

TOSHIBA

e-STUDIO4525AC/5525AC/6525AC

all of the above with FAX Unit and FIPS Hard Disk Kit

Security Target

Version 2.08

This document is a translation of the evaluated and certified security target written in Japanese.

TABLE OF CONTENTS

| | |
|---|-----------|
| 1. ST INTRODUCTION | 1 |
| 1.1. ST Reference..... | 1 |
| 1.2. TOE Reference..... | 1 |
| 1.3. TOE Overview | 2 |
| 1.3.1. TOE Type..... | 2 |
| 1.3.2. Usage and Major Security Features of the TOE | 2 |
| 1.3.3. Required Non-TOE Hardware and Software | 3 |
| 1.4. TOE Description..... | 3 |
| 1.4.1. Physical Boundary | 3 |
| 1.4.2. Guidance..... | 6 |
| 1.4.3. Logical Boundary | 6 |
| 1.4.3.1. Basic Functions..... | 7 |
| 1.4.3.2. Security Functions | 8 |
| 1.4.3.3. Terminology | 9 |
| 2. Conformance Claim | 10 |
| 2.1. CC Conformance Claim | 10 |
| 2.2. PP Conformance Claim | 10 |
| 2.3. Package Conformance Claim | 10 |
| 2.4. Conformance Rationale | 10 |
| 3. SECURITY PROBLEM DEFINITIONS | 11 |
| 3.1. Users | 11 |
| 3.2. Assets | 11 |
| 3.2.1. User Data..... | 11 |
| 3.2.2. TSF Data..... | 12 |
| 3.3. Threats..... | 12 |
| 3.4. Organization Security Policies..... | 13 |
| 3.4.1. Organizational Security Policy Definitions | 13 |
| 3.5. Assumption Definitions | 13 |
| 4. SECURITY OBJECTIVES | 15 |
| 4.1. Security Objectives for Operational Environment..... | 15 |
| 5. EXTENDED COMPONENT DEFINITIONS..... | 16 |
| 5.1. FAU_STG_EXT Extended: External Audit Trail Storage | 16 |

| | | | |
|-----------|---|---|-----------|
| 5.2. | FCS_CKM_EXT | Extended: Cryptographic Key Management..... | 16 |
| 5.3. | FCS_HTTPS_EXT | Extended: HTTPS selected | 17 |
| 5.4. | FCS_KDF_EXT | Extended: Cryptographic Key Derivation..... | 18 |
| 5.5. | FCS_KYC_EXT | Extended: Cryptographic Operation (Key Chaining)..... | 19 |
| 5.6. | FCS_RBG_EXT | Extended: Cryptographic Operation (Random Bit Generation)..... | 20 |
| 5.7. | FCS_SMC_EXT | Extended: Submask Combining..... | 21 |
| 5.8. | FCS_TLS_EXT | Extended: TLS selected..... | 21 |
| 5.9. | FDP_DSK_EXT | Extended: Protection of Data on Disk | 23 |
| 5.10. | FDP_FXS_EXT | Extended: Fax Separation..... | 24 |
| 5.11. | FIA_PMG_EXT | Extended: Password Management..... | 24 |
| 5.12. | FPT_KYP_EXT | Extended: Protection of Key and Key Material | 25 |
| 5.13. | FPT_SKP_EXT | Extended: Protection of TSF Data | 26 |
| 5.14. | FPT_TST_EXT | Extended: TSF testing | 27 |
| 5.15. | FPT_TUD_EXT | Extended: Trusted Update | 27 |
| 6. | SECURITY REQUIREMENTS | | 29 |
| 6.1. | Notation..... | | 29 |
| 6.2. | Class FAU: Security Audit | | 29 |
| 6.2.1. | FAU_GEN.1 | Audit data generation..... | 29 |
| 6.2.2. | FAU_GEN.2 | User identity association | 29 |
| 6.2.3. | FAU_STG_EXT.1 | Extended: External Audit Trail Storage..... | 30 |
| 6.3. | Class FCS: Cryptographic Support | | 30 |
| 6.3.1. | FCS_CKM.1(a) | Cryptographic Key Generation (for asymmetric keys)..... | 30 |
| 6.3.2. | FCS_CKM.1(b) | Cryptographic key generation (Symmetric Keys) | 30 |
| 6.3.3. | FCS_CKM.4(a) | Cryptographic key destruction..... | 30 |
| 6.3.4. | FCS_CKM.4(b) | Cryptographic key destruction..... | 31 |
| 6.3.5. | FCS_CKM_EXT.4 | Extended: Cryptographic Key Material Destruction | 31 |
| 6.3.6. | FCS_COP.1(a) | Cryptographic Operation (Symmetric encryption/decryption) | 31 |
| 6.3.7. | FCS_COP.1(b) | Cryptographic Operation (for signature generation/verification) | 32 |
| 6.3.8. | FCS_RBG_EXT.1(a) | Extended: Cryptographic Operation (Random Bit Generation)..... | 32 |
| 6.3.9. | FCS_RBG_EXT.1(b) | Extended: Cryptographic Operation (Random Bit Generation) | 32 |
| 6.3.10. | FCS_COP.1(c) | Cryptographic operation (Hash Algorithm)..... | 32 |
| 6.3.11. | FCS_COP.1(f) | Cryptographic operation (Key Encryption) | 32 |
| 6.3.12. | FCS_SMC_EXT.1 | Extended: Submask Combining..... | 33 |
| 6.3.13. | FCS_COP.1(g) | Cryptographic Operation (for keyed-hash message authentication) | 33 |
| 6.3.14. | FCS_COP.1(h) | Cryptographic Operation (for keyed-hash message authentication) | 33 |
| 6.3.15. | FCS_TLS_EXT.1 | Extended: TLS selected | 33 |
| 6.3.16. | FCS_HTTPS_EXT.1 | Extended: HTTPS selected..... | 34 |

| | | |
|--|--|-----------|
| 6.3.17. FCS_KDF_EXT | Extended: Cryptographic Key Derivation | 34 |
| 6.3.18. FCS_KYC_EXT.1 | Extended: Key Chaining | 34 |
| 6.4. Class FDP: User Data Protection | | 34 |
| 6.4.1. FDP_ACC.1 | Subset access control | 34 |
| 6.4.2. FDP_ACF.1 | Security attribute based access control | 38 |
| 6.4.3. FDP_FXS_EXT.1 | Extended: Fax separation | 38 |
| 6.4.4. FDP_DSK_EXT.1 | Extended: Protection of Data on Disk | 38 |
| 6.5. Class FIA: Identification and Authentication | | 38 |
| 6.5.1. FIA_AFL.1 | Authentication failure handling | 38 |
| 6.5.2. FIA_ATD.1 | User attribute definition | 39 |
| 6.5.3. FIA_PMG_EXT | Extended: Password Management | 39 |
| 6.5.4. FIA_UAU.1 | Timing of authentication | 39 |
| 6.5.5. FIA_UAU.7 | Protected authentication feedback | 40 |
| 6.5.6. FIA_UID.1 | Timing of identification | 40 |
| 6.5.7. FIA_USB.1 | User-subject binding | 40 |
| 6.6. Class FMT: Security Management | | 40 |
| 6.6.1. FMT_MOF.1 | Management of security functions behavior | 40 |
| 6.6.2. FMT_MSA.1 | Management of security attributes | 40 |
| 6.6.3. FMT_MSA.3 | Static attribute initialization | 41 |
| 6.6.4. FMT_MTD.1 | Management of TSF data | 41 |
| 6.6.5. FMT_SMF.1 | Specification of Management Functions | 42 |
| 6.6.6. FMT_SMR.1 | Security roles | 46 |
| 6.7. Class FPT: Protection of the TSF | | 46 |
| 6.7.1. FPT_SKP_EXT.1 | Extended: Protection of TSF Data | 46 |
| 6.7.2. FPT_STM.1 | Reliable time stamps | 46 |
| 6.7.3. FPT_TST_EXT.1 | Extended: TSF testing | 46 |
| 6.7.4. FPT_TUD_EXT.1 | Extended: Trusted Update | 47 |
| 6.7.5. FPT_KYP_EXT.1 | Extended: Protection of Key and Key Material | 47 |
| 6.8. Class FTA: TOE Access | | 47 |
| 6.8.1. FTA_SSL.3 | TSF-initiated termination | 47 |
| 6.9. Class FTP: Trusted Paths/Channels | | 47 |
| 6.9.1. FTP_ITC.1 | Inter-TSF trusted channel | 47 |
| 6.9.2. FTP_TRP.1(a) | Trusted path (for Administrators) | 48 |
| 6.9.3. FTP_TRP.1(b) | Trusted path (for Non-administrators) | 48 |
| 6.10. Security Assurance Requirements | | 49 |
| 6.11. Security Functional Requirements Rationale | | 49 |
| 6.11.1. Dependencies of Security Functional Requirements Documents | | 49 |
| 6.11.2. Security Assurance Requirements Rationale | | 52 |

| | |
|--|----|
| 7. TOE SUMMARY SPECIFICATION | 53 |
| 7.1. Audit..... | 53 |
| 7.2. Cryptographic Support..... | 55 |
| 7.3. Storage Encryption (Conditionally mandatory)..... | 58 |
| 7.4. Storage Encryption (Selective requirements)..... | 60 |
| 7.5. Communication Protection (Selective requirements) | 61 |
| 7.6. Trusted Update (Selective requirements) | 63 |
| 7.7. User Data Protection..... | 63 |
| 7.8. PSTN Fax-Network Separation | 70 |
| 7.9. Identification and Authentication..... | 70 |
| 7.10. Security Management | 71 |
| 7.11. Protection of the TSF | 74 |
| 7.12. TOE Access..... | 76 |
| 7.13. Trusted Path/Channel..... | 76 |
| APENDIX | 79 |

