V2.0]

**Internal Authentication**

Identification and authentication function that is wholly contained within the TOE.

**Job**

A document processing task submitted to the hardcopy device. A single processing task may process one or more documents. [2600.1]

**Job Owner**

A User who has permission to control a Job and access its documents. Typically, such permissions are obtained by submitting a Job, by access control mechanism, or by obtaining a credential associated with a Job.

**Local Area Network**

A non-public data network in which serial transmission is used without store and forward techniques for direct data communication among data stations located on the User’s premises. [8802-6]

**Local User**

A User who is physically interacting with the HCD.

**Modify**

Changing the value / content of data in a storage device. Note that in the case of document processing jobs, the outcome is that the instructions or other parameters of the job are changed.

**Multifunction Device**

A Hardcopy Device that fulfills multiple purposes by using multiple functions in different combinations to replace several, single function devices. [Also known as Multifunction Printer and Multifunction Peripheral] [2600]

**Network Printing**

Printing operation that has been initiated by a Network User.

**Network User**

A User who interacts with the HCD over a network.

**Nonvolatile Storage Device**

A device that provides computer storage of data that is not cleared when the power is turned off.

**Normal User**

A User who is authorized to perform functions that process User Document Data in the TOE.

**Operational Environment**

Environment in which the TOE is operated. [CC]

**Optional Use**

One of the uses described in section 1.3.1.3 which may be present in the TOE, and may optionally be included in its evaluated configuration.

**Organizational Security Policy**

Set of security rules, procedures, or guidelines for an organization. [CC]

**Output Tray**

A receptacle for the TOE's printed output.

**Protected (TSF) Data**

Assets for which alteration by a User who is not an Administrator or the owner of the data would have an effect on the operational security of the TOE, but for which disclosure is acceptable. [2600.1]

**Protection Profile**

Implementation-independent statement of security needs for a TOE type. [CC]

**Read**

To access data from a storage device or data medium. (Note that in this case, the data medium may be a printed output, and therefore, release of a print job is a "read" operation) [610.12]

**Redeploy**

The act of moving an HCD from one Operational Environment to another Operational Environment.

**Required Use**

One of the uses described in section 1.3.1.1 which must be present in the TOE in its evaluated configuration.

**Security Assurance Requirement**

A description of how assurance is to be gained that the TOE meets the SFRs. [CC]

**Security Functional Requirement**

A translation of the Security Objectives for the TOE into a standardized language. [CC]

**Security Objective**

Statement of an intent to counter identified Threats and/or satisfy identified organization security policies and/or Assumptions. [CC]

**Security Target**

Implementation-dependent statement of security needs for a specific identified TOE. [CC]

**Servicing**

Performing repairs or preventative maintenance on the HCD.

**Standard Protection Profile**

A Protection Profile that is developed according to processes defined by NIAP.

**Submask**

A submask is a bit string that can be generated and stored in a numbers of ways, such as passphrases, tokens, etc. [CPP\_FDE\_EE\_V2.0]

**Target of Evaluation**

Set of software, firmware and/or hardware possibly accompanied by guidance. [CC]

**Temporary Storage**

Storage of data that is not intentionally retained by the TOE after the completion of a Document Processing Job.

**Threat**

Capabilities, intentions, and attack methods of adversaries, or any circumstance or event, with the potential to violate the TOE security policy. [2600.1]

**TOE Owner**

A person or organizational entity responsible for protecting TOE Assets and establishing related security policies. [2600.1]

**TOE Security Functionality**

Combined functionality of all hardware, software, and firmware of a TOE that must be relied upon for the correct enforcement of the SFRs. [CC]

**TSF Data**

Data for the operation of the TOE upon which the enforcement of the SFR relies. [CC]

**TSF interface**

Means by which external entities (or subjects in the TOE but outside of the TSF) supply data to the TSF, receive data from the TSF and invoke services from the TSF [CC]

**Unauthorized Access**

Access to a resource that a User is not permitted to access.

## User

Human or IT entity possibly interacting with the TOE from outside of the TOE boundary. [CC]

## User Data

Data for the User that does not affect the operation of the TSF. [CC]

## User Document Data

The Asset that consists of the information contained in a User's Document. This includes the original Document itself in either hardcopy or electronic form, image data, or residually stored data created by the hardcopy device while processing an original Document and printed hardcopy output [2600.1]

## User Job Data

The Asset that consists of the information about a User's Document or job to be processed by the TOE. [2600.1]

## Sources:

[2600] IEEE Std. 2600™-2008 "IEEE Standard for Information Technology: Hardcopy Device and System Security"

[2600.1] IEEE Std. 2600.1™-2009 "IEEE Standard for a Protection Profile in Operational Environment A"

[610.12] IEEE Std 610.12-1990 "IEEE Standard Glossary of Software Engineering Terminology"

[8802-6] ISO /IEC 8802-6:1994 "Information technology – Telecommunications and information exchange between systems – Local and metropolitan area networks – Specific requirements – Part 6"

[CC] ISO/IEC 15408-1:2009 "Information technology – Security techniques – Evaluation criteria for IT security – Part 1"

[CPP\_FDE\_EE\_V2.0] collaborative Protection Profile for Full Drive Encryption – Encryption Engine, Version 2.0, September 09, 2016

[FAR] United States Federal Acquisition Regulations

[IEEE] IEEE Standards Dictionary (ISBN 973-0-7381-2601-2)

# Appendix J: Acronyms

Table 13. Acronyms

Acronym	Meaning
AES	Advanced Encryption Standard
ITSEF	IT Security Evaluation Facility
BEV	Border Encryption Value

<b>Acronym</b>	<b>Meaning</b>
CBC	Cipher Block Chaining
CC	Common Criteria
CCEVS	Common Criteria Evaluation and Validation Service
CEM	Common Methodology for Information Security Evaluation
CNSSP	Committee on National Security Systems Policy
COTS	Commercial Off-The-Shelf
cPP	collaborative Protection Profile
DEK	Data Encryption Key
DSA	Digital Signature Algorithm
EAL	Evaluation Assurance Level
ECDSA	Elliptic Curve Digital Signature Algorithm
FIPS	Federal Information Processing Standards
GCM	Galois/Counter Mode
HCD	Hardcopy Device
HMAC	keyed-hash message authentication code
HTTPS	Hypertext Transfer Protocol Secure
IPA	Information-technology Promotion Agency
I&A	Identification and Authentication
IPsec	IP security
IT	Information Technology
ITC	international Technical Community
JISEC	Japan Information technology Security Evaluation and Certification scheme
KDF	Key Derivation Function
KMD	Key Management Description
LAN	Local Area Network
LDAP	Lightweight Directory Access Protocol
MFD	Multifunction Device
MFP	Multifunction Printer, Multifunction Peripheral
NAT	Network address translation
NIAP	National Information Assurance Partnership
NIST	National Institute of Standards and Technology
NTP	Network Time Protocol
OCSP	Online Certificate Status Protocol

Acronym	Meaning
OSP	Organizational Security Policy
PP	Protection Profile
PSTN	Public Switched Telephone Network
RBG	Random Bit Generator
RFC	Request for Comments
RNG	Random Number Generator
RSA	Rivest–Shamir–Adleman
SAR	Security Assurance Requirement
SED	Self Encrypting Drive
SFP	Security Functional Policy
SFR	Security Functional Requirement
SPD	Security Problem Definition
SPP	Standard Protection Profile
SSH	Secure Shell
ST	Security Target
TLS	Transport Layer Security
TOE	Target of Evaluation
TPM	Trusted Platform Module
TSF	TOE Security Functionality
TSFI	TSF Interface
TSS	TOE Summary Specification
XTS	XEX-based tweaked-codebook mode with ciphertext stealing

## Appendix K: Definitions and Rationale Tables

### K.1. User Definitions

There are two categories of Users defined in this PP:

*Table 14. User Categories*

<b>Designation</b>	<b>Category Name</b>	<b>Definition</b>
U.NORMAL	Normal User	A User who has been identified and authenticated and does not have an administrative role. A Normal User can be a Local User or a Network User as described in Section 1.3.3
U.ADMIN	Administrator	A User who has been identified and authenticated and has an administrative role

A conforming TOE may define additional roles, sub-roles, or groups. In particular, a conforming TOE may define several administrative roles that have authority to administer different aspects of the TOE.

## K.2. Asset Definitions

Assets are passive entities in the TOE that contain or receive information. In this PP, Assets are Objects (as defined by the CC). There are two categories of Assets defined in this PP:

*Table 15. Asset Categories*

<b>Designation</b>	<b>Asset Category</b>	<b>Definition</b>
D.USER	User Data	Data created by and for Users that do not affect the operation of the TSF
D.TSF	TSF Data	Data created by and for the TOE that might affect the operation of the TSF

A conforming TOE may define additional Asset categories.