List of Tables

| | | |
|----------|---|----|
| Table 1 | TOE Configuration Item | 1 |
| Table 2 | English Guidance | 6 |
| Table 3 | Terminology | 9 |
| Table 4 | User Categories | 11 |
| Table 5 | Asset Classification | 11 |
| Table 6 | User Data types | 11 |
| Table 7 | TSF Data types | 12 |
| Table 8 | Threats | 12 |
| Table 9 | Organization Security Policies | 13 |
| Table 10 | Assumptions | 13 |
| Table 11 | Security Objectives for the Operational Environment | 15 |
| Table 12 | Auditable Events | 29 |
| Table 13 | D.USER.DOC Access Control SFP | 35 |
| Table 14 | D.USER.JOB Access Control SFP | 36 |
| Table 15 | Other Available Characters | 39 |
| Table 16 | Security Attributes List | 41 |
| Table 17 | Management of TSF Data | 41 |
| Table 18 | Management Functions | 42 |
| Table 19 | Time Interval of User Inactivity | 47 |
| Table 20 | TOE Security Assurance Requirements | 49 |
| Table 21 | Analysis Results of Dependencies for Security Functional Requirements | 49 |
| Table 22 | Recorded Events and Audit Logs | 53 |
| Table 23 | Print Access Control for D.USER.DOC | 64 |
| Table 24 | Scan Access Control for D.USER.DOC | 64 |
| Table 25 | Copy Access Control for D.USER.DOC | 65 |
| Table 26 | Fax Transmission Access Control for D.USER.DOC | 66 |
| Table 27 | Fax Reception Access Control for D.USER.DOC | 66 |
| Table 28 | Print Access Control for D.USER.JOB | 67 |
| Table 29 | Scan Access Control for D.USER.JOB | 67 |
| Table 30 | Copy Access Control for D.USER.JOB | 68 |
| Table 31 | Fax Transmission Access Control for D.USER.JOB | 68 |
| Table 32 | Fax Reception Access Control for D.USER.JOB | 69 |
| Table 33 | Definition of TSFI | 78 |
| Table 34 | Definition of Acronyms | 79 |

List of Tables

| | | |
|----------|--|---|
| Figure1 | Environment for the usage of the MFP | 2 |
| Figure 2 | Physical Boundary | 4 |
| Figure 3 | Logical Boundary | 7 |

1. ST Introduction

ST Reference, TOE Reference, TOE Overview, and TOE Description are described in this Chapter.

1.1. ST Reference

The identity of the ST is described below.

Title: TOSHIBA e-STUDIO4525AC/5525AC/6525AC all of the above with FAX Unit and FIPS Hard Disk Kit Security Target
Version: 2.08
Date Created: January 27, 2023
Author: TOSHIBA TEC CORPORATION

1.2. TOE Reference

The identity of the TOE is described below.

TOE Name: TOSHIBA e-STUDIO4525AC/5525AC/6525AC all of the above with FAX Unit and FIPS Hard Disk Kit
Version: SYS V2.1
TOE Type: Multifunction Product
Developer Name: TOSHIBA TEC CORPORATION

The TOE shown above is consists of the MFP and required option as shown in **Table 1**.

Table 1 TOE Configuration Item

| Required components | Identification information of TOE | Sales Area |
|----------------------------|--|---------------|
| MFP | e-STUDIO4525AC, e-STUDIO5525AC or e-STUDIO6525AC | North America |
| FAX unit | GD-1370NA-N | |
| FIPS Hard Disk kit GE-1260 | 9401 TOSHIBA MQ01ABU032BW | |
| Software | SYS V2.1 | |
| MFP | e-STUDIO4525AC, e-STUDIO5525AC or e-STUDIO6525AC | Europe |
| FAX unit | GD-1370EU | |
| FIPS Hard Disk kit GE-1260 | 9401 TOSHIBA MQ01ABU032BW | |
| Software | SYS V2.1 | |

1.3. TOE Overview

1.3.1. TOE Type

The TOE is the Multifunction Products that work in a network environment and provide capabilities of print, copy, scan, and fax.

1.3.2. Usage and Major Security Features of the TOE

The TOE is intended to be installed in a general office and used in a network environment. The network environment to be used is an internal network (LAN) protected by a firewall from unauthorized access from the external network, where the TOE is connected to the client PCs, servers (FTP server, mail server, SYSLOG server), and public telephone network. Also, users use the basic functions of the MFP on the control panel of the MFP or from a client PC through a web browser or printer driver. Figure 1 shows the operational environment.

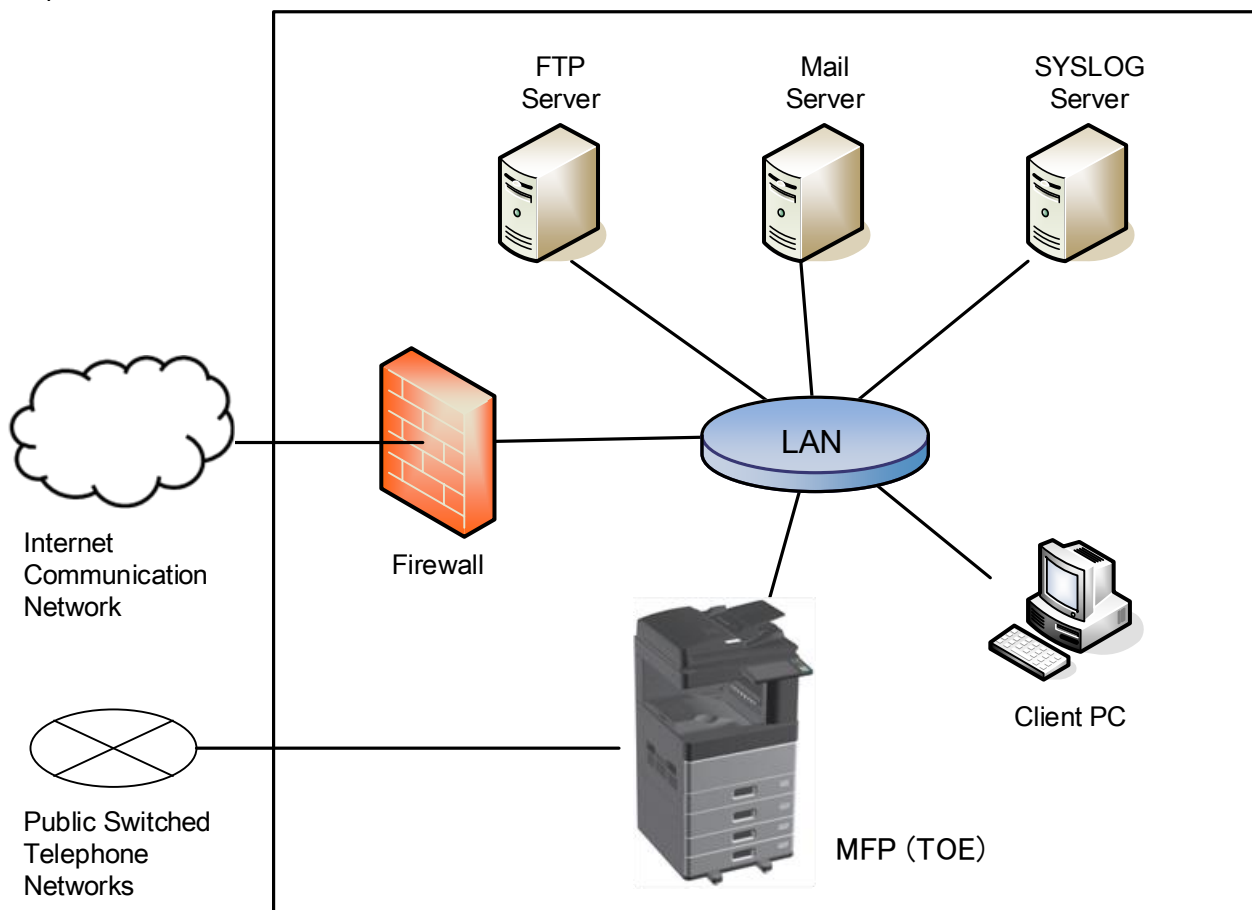


Figure1 Environment for the usage of the MFP

The TOE is a digital multifunction product equipped with the basic functions, such as copying, printing, scanning, and faxing. In addition, in order to protect user document data and security-related data, the TOE has the following functions: a function to identify and authenticate users, an access control function based on user authority, a function to record a log of TOE use history and send it to the audit server, a function to encrypt data stored in the storage in the TOE, a function to protect communication data on the LAN, a setting function that limits security setting operations to administrators, a function to guarantee the normal operation of the security functions of the TOE, and a function to prohibit bridge connection between LAN and the public telephone network (PSTN). It should be noted that data clearing and purging are not included in the security functions to be evaluated.

1.3.3. Required Non-TOE Hardware and Software

Required hardware and firmware other than the TOE are shown below.

- Client PC

U.NORMAL(a) can request printing of the document data through the LAN to the TOE. The U.ADMIN(a) can refer to or change the setting data in the MFP using the Web browser. The browser and printer driver are as follows:

- Web browser: Microsoft Edge
- Printer Driver: TOSHIBA Universal Printer Driver2 (Version:7.222.5412.30)

- Mail Server

The Mail Server is a server which transmits email using SMTP. The TOE and the Mail Server is connected with TLS communication. (This operation assumes a server using Sendmail 8.15.2.)

- FTP Server

The FTP Server is a server which activates the File Transfer Protocol Server Software. The TOE and the FTP Server is connected with TLS communication. (This operation assumes a server using ProFTPD 1.3.6.)

- SYSLOG Server

The SYSLOG Server is a server which transmits/receives TOE log data which is transferred using the Syslog protocol. The TOE and the SYSLOG Server is connected with TLS communication. (This operation assumes a server using Syslog-ng 3.14.)

1.4. TOE Description

1.4.1. Physical Boundary

The TOE is the Digital Multifunction Products consists of hardware (Main unit of the MFP, Fax unit, FIPS Hard Disk kit GE-1260) and software. The main unit of the MFP (e-STUDIO4525AC, e-STUDIO5525AC and e-STUDIO6525AC containing the following versions of SYSTEM FIRMWARE, SYSTEM SOFTWARE, ENGINE FIRMWARE, SCANNER FIRMWARE) is delivered to users by a transport service provider with being packed in a cardboard box.

Hardware Construction

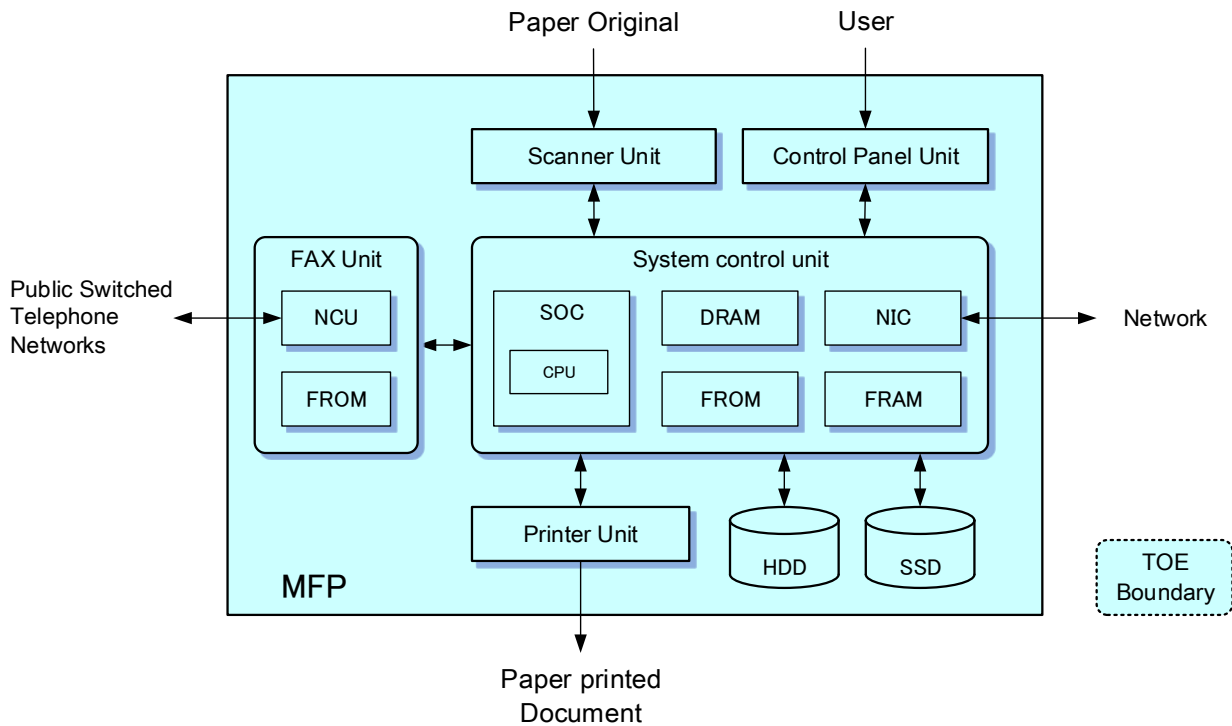


Figure 2 Physical Boundary

Software Construction

- SYSTEM FIRMWARE: Ver. TS20SF0W1721
- SYSTEM SOFTWARE: Ver. TS20SD0W1721
- ENGINE FIRMWARE: Ver. TK166MWW11
- SCANNER FIRMWARE: Ver. TK160SLGWW07
- FAX1 FIRMWARE: Ver. FAXH625TA13

• Control Panel Unit

The Control Panel Unit is a user interface by which a user operates the MFP. Hardware construction is operation buttons, LEDs, and LCD with a touch panel. Information from the MFP is displayed on the LCD and each operation such as copy start is executed by communicating with the System Control Unit.

• Scanner Unit

The Scanner Unit is an input device which scans paper original and transmits the image data to the System Control Unit. Firmware (SCANNER FIRMWARE) which controls communication between the Scanner Unit and the System Control Unit is stored in the HDD.

• System Control Unit

The System Control Unit is a unit which achieves each function by controlling the entire MFP. The control software consists of the SYSTEM FIRMWARE and SYSTEM SOFTWARE stored in the FROM and SSD respectively in the System Control Unit.

• Printer Unit

The Printer Unit is a unit which receives a print request from the System Control Unit and prints the print data on the paper. Firmware (ENGINE FIRMWARE) which controls communication between

the Printer Unit and the System Control Unit is stored in the FROM in the Printer Unit.

- HDD (FIPS Hard Disk kit GE-1260:9401 TOSHIBA MQ01ABU032BW)

The HDD is a Hard Disk Drive with the self-encryption function complies with the Federal Information Processing Standard (FIPS140-2) in the US and a required Option Unit with JCMVP authentication (JCMVP authentication No.: F0022). Protected asset data such as image data and document data are stored in encrypted partitions. The FIPS Hard Disk Kit is delivered to a user by a transport service provider with being packed in a cardboard box.

- SSD (Solid State Drive)

Part of the software that controls the MFP (SYSTEM SOFTWARE) is stored in the SSD.

- FROM (Flash Memory)

The FROM is a nonvolatile storage memory. A part of software (SYSTEM FIRMWARE) that controls the MFP is stored.

- FRAM

The FRAM is a nonvolatile storage memory. This is a memory device which saves setup values required for controlling the MFP.

- SoC

SoC is a LSI in which a device controller circuit is integrated with a microprocessor at the core, and is a semiconductor chip which performs basic control of the MFP behavior.

- DRAM

The DRAM is a volatile memory. This is a memory which loads and executes a program which controls the MFP.

- NIC (Network Interface Card)

The NIC is a device for network-connection interface. It supports 10Base-T/100Base-TX/Gigabit Ethernet.

- Fax Unit (GD-1370NA-N/GD-1370EU)

The Fax Unit is a required option unit which connects to the PSTN and transmits/receives fax documents between the Fax devices which comply with G 3. The PSTN circuit standard differs depending on the sales countries and areas. So, an appropriate fax option is selected for each area. The identifier is distinguished by the trailing alphabet (NA-N, EU) of the model number as shown in **Table 1**.

The same firmware (FAX1 FIRMWARE: Ver. FAXH625TA13) regardless of the sales countries and areas which controls Fax communication and communication between the System Control Units is stored in the FROM in the Fax Unit for each destination, and all users can use the same fax functions. The fax option is delivered to the users by a transport service provider with being packed in a cardboard box.

1.4.2. Guidance

There are two types of the TOE Guidance written in English as shown in **Table 2**; One is stored in the DVD-ROM in the PDF format and the other is supplied as a printed document. They are distributed to users as bundled with each MFP.

Table 2 English Guidance

| Title | Identifier | PDF Format | Print |
|----------------------------------|-------------|------------|-------|
| Preparation of Paper | OME21000400 | ○ | |
| Troubleshooting | OME21000600 | ○ | |
| Quick Start Guide | OME21001200 | ○ | ○ |
| Safety Information | OME21001400 | ○ | ○ |
| Information About Equipment | OME21001600 | ○ | |
| Copy | OME21001800 | ○ | |
| Scan | OME21002000 | ○ | |
| Fax | OME21002200 | ○ | |
| Template | OME21002600 | ○ | |
| User Functions | OME21002800 | ○ | |
| Frequently Asked Questions | OME21003000 | ○ | |
| Installation | OME21003200 | ○ | |
| Print | OME21003400 | ○ | |
| TopAccess | OME21003600 | ○ | |
| Specifications | OME21003800 | ○ | |
| High Security Mode | OME210040B0 | ○ | |
| FAX Unit Precautions for GD-1370 | OME21004600 | ○ | |
| Information to our customers | OMM210083B0 | | ○ |

1.4.3. Logical Boundary

The logical boundary of the TOE is defined by the TOE security function and a basic function which are described in the following section.