### K.2.1. User Data

User Data are composed of two types:

*Table 16. User Data types*

<b>Designation</b>	<b>User Data type</b>	<b>Definition</b>
D.USER.DOC	User Document Data	Information contained in a User's Document, in electronic or hardcopy form
D.USER.JOB	User Job Data	Information related to a User's Document or Document Processing Job

A conforming TOE may define additional types of User Data.



## K.2.2. TSF Data

TSF Data are composed of two types:

*Table 17. TSF Data types*

Designation	TSF Data type	Definition
D.TSF.PROT	Protected TSF Data	TSF Data for which alteration by a User who is neither the data owner nor in an Administrator role might affect the security of the TOE, but for which disclosure is acceptable
D.TSF.CONF	Confidential TSF Data	TSF Data for which either disclosure or alteration by a User who is neither the data owner nor in an Administrator role might affect the security of the TOE

A conforming TOE may define additional types of TSF Data, examples include:

*Table 18. Examples of TSF Data Categorization*

Examples of TSF Protected Data	Examples of TSF Confidential Data
User and Administrator identification data	User and Administrator authentication data
Scan/fax/e-mail destination lists or address books	Credentials for accessing external devices (e.g., e-mail or file servers)
Job status logs	Job details and audit logs
Status of pending or stored jobs and documents	Access control lists
Device and network status information and configuration settings	Device and network management (e.g., Simple Network Management Protocol) authentication data
Device security status	Cryptographic keys
Device firmware and software	

## K.3. Threat Definitions

Threats are defined by a threat agent that performs an action resulting in an outcome that has the potential to violate TOE security policies.

*Table 19. Threats*

<b>Designation</b>	<b>Definition</b>
T.UNAUTHORIZED_ACCESS	An attacker may access (read, modify, or delete) User Document Data or change (modify or delete) User Job Data in the TOE through one of the TOE's interfaces or the physical Nonvolatile Storage component.
T.TSF_COMPROMISE	An attacker may gain Unauthorized Access to TSF Data in the TOE through one of the TOE's interfaces or the physical Nonvolatile Storage component.
T.TSF_FAILURE	A malfunction of the TSF may cause loss of security if the TOE is permitted to operate.
T.UNAUTHORIZED_UPDATE	An attacker may cause the installation of unauthorized software on the TOE.
T.NET_COMPROMISE	An attacker may access data in transit or otherwise compromise the security of the TOE by monitoring or manipulating network communication.

## K.4. Organizational Security Policy Definitions

Organizational Security Policies are used to provide a basis for Security Objectives that are not practical to define on the basis of Threats to Assets or that originate primarily from customer expectations.

*Table 20. Organizational Security Policies*

<b>Designation</b>	<b>Definition</b>
P.AUTHORIZATION	Users must be authorized before performing Document Processing and administrative functions.
P.AUDIT	Security-relevant activities must be audited and the log of such actions must be protected and transmitted to an External IT Entity.
P.COMMS_PROTECTION	The TOE must be able to identify itself to other devices on the LAN.
P.STORAGE_ENCRYPTION (conditionally mandatory)	If the TOE stores User Document Data or Confidential TSF Data on Nonvolatile Storage Devices, it will encrypt such data on those devices.

<b>Designation</b>	<b>Definition</b>
P.KEY_MATERIAL (conditionally mandatory)	Cleartext keys, submasks, random numbers, or any other values that contribute to the creation of encryption keys for Nonvolatile Storage of User Document Data or Confidential TSF Data must be protected from unauthorized access and must not be stored on that storage device.
P.FAX_FLOW (conditionally mandatory)	If the TOE provides a PSTN fax function, it will ensure separation between the PSTN fax line and the LAN.
P.IMAGE_OVERWRITE (optional)	Upon completion or cancellation of a Document Processing job, the TOE shall overwrite residual image data from its Nonvolatile Storage Devices.
P.PURGE_DATA (optional)	The TOE shall provide a function that an authorized administrator can invoke to make all customer-supplied User Data and TSF Data permanently irretrievable from Nonvolatile Storage Devices.

## K.5. Assumption Definitions

Assumptions are conditions that must be satisfied in order for the Security Objectives and functional requirements to be effective.

*Table 21. Assumptions*

<b>Designation</b>	<b>Definition</b>
A.PHYSICAL	Physical security, commensurate with the value of the TOE and the data it stores or processes, is assumed to be provided by the environment.
A.NETWORK	The Operational Environment is assumed to protect the TOE from direct, public access to its LAN interface.
A.TRUSTED_ADMIN	TOE Administrators are trusted to administer the TOE according to site security policies.
A.TRAINED_USERS	Authorized Users are trained to use the TOE according to site security policies.