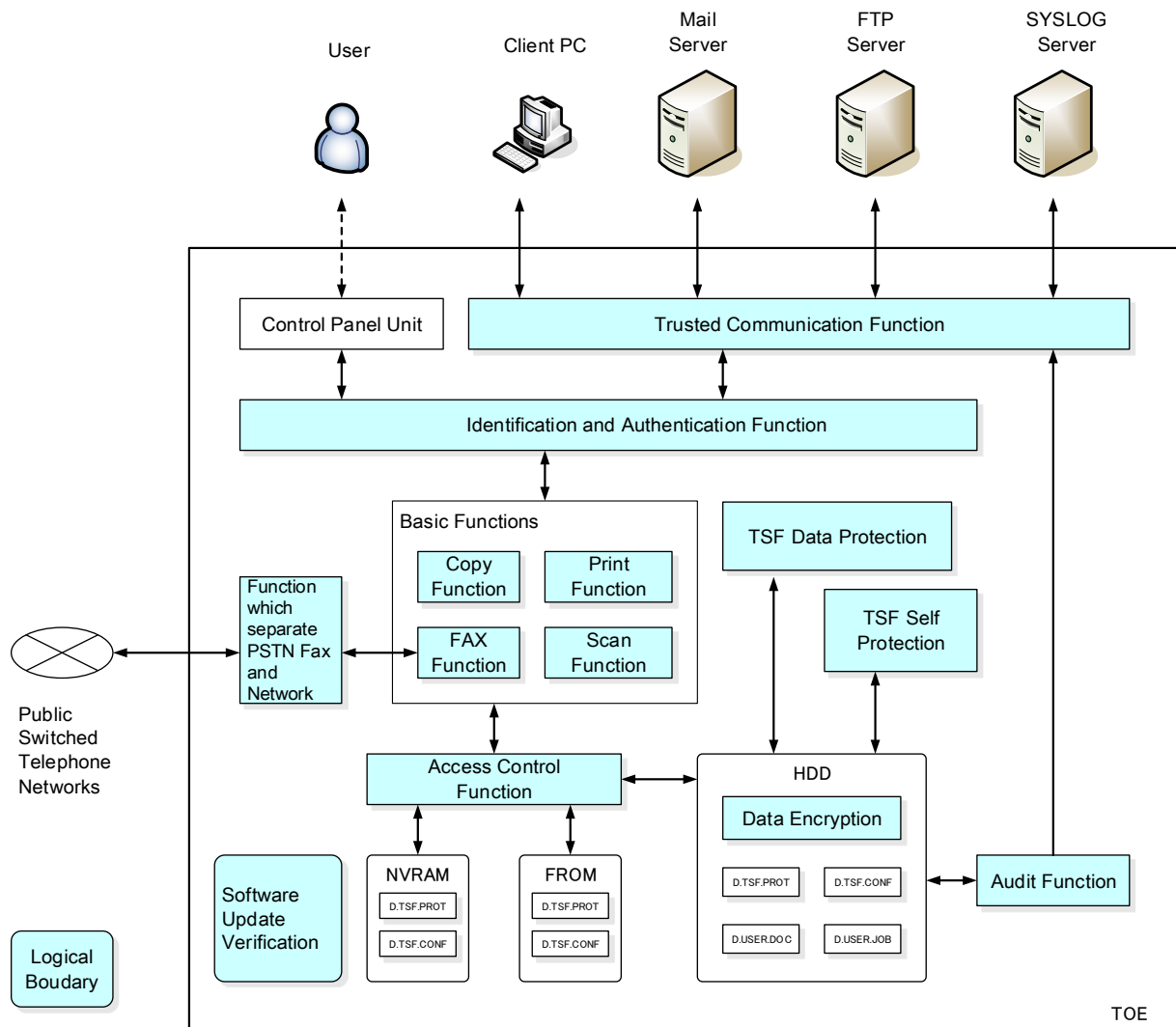


Figure 3 Logical Boundary

1.4.3.1. Basic Functions

The TOE is provided with a series of functions associated with images, such as Copy, Print, and Scan, as the Basic Functions, and controls these functions integrally.

- Copy function

A Copy function is a function to read the original with the scanner and print it out from the printer according to the general user's operation from the control panel.

- Print function

A Print function is a function which transmits the print data from the client PC to the TOE through the LAN and prints the data on a paper.

- Scan function

The Scan function can attach and send a paper document by user operation on the control panel and reading the paper document with the Scanner to an email and the FTP server.

- Fax function

The Fax function consists of the Fax transmission function and the Fax reception function.

The Fax transmission function is a function which transmits the paper document data read with the Scanner Unit to the external Fax machine through the PSTN. The Fax reception function is a function which receives the document data transmitted from the external Fax machine through the PSTN. In order to achieve the above functions, the Fax option (GD-1370NA-N, or GD-1370EU) is required.

1.4.3.2. Security Functions

The security functions provided by the TOE are as follows:

- Identification, Authentication, and function which gives permission to use HCD functions

It is a function which verifies whether a user who wants to use the TOE is an authorized user, and gives the user a permission to use the TOE only when the user is identified.

The TOE prompts a user to enter the user ID and user password from the control panel or the client PC for user authentication, and has the feedback protection function which displays dummy characters during user password entry and the lockout function which locks a user who failed in authentication out. In addition, if there is no operation for a predetermined time after logging in, it has a function to automatically log out.

- Access Control Function

The TOE controls access to the user data and functions that are secured assets to the authorized users.

- Audit Function

The TOE generates audit logs for tracking the state of the TOE. All logs recorded per event are transferred to the audit server and viewable from the audit server.

- Trusted Communication Function

The TOE supports the cryptographic communication protocol in order to prevent communication data from being leaked or tampered on the network during connection and communication with the LAN.

The TOE communicates with the client PC, mail server, SYSLOG server, and FTP server in the operational environment using TLS for data encryption. The TOE protects the print data by using TLS and print protocol IPPS during communication with the client PC when IPP print is performed by the client PC using the printer driver.

- TSF Self Protection

The TOE performs integrity tests on its static executables and configuration files using verification of their digital signatures against the known signatures. This allows the TOE to detect any tampering of its trusted state.

- TSF Data Protection

Only an administrator role user authenticated by the Identity Authentication function has the capability to manage the TSF data from the operator panel or TopAccess. For example, you can change the date and time, register/delete users, and enable or disable available services and protocols.

- Data Encryption

The Data Encryption is a function to encrypt user data saved in the HDD to protect them from being leaked.

- Function which separate PSTN Fax and Network

This function prohibits bridge connections between the public telephone network and LAN by restricting input from the PSTN to fax reception.

- Software Update Verification

This function is a function which verifies whether software to be updated is authorized when software of the TOE is updated.

1.4.3.3. Terminology

The terms which are defined by CC and PP in Chapter 2 out of the specific terms associated with the ST should follow the definition thereof. The other terms are defined as shown in **Table 3**.

Table 3 Terminology

| Terminology | Definition |
|--------------------------------------|---|
| User ID | An identifier given to a general user and MFP administrator. The TOE specifies the user by the identifier. |
| User Password | A password which is used to log into the TOE by a user. |
| Job Log | The job information such as Print Job, Transmission Journals, Reception Journals and Scan Job. |
| Message Log | Logs regarding MFP's device information or operations executed by users. |
| TopAccess | A web-based job and device control tool. The MFP information can be retrieved by using this tool through network. |
| Auto Logout Time | Time to log out when a logged in user does not operate the MFP for a certain period of time. |
| Lockout Time | Time until the locked out account is released. |
| Date and Time | Time information for log management. Year/moth/day/hour/min/sec |
| Role | U.NORMAL, U.ADMIN. U.NORMAL is refined to U.NORMAL(a) and U.FAXOPERATOR. U.ADMIN is refined to U.ADMIN(a), U.ACCOUNTMANAGER, and U.ADDRESSBOOKOPERATOR. |
| Firmware | Software which is embedded into the device to control hardware. |
| Cipher Suite | Combination of the cryptographic algorithms used for TLS communication, which consists of the combination of "Key replacement_Signature_Encryption_Hash function". |
| Address Book | Fax numbers and email addresses can be registered and displayed in the destination list. It enables simple specification of the fax transmission destinations and scan email transmission destinations. |
| User Authentication Failure Handling | An administrator can change the number of retries for entering the login password and lockout time and clear the locked out account status. |
| Secure Channel | A communication channel in which data is encrypted to prevent wiretapping by the third party. |
| European Special Characters | Words with the German umlauts and French cedilla. |

2. Conformance Claim

2.1. CC Conformance Claim

The following shows the CC Conformance Claim of the ST and TOE.

Common Criteria version: Version 3.1 Release 5

- Part1: Introduction and general model April 2017 Version 3.1 Revision 5
- Part2: Security functional components April 2017 Version 3.1 Revision 5
- Part3: Security assurance components April 2017 Version 3.1 Revision 5
- Conformance of ST to CC part2: CC part 2 Extended
- Conformance of ST to CC part3: CC part 3 Conformant

2.2. PP Conformance Claim

The ST and TOE conform to the following PP.

PP Name: Protection Profile for Hardcopy Devices

PP Version: 1.0 dated September 10, 2015

Certification Identification: JISEC-C0553

Errata: Protection Profile for Hardcopy Devices – v1.0 Errata #1, June 2017

2.3. Package Conformance Claim

The ST does not conform to the packages

2.4. Conformance Rationale

The following conditions requested by PP have been satisfied and must be “Exact Conformance” as requested by PP. Therefore, the TOE type is consistent with PP.

- Required Uses
Printing, Scanning, Copying, Networking communications, Administration
- Conditionally Mandatory Uses
PSTN faxing, Field-Replaceable Nonvolatile Storage
- Optional Uses
None

3. Security Problem Definitions

3.1. Users

The User and role of the TOE are defined as shown below in the ST.

Table 4 User Categories

| | Role | Category name | Definition |
|---|-----------------------|---------------|--|
| U.NORMAL A User who has been identified and authenticated and does not have an administrative role | U.NORMAL(a) | Normal User | A User who is authorized to execute Copy, Print, Scan, and Fax functions which are the basic functions of the TOE. A Normal User is authorized to operate each function and can execute only the authorized function |
| | U.FAXOPERATOR | Normal User | A user who can execute the Fax transmission/reception functions |
| U.ADMIN A User who has been identified and authenticated and has an administrative role | U.ADMIN(a) | Administrator | An administrator who is authorized to manage the entire TOE, such as setting of the TOE security functions, change of the user account information, and browse of the audit log |
| | U.ACCOUNTMANAGER | Administrator | An administrator who can perform the settings for the user account management (setting of the user ID and role of the user and operation authority of the basic functions) |
| | U.ADDRESSBOOKOPERATOR | Administrator | A user who can edit the address book |

3.2. Assets

Two asset classifications are defined in the ST.

Table 5 Asset Classification

| Designation | Asset category | Definition |
|-------------|----------------|---|
| 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. |

3.2.1. User Data

The two User Data is defined in the ST.

Table 6 User Data types

| Designation | User Data type | Definition | Details |
|-------------|--------------------|--|--------------------------------|
| D.USER.DOC | User Document Data | Information contained in a User's Document, in electronic or hardcopy form | Copy Document Data |
| | | | Print Document Data |
| | | | Scan Document Data |
| | | | Fax Transmission Document Data |

| Designation | User Data type | Definition | Details |
|-------------|----------------|---|-----------------------------|
| | | | Fax Reception Document Data |
| D.USER.JOB | User Job Data | Information related to a User's Document or Document Processing Job | Print Job |
| | | | Scan Job |
| | | | Copy Job |
| | | | Fax Transmission Job |
| | | | Fax Reception Job |

3.2.2. TSF Data

The TSF Data consist of the following 2 types.

Table 7 TSF Data types

| Designation | TSF Data type | Definition | Details |
|-------------|-----------------------|---|--|
| 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 | Enable/Disable of the Secure Channel |
| | | | User ID |
| | | | Role |
| | | | Allowable Number of entry for Login Password |
| | | | Lockout Time |
| | | | Locked Account Status |
| | | | Auto Logout Time |
| | | | Date and Time Information |
| | | | Minimum Password Length |
| | | | Address Book |
| | | | SYSLOG Server Settings |
| | | | FTP Server Settings |
| | | | Software update |
| 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 | User Password |
| | | | Encryption Key |

3.3. Threats

The Threats to the TOE which are countered by the conforming products are as shown below. 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 8 Threats

| Designation | Definition |
|-----------------------|--|
| 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. |
| T.TSF_COMPROMISE | An attacker may gain Unauthorized Access to TSF Data in the TOE through one of the TOE's interfaces. |

| Designation | Definition |
|-----------------------|---|
| 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. |

3.4. Organization Security Policies

The following are Organizational Security Policies³ (OSPs) that are upheld by conforming products.

3.4.1. 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 9 Organization Security Policies

| Designation | Definition |
|---|---|
| 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 Field-Replaceable Nonvolatile Storage Devices, it will encrypt such data on those devices. |
| P.KEY_MATERIAL (conditionally mandatory) | Cleartext keys, submasks, random numbers, or any other values that contribute to the creation of encryption keys for Field-Replaceable 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. |

3.5. Assumption Definitions

Assumptions are conditions that must be satisfied in order for the Security Objectives and functional requirements to be effective.

Table 10 Assumptions

| Designation | Definition |
|-------------|--|
| 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. |

| Designation | Definition |
|-----------------|---|
| 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. |

4. Security Objectives

4.1. Security Objectives for Operational Environment

The details of the Security Objectives for the Operational Environment are as described in **Table 11**.

Table 11 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. |

5. Extended Component Definitions

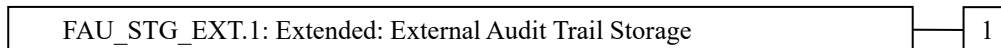
Extended component definitions are listed below.

5.1. FAU_STG_EXT Extended: External Audit Trail Storage

Family Behavior:

This family defines requirements for the TSF to ensure that secure transmission of audit data from TOE to an External IT Entity.

Component leveling:



FAU_STG_EXT.1 External Audit Trail Storage requires the TSF to use a trusted channel implementing a secure protocol.

Management:

The following actions could be considered for the management functions in FMT:

- The TSF shall have the ability to configure the cryptographic functionality.

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.

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.

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 audits 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.

5.2. FCS_CKM_EXT Extended: Cryptographic Key Management

Family Behavior:

This family addresses the management aspects of cryptographic keys. Especially, this extended component is intended for cryptographic key destruction.

Component leveling:

FCS_CKM_EXT.4: Extended: Cryptographic Key Material Destruction

4

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.

Management:

The following actions could be considered for the management functions in FMT:

- There are no management actions foreseen.

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.

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

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.

5.3. FCS_HTTPS_EXT Extended: HTTPS selected

Family Behavior:

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.

Component leveling:

FCS_HTTPS_EXT.1 Extended: HTTPS selected

1

FCS_HTTPS_EXT.1 HTTPS selected, requires that HTTPS be implemented according to RFC 2818 and supports TLS.

Management:

The following actions could be considered for the management functions in FMT:

- There are no management actions foreseen.

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

FCS_HTTPS_EXT.1 Extended: HTTPS selected

Hierarchical to: No other components.

Dependencies: No dependencies.

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.

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.

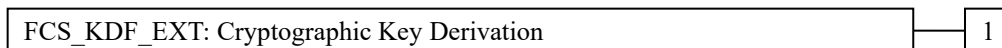
This extended component protects the communication data using cryptographic algorithms, and it is therefore placed in the FCS class with a single component.

5.4. FCS_KDF_EXT Extended: Cryptographic Key Derivation

Family Behavior:

This family specifies the means by which an intermediate key is derived from a specified set of submasks.

Component leveling:



FCS_KDF_EXT.1 Cryptographic Key Derivation requires the TSF to derive intermediate keys from submasks using the specified hash functions.

Management:

The following actions could be considered for the management functions in FMT:

- There are no management actions foreseen.

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.

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.

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.

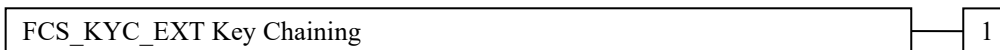
This extended component protects the Data Encryption Keys using cryptographic algorithms in the maintained key chains, and it is therefore placed in the FCS class with a single component.

5.5. FCS_KYC_EXT Extended: Cryptographic Operation (Key Chaining)

Family Behavior:

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.

Component leveling:



FCS_KYC_EXT Key Chaining requires the TSF to maintain a key chain and specifies the characteristics of that chain.

Management:

The following actions could be considered for the management functions in FMT:

- There are no management actions foreseen.

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.

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].

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.

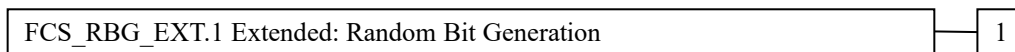
This extended component protects the TSF data using cryptographic algorithms, and it is therefore placed in the FCS class with a single component.

5.6. FCS_RBG_EXT Extended: Cryptographic Operation (Random Bit Generation)

Family Behavior:

This family defines requirements for random bit generation to ensure that it is performed in accordance with selected standards and seeded by an entropy source.

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.

Management:

The following actions could be considered for the management functions in FMT:

- There are no management actions foreseen.

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.

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 [selection: ISO/IEC 18031:2011, NIST SP 800-90A] using [selection: Hash_DRBG (any), HMAC_DRBG (any), CTR_DRBG (AES)].

FCS_RBG_EXT.1.2 The deterministic RBG shall be seeded by an entropy source that accumulates entropy from [selection: [assignment: *number of software-based sources*] *software-based noise source(s)*, [assignment: *number of hardware-based sources*] *hardware-based noise source(s)*] with a minimum of [selection: *128 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.

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.

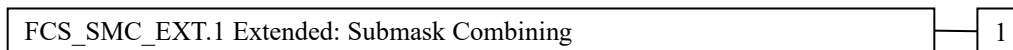
This extended component ensures the strength of encryption keys, and it is therefore placed in the FCS class with a single component.

5.7. FCS_SMC_EXT Extended: Submask Combining

Family Behavior:

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.

Component leveling:



FCS_SMC_EXT.1 Submask combining requires the TSF to combine the submasks in a predictable fashion.

Management:

The following actions could be considered for the management functions in FMT:

- There are no management actions foreseen.

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.

FCS_SMC_EXT.1 Extended: Submask Combining

Hierarchical to: No other components.

Dependencies: FCS_COP.1(c) 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.

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.

5.8. FCS_TLS_EXT Extended: TLS selected

Family Behavior:

This family addresses the ability for a server and/or a client to use TLS to protect data between a client and the server using the TLS protocol.

Component leveling:

FCS_TLS_EXT.1 Extended: TLS selected

1

FCS_TLS_EXT.1 TLS selected, requires the TLS protocol implemented as specified.

Management:

The following actions could be considered for the management functions in FMT:

- There are no management actions foreseen.

Audit:

The following actions should be auditable if FAU_GEN Security Audit Data Generation is included in the PP/ST:

- Failure of TLS session establishment

FCS_TLS_EXT.1 Extended: TLS selected

Hierarchical to: No other components.

Dependencies: No dependencies.

FCS_TLS_EXT.1.1 The TSF shall implement one or more of the following protocols [selection: *TLS 1.0 (RFC 2246)*, *TLS 1.1 (RFC 4346)*, *TLS 1.2 (RFC 5246)*] supporting the following ciphersuites:

Mandatory Ciphersuites:

- TLS_RSA_WITH_AES_128_CBC_SHA

Optional Ciphersuites:

[selection:

- None
- TLS_RSA_WITH_AES_256_CBC_SHA
- TLS_DHE_RSA_WITH_AES_128_CBC_SHA
- TLS_DHE_RSA_WITH_AES_256_CBC_SHA
- TLS_RSA_WITH_AES_128_CBC_SHA256
- TLS_RSA_WITH_AES_256_CBC_SHA256
- TLS_DHE_RSA_WITH_AES_128_CBC_SHA256
- TLS_DHE_RSA_WITH_AES_256_CBC_SHA256
- TLS_ECDHE_RSA_WITH_AES_128_CBC_SHA
- TLS_ECDHE_RSA_WITH_AES_256_CBC_SHA
- TLS_ECDHE_ECDSA_WITH_AES_128_CBC_SHA
- TLS_ECDHE_ECDSA_WITH_AES_256_CBC_SHA
- TLS_ECDHE_RSA_WITH_AES_128_CBC_SHA256
- TLS_ECDHE_RSA_WITH_AES_256_CBC_SHA384
- TLS_ECDHE_RSA_WITH_AES_128_GCM_SHA256
- TLS_ECDHE_RSA_WITH_AES_256_GCM_SHA384
- TLS_ECDHE_ECDSA_WITH_AES_128_GCM_SHA256
- TLS_ECDHE_ECDSA_WITH_AES_256_GCM_SHA384
- TLS_ECDHE_ECDSA_WITH_AES_128_CBC_SHA256
- TLS_ECDHE_ECDSA_WITH_AES_256_CBC_SHA384

].

Rationale:

TLS is one of the secure communication protocols, and the Common Criteria does not provide a suitable SFR for the communication protocols using cryptographic algorithms.

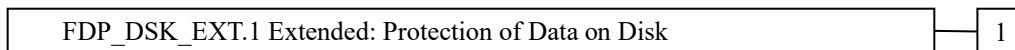
This extended component protects the communication data using cryptographic algorithms, and it is therefore placed in the FCS class with a single component.

5.9. FDP_DSK_EXT Extended: Protection of Data on Disk

Family Behavior:

This family is to mandate the encryption of all protected data written to the storage.

Component leveling:



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 Field-Replaceable Nonvolatile Storage Devices in order to avoid storing these data in plaintext on the devices.

Management:

The following actions could be considered for the management functions in FMT:

- There are no management actions foreseen.

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.

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 Field-Replaceable Nonvolatile Storage Device that is separately CC certified to conform to the FDE EE cPP*] such that any Field-Replaceable 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.

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.

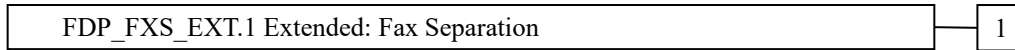
This extended component protects the Data on Disk, and it is therefore placed in the FDP class with a single component.