## K.6. Definitions of Security Objectives for the TOE

*Table 22. Security Objectives for the TOE*

<b>Designation</b>	<b>Definition</b>
O.USER_I&A	The TOE shall perform identification and authentication of Users for operations that require access control, User authorization, or Administrator roles.
O.ACCESS_CONTROL	The TOE shall enforce access controls to protect User Data and TSF Data in accordance with security policies.
O.USER_AUTHORIZATION	The TOE shall perform authorization of Users in accordance with security policies.
O.ADMIN_ROLES	The TOE shall ensure that only authorized Administrators are permitted to perform administrator functions.
O.UPDATE_VERIFICATION	The TOE shall provide mechanisms to verify the authenticity of software updates.
O.TSF_SELF_TEST	The TOE shall test some subset of its security functionality to help ensure that subset is operating properly.
O.COMMS_PROTECTION	The TOE shall have the capability to protect LAN communications of User Data and TSF Data from Unauthorized Access, replay, and source/destination spoofing.
O.AUDIT	The TOE shall generate audit data, and be capable of sending it to a trusted External IT Entity. Optionally, it may store audit data in the TOE.
O.STORAGE_ENCRYPTION (conditionally mandatory)	If the TOE stores User Document Data or Confidential TSF Data in Nonvolatile Storage devices, then the TOE shall encrypt such data on those devices.
O.KEY_MATERIAL (conditionally mandatory)	The TOE shall protect from unauthorized access any cleartext keys, submasks, random numbers, or other values that contribute to the creation of encryption keys for storage of User Document Data or Confidential TSF Data in Nonvolatile Storage Devices; The TOE shall ensure that such key material is not stored in cleartext on the storage device that uses that material.
O.FAX_NET_SEPARATION (conditionally mandatory)	If the TOE provides a PSTN fax function, then the TOE shall ensure separation of the PSTN fax telephone line and the LAN, by system design or active security function.

Designation	Definition
O.IMAGE_OVERWRITE (optional)	Upon completion or cancellation of a Document Processing job, the TOE shall overwrite residual image data from its Nonvolatile Storage Devices.
O.PURGE_DATA (optional)	The TOE provides a function that an authorized administrator can invoke to make all customer-supplied User Data and TSF Data permanently irretrievable from Nonvolatile Storage Devices.

## K.7. Definitions of Security Objectives for the Operational Environment

Table 23. Security Objectives for the Operational Environment

Designation	Definition
OE.PHYSICAL_PROTECTION	The Operational Environment shall provide physical security, commensurate with the value of the TOE and the data it stores or processes.
OE.NETWORK_PROTECTION	The Operational Environment shall provide network security to protect the TOE from direct, public access to its LAN interface.
OE.ADMIN_TRUST	The TOE Owner shall establish trust that Administrators will not use their privileges for malicious purposes.
OE.USER_TRAINING	The TOE Owner shall ensure that Users are aware of site security policies and have the competence to follow them.
OE.ADMIN_TRAINING	The TOE Owner shall ensure that Administrators are aware of site security policies and have the competence to use manufacturer's guidance to correctly configure the TOE and protect passwords and keys accordingly.

## K.8. Security Objectives Tables

Table 24. Security Objectives rationale

Threat/Policy/Assumption	Rationale
<p>T.UNAUTHORIZED_ACCESS</p> <p>An attacker may access (read, modify, or delete) User Document Data or change (modify or delete) User Job Data in the TOE through one of the TOE's interfaces.</p>	<p>O.ACCESS_CONTROL restricts access to User Data in the TOE to authorized Users.</p> <p>O.USER_I&amp;A provides the basis for access control.</p> <p>O.ADMIN_ROLES restricts the ability to authorize Users and set access controls to authorized Administrators.</p>
<p>T.TSF_COMPROMISE</p> <p>An attacker may gain Unauthorized Access to TSF Data in the TOE through one of the TOE's interfaces.</p>	<p>O.ACCESS_CONTROL restricts access to TSF Data in the TOE to authorized Users.</p> <p>O.USER_I&amp;A provides the basis for access control.</p> <p>O.ADMIN_ROLES restricts the ability to authorize Users and set access controls to authorized Administrators.</p>
<p>T.TSF_FAILURE</p> <p>A malfunction of the TSF may cause loss of security if the TOE is permitted to operate.</p>	<p>O.TSF_SELF_TEST prevents the TOE from operating if a malfunction is detected.</p>
<p>T.UNAUTHORIZED_UPDATE</p> <p>An attacker may cause the installation of unauthorized software on the TOE.</p>	<p>O.UPDATE_VERIFICATION verifies the authenticity of software updates.</p>
<p>T.NET_COMPROMISE</p> <p>An attacker may access data in transit or otherwise compromise the security of the TOE by monitoring or manipulating network communication.</p>	<p>O.COMMS_PROTECTION protects LAN communications from sniffing, replay, and man-in-the-middle attacks.</p>
<p>P.AUTHORIZATION</p> <p>Users must be authorized before performing Document Processing and administrative functions.</p>	<p>O.USER_AUTHORIZATION restricts the ability to perform Document Processing and administrative functions to authorized Users.</p> <p>O.USER_I&amp;A provides the basis for authorization.</p> <p>O.ADMIN_ROLES restricts the ability to authorize Users to authorized Administrators.</p>