5.10. FDP_FXS_EXT Extended: Fax Separation

Family Behavior:

This family addresses the requirements for separation between Fax PSTN line and the LAN to which TOE is connected.

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.

Management:

The following actions could be considered for the management functions in FMT:

- There are no management actions foreseen.

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.

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.

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.

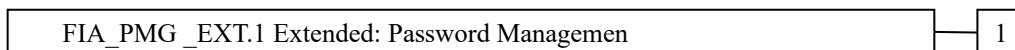
This extended component protects the TSF Data or User Data, and it is therefore placed in the FDP class with a single component.

5.11. FIA_PMG_EXT Extended: Password Management

Family Behavior:

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.

Component leveling:



FIA_PMG_EXT.1 Password management requires the TSF to support passwords with varying composition requirements, minimum lengths, maximum lifetime, and similarity constraints.

Management:

The following actions could be considered for the management functions in FMT:

- There are no auditable events foreseen.

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.

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.

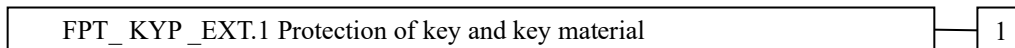
This extended component protects the TOE by means of password management, and it is therefore placed in the FIA class with a single component.

5.12. FPT_KYP_EXT Extended: Protection of Key and Key Material

Family Behavior:

This family addresses the requirements for keys and key materials to be protected if and when written to nonvolatile storage.

Component leveling:



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.

Management:

The following actions could be considered for the management functions in FMT:

- There are no management actions foreseen.

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.

FPT_KYP_EXT.1 Extended: Protection of Key and Key Material

Hierarchical to: No other components.

Dependencies: No dependencies.

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 Field-Replaceable Nonvolatile Storage Device, and not store any such plaintext key on a device that uses the key for its encryption.

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.

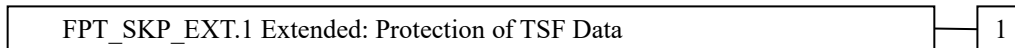
This extended component protects the TSF data, and it is therefore placed in the FPT class with a single component.

5.13. FPT_SKP_EXT Extended: Protection of TSF Data

Family Behavior:

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.

Component leveling:



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.

Management:

The following actions could be considered for the management functions in FMT:

- There are no management actions foreseen.

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.

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.

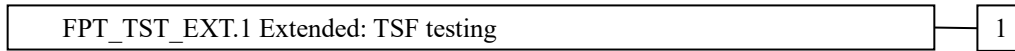
This extended component protects the TOE by means of strong authentication using Pre-shared Key, and it is therefore placed in the FPT class with a single component.

5.14. FPT_TST_EXT Extended: TSF testing

Family Behavior:

This family addresses the requirements for self-testing the TSF for selected correct operation.

Component leveling:



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.

Management:

The following actions could be considered for the management functions in FMT:

- There are no management actions foreseen.

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.

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.

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.

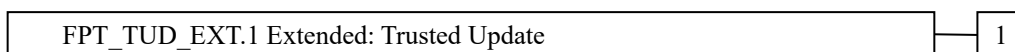
This extended component protects the TOE, and it is therefore placed in the FPT class with a single component.

5.15. FPT_TUD_EXT Extended: Trusted Update

Family Behavior:

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.

Component leveling:



FPT_TUD_EXT.1 Trusted Update, ensures authenticity and access control for updates.

Management:

The following actions could be considered for the management functions in FMT:

- There are no management actions foreseen.

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.

FPT_TUD_EXT.1 Trusted Update

Hierarchical to: No other components.

Dependencies: [FCS_COP.1(b) Cryptographic Operation (for signature generation/verification),
or
FCS_COP.1(c) 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: no other functions] prior to installing those updates.

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.

6. Security Requirements

6.1. Notation

- **Bold** typeface indicates the portion that has been “completed” or “refined” in this PP.
- ***Bold italic*** typeface indicates the portion that has been “assigned”, “selected” or “refined” in this ST.
- Letters in brackets indicate the “assigned” or “selected” results.
- SFR components that are followed by a letter in parentheses, e.g., (a), (b)··· represent required iterations.

6.2. Class FAU: Security Audit

6.2.1. 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:

- Start-up and shutdown of the audit functions;
- All auditable events for the **not specified** level of audit; and
- All auditable events specified in Table 12, [none].**

FAU_GEN.1.2 The TSF shall record within each audit record at least the following information:

- Date and time of the event, type of event, subject identity (if applicable), and the outcome (success or failure) of the event; and
- 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 12, [none].**

Table 12 Auditable Events

| Auditable events | Relevant SFR | Additional information |
|--|---|------------------------|
| Job completion | FDP_ACF.1 | Type of job |
| Unsuccessful User authentication | FIA_UAU.1 | None |
| Unsuccessful User identification | FIA_UID.1 | None |
| Use of management functions | FMT_SMF.1 | None |
| 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 |

6.2.2. FAU_GEN.2 User identity association

(for O.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.

6.2.3. FAU_STG_EXT.1 Extended: External Audit Trail Storage

(for O.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.

6.3. Class FCS: Cryptographic Support

6.3.1. FCS_CKM.1(a) Cryptographic Key Generation (for asymmetric keys)

(for O.COMMS_PROTECTION)

Hierarchical to: No other components.

Dependencies: FCS_COP.1(b) Cryptographic Operation (for signature generation/ verification)
FCS_COP.1(i) Cryptographic operation (Key Transport)]
FCS_CKM_EXT.4 Extended: Cryptographic Key Material Destruction

FCS_CKM.1.1(a) Refinement: The TSF shall generate **asymmetric** cryptographic keys **used for key establishment** in accordance with [

- *NIST Special Publication 800-56B, "Recommendation for Pair-Wise Key Establishment Schemes Using Integer Factorization Cryptography" for RSA-based key establishment schemes*
] and specified cryptographic key sizes equivalent to, or greater than, a symmetric key strength of 112 bits.

6.3.2. FCS_CKM.1(b) Cryptographic key generation (Symmetric Keys)

(for O.COMMS_PROTECTION, O.STORAGE_ENCRYPTION)

Hierarchical to: No other components.

Dependencies: [FCS_COP.1(a) Cryptographic Operation (Symmetric encryption/decryption)
FCS_COP.1(e) Cryptographic Operation (Key Wrapping)
FCS_COP.1(f) Cryptographic operation (Key Encryption)
FCS_COP.1(g) 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 [128 bit, 256 bit] that meet the following: No Standard.**

6.3.3. FCS_CKM.4(a) 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(a) Refinement: The TSF shall **destroy** cryptographic keys in accordance with a specified cryptographic key **destruction** method [

For volatile memory, the destruction shall be executed by [*powering off a device*].

For nonvolatile storage, the destruction shall be executed by a [*single*] overwrite of key data storage location consisting of [*a pseudo random pattern using the TSF's RBG (as specified in FCS_RBG_EXT.1)*], followed by a [*none*]. If read-verification of the overwritten data fails, the process shall be repeated again;] that meets the following: [*no standard*].

6.3.4. FCS_CKM.4(b) 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(b) Refinement: The TSF shall **destroy** cryptographic keys in accordance with a specified cryptographic key **destruction** method [

For volatile memory, the destruction shall be executed by [*powering off a device*].

For nonvolatile storage, the destruction shall be executed by a [*three*] overwrite of key data storage location consisting of [*a static pattern*], followed by a [*none*]. If read-verification of the overwritten data fails, the process shall be repeated again;] that meets the following: [*no standard*].

6.3.5. 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.

6.3.6. FCS_COP.1(a) Cryptographic Operation (Symmetric encryption/decryption)

(for O.COMMS_PROTECTION)

Hierarchical to: No other components.

Dependencies: FCS_CKM.1(b) Cryptographic key generation (Symmetric Keys)]
FCS_CKM_EXT.4 Extended: Cryptographic Key Material Destruction

FCS_COP.1.1(a) Refinement: The TSF shall perform **encryption and decryption** in accordance with a specified cryptographic algorithm **AES operating in [CBC modes]** and cryptographic key sizes **128-bits and 256-bits** that meets the following:

- FIPS PUB 197, "Advanced Encryption Standard (AES)"
- [NIST SP 800-38A, NIST SP 800-38D]

6.3.7. FCS_COP.1(b) Cryptographic Operation (for signature generation/verification)

(for O.UPDATE_VERIFICATION, O.COMMS_PROTECTION)

Hierarchical to: No other components.

Dependencies: [FCS_CKM.1(a) Cryptographic key generation]

FCS_CKM_EXT.4 Extended: Cryptographic Key Material Destruction

FCS_COP.1.1(b) Refinement: The TSF shall perform **cryptographic signature services** in accordance with a [*RSA Digital Signature Algorithm (rDSA) with key sizes (modulus) of [2048 bits]*] that meets the following [*FIPS PUB 186-4, "Digital Signature Standard"*].

6.3.8. FCS_RBG_EXT.1(a) Extended: Cryptographic Operation (Random Bit Generation)

(for O.STORAGE_ENCRYPTION)

Hierarchical to: No other components.

Dependencies: No dependencies.

FCS_RBG_EXT.1.1(a) The TSF shall perform all deterministic random bit generation services in accordance with [*NIST SP 800-90A*] using [*Hash_DRBG (any)*].

FCS_RBG_EXT.1.2(a) The deterministic RBG shall be seeded by at least one entropy source that accumulates entropy from [*single hardware-based noise source(s)*] with a minimum of [*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.

6.3.9. FCS_RBG_EXT.1(b) Extended: Cryptographic Operation (Random Bit Generation)

(for O.COMMS_PROTECTION)

Hierarchical to: No other components.

Dependencies: No dependencies.

FCS_RBG_EXT.1.1(b) The TSF shall perform all deterministic random bit generation services in accordance with [*NIST SP 800-90A*] using [*CTR_DRBG (AES)*].

FCS_RBG_EXT.1.2(b) The deterministic RBG shall be seeded by at least one entropy source that accumulates entropy from [*single hardware-based noise source(s)*] with a minimum of [*128bits*] 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.

6.3.10. FCS_COP.1(c) Cryptographic operation (Hash Algorithm)

(selected in FPT_TUD_EXT.1.3, or with FCS_SNI_EXT.1.1)

Hierarchical to: No other components.

Dependencies: No dependencies.

FCS_COP.1.1(c) Refinement: The TSF shall perform cryptographic hashing services in accordance with [*SHA-1, SHA-256, SHA-384, SHA-512*] that meet the following: [*ISO/IEC 10118-3:2004*].

6.3.11. 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 [[CBC] mode]** and cryptographic key sizes [**256 bits**] that meet the following: [**AES as specified in ISO /IEC 18033-3, [CBC as specified in ISO/IEC 10116].**

6.3.12. FCS_SMC_EXT.1 Extended: Submask Combining

(selected in FCS_KYC_EXT.1.1)

Hierarchical to: No other components.

Dependencies: FCS_COP.1(c) Cryptographic operation (Hash Algorithm)

FCS_SMC_EXT.1.1 The TSF shall combine submasks using the following method [**exclusive OR (XOR)**] to generate an intermediary key or BEV.

6.3.13.FCS_COP.1(g) Cryptographic Operation (for keyed-hash message authentication)

(selected with FCS_IPSEC_EXT.1.4)

Hierarchical to: No other components.

Dependencies: [FCS_CKM.1(b) Cryptographic key generation (Symmetric Keys)]

FCS_CKM_EXT.4 Extended: Cryptographic Key Material Destruction

FCS_COP.1.1(g) Refinement: The TSF shall perform keyed-hash message authentication in accordance with a specified cryptographic algorithm HMAC-**[SHA-1, SHA-256]**, key size [**160, 256**]bits, and message digest sizes [**160, 256**] bits that meet the following: FIPS PUB 198-1, "The Keyed-Hash Message Authentication Code, and FIPS PUB 180-3, "Secure Hash Standard."

6.3.14.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: FCS_CKM.1(b) Cryptographic key generation (Symmetric Keys)]

FCS_COP.1(c) 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 [**HMAC-SHA-512**] and cryptographic key sizes [256] that meet the following: [**ISO/IEC 9797-2:2011, Section 7 "MAC Algorithm 2"**; ISO/IEC 10118].

6.3.15.FCS_TLS_EXT.1 Extended: TLS selected

(selected in FTP_ITC.1.1, FTP_TRP.1.1)

Hierarchical to: No other components.

Dependencies: FCS_CKM.1(a) Cryptographic Key Generation (for asymmetric Keys)

FCS_COP.1(a) Cryptographic Operation (Symmetric encryption/decryption)

FCS_COP.1(b) Cryptographic Operation (for signature generation/verification)

FCS_COP.1(c) Cryptographic Operation (Hash Algorithm)

FCS_COP.1(g) Cryptographic Operation (for keyed-hash message authentication)

FCS_RBG_EXT.1 Extended: Cryptographic Operation (Random Bit Generation)

FCS_TLS_EXT.1.1 The TSF shall implement one or more of the following protocols [**TLS 1.2**

(RFC 5246) supporting the following ciphersuites:

Mandatory Ciphersuites:

- TLS_RSA_WITH_AES_128_CBC_SHA

Optional Ciphersuites:

[

- TLS_RSA_WITH_AES_256_CBC_SHA
- TLS_RSA_WITH_AES_128_CBC_SHA256
- TLS_RSA_WITH_AES_256_CBC_SHA256

].

6.3.16.FCS_HTTPS_EXT.1 Extended: HTTPS selected

Hierarchical to: No other components.

Dependencies: No dependencies.

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.

6.3.17.FCS_KDF_EXT Extended: Cryptographic Key Derivation

(for O.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 [*a RNG generated submask as specified in FCS_RBG_EXT.1*] to derive an intermediate key, as defined in [*NIST SP 800-108 [KDF in Counter Mode]*], 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.

6.3.18.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(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: [*intermediate keys originating from one or more submask(s) to the BEV or DEK using the following method(s): [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]*] while maintaining an effective strength of [*256 bits*].

6.4. Class FDP: User Data Protection

6.4.1. 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 13** and **Table 14**.

Table 13 D.USER.DOC Access Control SFP

| | | "Create" | "Read" | "Modify" | "Delete" |
|-------|-----------------------|--|--|-------------------------------|-------------------------------|
| Print | <i>Operation:</i> | <i>Submit a document to be printed</i> | <i>View image or Release printed output</i> | <i>Modify stored document</i> | <i>Delete stored document</i> |
| | Job owner | (note 1) | | denied | |
| | U.ADMIN(a) | | denied | denied | |
| | U.NORMAL(a) | | denied | denied | denied |
| | U.ACCOUNTMANAGER | denied | denied | denied | denied |
| | U.FAXOPERATOR | denied | denied | denied | denied |
| | U.ADDRESSBOOKOPERATOR | denied | denied | denied | denied |
| | Unauthenticated | (condition 1) | denied | denied | denied |
| Scan | <i>Operation:</i> | <i>Submit a document for scanning</i> | <i>View scanned image</i> | <i>Modify stored image</i> | <i>Delete stored image</i> |
| | Job owner | (note 2) | | | |
| | U.ADMIN(a) | | denied | denied | |
| | U.NORMAL(a) | | denied | denied | denied |
| | U.ACCOUNTMANAGER | denied | denied | denied | denied |
| | U.FAXOPERATOR | denied | denied | denied | denied |
| | U.ADDRESSBOOKOPERATOR | denied | denied | denied | denied |
| | Unauthenticated | denied | denied | denied | denied |
| Copy | <i>Operation:</i> | <i>Submit a document for copying</i> | <i>View scanned image or Release printed copy output</i> | <i>Modify stored image</i> | <i>Delete stored image</i> |
| | Job owner | (note 2) | | denied | |
| | U.ADMIN(a) | | denied | denied | |
| | U.NORMAL(a) | | denied | denied | denied |
| | U.ACCOUNTMANAGER | denied | denied | denied | denied |
| | U.FAXOPERATOR | denied | denied | denied | denied |
| | U.ADDRESSBOOKOPERATOR | denied | denied | denied | denied |
| | Unauthenticated | denied | denied | denied | denied |

| Fax send | | "Create" | "Read" | "Modify" | "Delete" |
|-------------|-----------------------|-------------------|---|---|-------------------------------------|
| | | <i>Operation:</i> | <i>Submit a document to send as a fax</i> | <i>View scanned image</i> | <i>Modify stored image</i> |
| | Job owner | (note 2) | | | |
| | U.ADMIN(a) | | denied | denied | |
| | U.NORMAL(a) | | denied | denied | denied |
| | U.ACCOUNTMANAGER | denied | denied | denied | denied |
| | U.FAXOPERATOR | | denied | denied | denied |
| | U.ADDRESSBOOKOPERATOR | denied | denied | denied | denied |
| | Unauthenticated | denied | denied | denied | denied |
| Fax receive | | "Create" | "Read" | "Modify" | "Delete" |
| | | <i>Operation:</i> | <i>Receive a fax and store it</i> | <i>View fax image or Release printed fax output</i> | <i>Modify image of received fax</i> |
| | Job owner | (note 3) | | denied | |
| | U.ADMIN(a) | (note 4) | | denied | |
| | U.NORMAL(a) | (note 4) | denied | denied | denied |
| | U.ACCOUNTMANAGER | (note 4) | denied | denied | denied |
| | U.FAXOPERATOR | (note 4) | | denied | |
| | U.ADDRESSBOOKOPERATOR | (note 4) | denied | denied | denied |
| | Unauthenticated | (note 4) | denied | denied | denied |

Table 14 D.USER.JOB Access Control SFP

| Print | | "Create" * | "Read" | "Modify" | "Delete" |
|-------|-----------------------|-------------------|-------------------------|-------------------------------|-------------------------|
| | | <i>Operation:</i> | <i>Create print job</i> | <i>View print queue / log</i> | <i>Modify print job</i> |
| | Job owner | (note 1) | | denied | |
| | U.ADMIN(a) | | | denied | |
| | U.NORMAL(a) | | | denied | denied |
| | U.ACCOUNTMANAGER | denied | | denied | denied |
| | U.FAXOPERATOR | denied | | denied | denied |
| | U.ADDRESSBOOKOPERATOR | denied | | denied | denied |
| | Unauthenticated | | denied | denied | denied |
| Scan | | "Create" * | "Read" | "Modify" | "Delete" |
| | | <i>Operation:</i> | <i>Create scan job</i> | <i>View scan status / log</i> | <i>Modify scan job</i> |
| | Job owner | (note 2) | | denied | |
| | U.ADMIN(a) | | | denied | |
| | U.NORMAL(a) | | | denied | denied |
| | U.ACCOUNTMANAGER | denied | | denied | denied |
| | U.FAXOPERATOR | denied | | denied | denied |
| | U.ADDRESSBOOKOPERATOR | denied | | denied | denied |

| | | "Create" * | "Read" | "Modify" | "Delete" |
|-------------|-----------------------|-------------------------------|--------------------------------------|-------------------------------|-------------------------------|
| | Unauthenticated | denied | denied | denied | denied |
| Copy | <i>Operation:</i> | <i>Create copy job</i> | <i>View copy status / log</i> | <i>Modify copy job</i> | <i>Cancel copy job</i> |
| | Job owner | (note 2) | | denied | |
| | U.ADMIN(a) | | | denied | |
| | U.NORMAL(a) | | | denied | denied |
| | U.ACCOUNTMANAGER | denied | | denied | denied |
| | U.FAXOPERATOR | denied | | denied | denied |
| | U.ADDRESSBOOKOPERATOR | denied | | denied | denied |
| | Unauthenticated | denied | denied | denied | denied |
| Fax send | <i>Operation:</i> | <i>Create fax send job</i> | <i>View fax job queue / log</i> | <i>Modify fax send job</i> | <i>Cancel fax send job</i> |
| | Job owner | (note 2) | | denied | |
| | U.ADMIN(a) | | | denied | |
| | U.NORMAL(a) | | | denied | denied |
| | U.ACCOUNTMANAGER | denied | | denied | denied |
| | U.FAXOPERATOR | | | denied | denied |
| | U.ADDRESSBOOKOPERATOR | denied | | denied | denied |
| | Unauthenticated | denied | denied | denied | denied |
| Fax receive | <i>Operation:</i> | <i>Create fax receive job</i> | <i>View fax receive status / log</i> | <i>Modify fax receive job</i> | <i>Cancel fax receive job</i> |
| | Fax owner | (note 3) | | denied | denied |
| | U.ADMIN(a) | (note 4) | | denied | denied |
| | U.NORMAL(a) | (note 4) | denied | denied | denied |
| | U.ACCOUNTMANAGER | (note 4) | denied | denied | denied |
| | U.FAXOPERATOR | (note 4) | | denied | denied |
| | U.ADDRESSBOOKOPERATOR | (note 4) | denied | denied | denied |
| | Unauthenticated | (note 4) | denied | denied | denied |

Application note:

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

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. Ownership of received faxes is assigned to U.FAXOPERATOR and U.ADMIN(a) role.