Threat/Policy/Assumption	Rationale
<p>P.AUDIT</p> <p>Security-relevant activities must be audited and the log of such actions must be protected and transmitted to an External IT Entity.</p>	<p>O.AUDIT requires the generation of audit data.</p> <p>O.ACCESS_CONTROL restricts access to audit data in the TOE to authorized Users.</p> <p>O.USER_AUTHORIZATION provides the basis for authorization.</p>
<p>P.COMMS_PROTECTION</p> <p>The TOE must be able to identify itself to other devices on the LAN.</p>	<p>O.COMMS_PROTECTION protects LAN communications from man-in-the-middle attacks.</p>
<p>P.STORAGE_ENCRYPTION (conditionally mandatory)</p> <p>If the TOE stores User Document Data or Confidential TSF Data on Nonvolatile Storage Devices, it will encrypt such data on those devices.</p>	<p>O.STORAGE_ENCRYPTION protects User Document Data and Confidential TSF Data stored in Nonvolatile Storage Devices from exposure if a device has been removed from the TOE and its Operational Environment.</p>
<p>P.KEY_MATERIAL (conditionally mandatory)</p> <p>Cleartext keys, submasks, random numbers, or any other values that contribute to the creation of encryption keys for Nonvolatile Storage of User Document Data or Confidential TSF Data must be protected from unauthorized access and must not be stored on that storage device.</p>	<p>O.KEY_MATERIAL protects keys and key materials from unauthorized access and ensures that they any key materials are not stored in cleartext on the device that uses those materials for its own encryption.</p>
<p>P.FAX_FLOW (conditionally mandatory)</p> <p>If the TOE provides a PSTN fax function, it will ensure separation between the PSTN fax line and the LAN.</p>	<p>O.FAX_NET_SEPARATION requires a separation between the PSTN fax line and the LAN.</p>
<p>P.IMAGE_OVERWRITE (optional)</p> <p>Upon completion or cancellation of a Document Processing job, the TOE shall overwrite residual image data from its Nonvolatile Storage Device.</p>	<p>O.IMAGE_OVERWRITE overwrites residual image data from Nonvolatile Storage Devices after Document Processing jobs are completed or cancelled.</p>
<p>P.PURGE_DATA (optional)</p> <p>The TOE shall provide a function that an authorized administrator can invoke to make all customer-supplied User Data and TSF Data permanently irretrievable from Nonvolatile Storage Devices.</p>	<p>O.PURGE_DATA provides a function that makes all customer-supplied User Data and TSF Data permanently irretrievable from Nonvolatile Storage Devices when invoked by an authorized administrator.</p>

Threat/Policy/Assumption	Rationale
<p>A.PHYSICAL</p> <p>Physical security, commensurate with the value of the TOE and the data it stores or processes, is assumed to be provided by the environment.</p>	<p>OE.PHYSICAL_PROTECTION establishes a protected physical environment for the TOE.</p>
<p>A.NETWORK</p> <p>The Operational Environment is assumed to protect the TOE from direct, public access to its LAN interface.</p>	<p>OE.NETWORK_PROTECTION establishes a protected LAN environment for the TOE.</p>
<p>A.TRUSTED_ADMIN</p> <p>TOE Administrators are trusted to administer the TOE according to site security policies.</p>	<p>OE.ADMIN_TRUST establishes responsibility of the TOE Owner to have a trusted relationship with Administrators.</p>
<p>A.TRAINED_USERS</p> <p>Authorized Users are trained to use the TOE according to site security policies.</p>	<p>OE.ADMIN_TRAINING establishes responsibility of the TOE Owner to provide appropriate training for Administrators.</p> <p>OE.USER_TRAINING establishes responsibility of the TOE Owner to provide appropriate training for Users.</p>