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

6.4.2. 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 13** and **Table 14**.

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 13 and Table 14.***

FDP_ACF.1.3 Refinement: The TSF shall explicitly authorise access of subjects to objects based on the following additional rules: [***none***].

FDP_ACF.1.4 Refinement: The TSF shall explicitly deny access of subjects to objects based on the following additional rules: [***none***].

6.4.3. FDP_FXS_EXT.1 Extended: Fax separation

(for O.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.

6.4.4. FDP_DSK_EXT.1 Extended: Protection of Data on Disk

(for O.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 [***use a self-encrypting Field-Replaceable Nonvolatile Storage Device that is separately CC certified to conform to the FDE EE cPP***], such that any Field-Replaceable 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.

6.5. Class FIA: Identification and Authentication

6.5.1. FIA_AFL.1 Authentication failure handling

(for O.USER_I&A)

Hierarchical to: No other components.

Dependencies: FIA_UAU.1 Timing of authentication

FIA_AFL.1.1 The TSF shall detect when [***an administrator configurable positive integer within [1 - 30]***] unsuccessful authentication attempts occur related to [***the unsuccessful user authentication attempts of following the last successful authentication or clear of user account lock***].

6.5.5. FIA_UAU.7 Protected authentication feedback

(for O.USER_I&A)

Hierarchical to: No other components.

Dependencies: FIA_UAU.1 Timing of authentication

FIA_UAU.7.1 The TSF shall provide only [*display dummy characters*] to the user while the authentication is in progress.

6.5.6. FIA_UID.1 Timing of identification

(for O.USER_I&A and O.ADMIN_ROLES)

Hierarchical to: No other components.

Dependencies: No dependencies.

FIA_UID.1.1 Refinement: The TSF shall allow [*receive PSTN fax 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.

6.5.7. FIA_USB.1 User-subject binding

(for O.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: [*User ID, Role*].

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: [*none*].

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: [*none*].

6.6. Class FMT: Security Management

6.6.1. FMT_MOF.1 Management of security functions behavior

(for O.ADMIN_ROLES)

Hierarchical to: No other components.

Dependencies: FMT_SMR.1 Security roles

FMT_SMF.1 Specification of Management Functions

FMT_MOF.1.1 The TSF shall restrict the ability to [*disable, enable*] the functions [*Secure Channel*] to *U.ADMIN(a)*.

6.6.2. FMT_MSA.1 Management of security attributes

(for O.ACCESS_CONTROL and O.USER_AUTHORIZATION)

Hierarchical to: No other components.

Dependencies: FDP_ACC.1 Subset access control,

~~FDP_IFC.1 Subset information flow control]~~

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 [*query, modify, delete, [create, export]*] the security attributes [*User ID, Role*] to [*refer to Table 16*].

Table 16 Security Attributes List

| Security Attributes | Operation | Role |
|---------------------------------|--|--|
| User ID | <i>create, modify, query, delete, export</i> | <i>U.ADMIN(a)</i> |
| | <i>query, export</i> | <i>U.ACCOUNTMANAGER</i> |
| | <i>query</i> | <i>U.NORMAL, U.ADDRESSBOOKOPERATOR</i> |
| User ID (Except for U.ADMIN(a)) | <i>create, modify, delete</i> | <i>U.ACCOUNTMANAGER</i> |
| Role | <i>create, modify, query, delete, export</i> | <i>U.ADMIN(a)</i> |
| | <i>query, export</i> | <i>U.ACCOUNTMANAGER</i> |
| | <i>query</i> | <i>U.NORMAL U.ADDRESSBOOKOPERATOR</i> |
| Role (Except for U.ADMIN(a)) | <i>create, modify, delete</i> | <i>U.ACCOUNTMANAGER</i> |

6.6.3. FMT_MSA.3 Static attribute initialization

(for O.ACCESS_CONTROL and O.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 [*restrictive*] default values for security attributes that are used to enforce the SFP.

FMT_MSA.3.2 Refinement: The TSF shall allow the [*no role*] to specify alternative initial values to override the default values when an object or information is created.

6.6.4. FMT_MTD.1 Management of TSF data

(for O.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 17.**

Table 17 Management of TSF Data

| Data | Operation | Authorised role(s) |
|--|-----------------------|-------------------------------------|
| User Password of <i>U.NORMAL</i> | <i>modify</i> | <i>the owning U.NORMAL</i> |
| | <i>modify, export</i> | <i>U.ADMIN(a) U.ACCOUNTMANAGER</i> |
| User Password of <i>U.ADMIN(a)</i> | <i>modify, export</i> | <i>U.ADMIN(a)</i> |
| User Password of <i>U.ACCOUNTMANAGER</i> | <i>modify, export</i> | <i>U.ADMIN(a), U.ACCOUNTMANAGER</i> |

| Data | Operation | Authorised role(s) |
|--|---------------------------|--|
| User Password of U.ADDRESSBOOKOPERATOR | modify | <i>the owning</i> <i>U.ADDRESSBOOKOPERATOR</i> |
| | modify, export | <i>U.ADMIN(a),</i> <i>U.ACCOUNTMANGER</i> |
| Allowable Number of entry for Login Password | modify | <i>U.ADMIN(a)</i> |
| Lockout Time | modify | <i>U.ADMIN(a)</i> |
| Locked-out Account Status | clear | <i>U.ADMIN(a),</i> <i>U.ACCOUNTMANGER</i> |
| Auto Logout Time | modify | <i>U.ADMIN(a)</i> |
| Date and Time Information | modify | <i>U.ADMIN(a)</i> |
| Minimum Password Length | modify | <i>U.ADMIN(a)</i> |
| Address Book | create, modify, delete | <i>U.ADMIN(a),</i> <i>U.ADDRESSBOOKOPERATOR</i> |
| SYSLOG Server Settings | modify | <i>U.ADMIN(a)</i> |
| FTP Server Settings | modify | <i>U.ADMIN(a)</i> |
| Software | query, modify | <i>U.ADMIN(a)</i> |

6.6.5. 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:
[refer to **Table 18**].

Table 18 Management Functions

| SFR | Management | Management Functions | Reason |
|---------------|--|----------------------|--------------------------------|
| FAU_GEN.1 | There are no management activities foreseen. | None | - |
| FAU_GEN.2 | There are no management activities foreseen. | None | - |
| FAU_STG_EXT.1 | The TSF shall have the ability to configure the cryptographic functionality. | None | This function is not provided. |
| FCS_CKM.1(b) | There are no management activities foreseen. | None | - |
| FCS_CKM.4(a) | There are no management activities foreseen. | None | - |
| FCS_CKM.4(b) | There are no management activities foreseen. | None | - |
| FCS_CKM_EXT.4 | There are no management activities foreseen. | None | - |
| FCS_COP.1(b) | There are no management activities foreseen. | None | - |
| FCS_COP.1(c) | There are no management activities foreseen. | None | - |

| SFR | Management | Management Functions | Reason |
|------------------|--|---|---|
| FCS_COP.1(f) | There are no management activities foreseen. | None | - |
| FCS_COP.1(g) | There are no management activities foreseen. | None | - |
| FCS_COP.1(h) | There are no management activities foreseen. | None | - |
| FCS_RBG_EXT.1(a) | There are no management activities foreseen. | None | - |
| FCS_RBG_EXT.1(b) | There are no management activities foreseen. | None | - |
| FCS_TLS_EXT.1 | There are no management activities foreseen. | None | - |
| FCS_HTTPS_EXT.1 | There are no management activities foreseen. | None | - |
| FCS_KDF_EXT.1(b) | There are no management activities foreseen. | None | - |
| FCS_KYC_EXT.1 | There are no management activities foreseen. | None | - |
| FDP_ACC.1 | There are no management activities foreseen. | None | - |
| FDP_ACF.1 | a) Management of attributes used for decision based on explicit access or denial. | None | The default value of an attribute is fixed and cannot be changed. |
| FDP_FXS_EXT.1 | There are no management activities foreseen. | None | - |
| FDP_DSK_EXT.1 | There are no management activities foreseen. | None | - |
| FIA_AFL.1 | a) Management of the threshold for unsuccessful authentication attempts | Management of unsuccessful user authentication processing | - |
| | b) Management of actions which are taken for the unsuccessful authentication events | None | It is a predefined action and not managed. |
| FIA_ATD.1 | a) If “assigned”, an authorized administrator can define additional security attributes to a user. | None | This function is not provided. |
| FIA_PMG_EXT.1 | There are no management activities foreseen. | Minimum Password Length management | - |

| SFR | Management | Management Functions | Reason |
|-----------|--|--|--|
| FIA_UAU.1 | a) Authentication data management by an administrator | <ul style="list-style-type: none"> • Management of User Password (U.ACCOUNTMANAGER/U.ADMIN(a)/U.NORMAL/U.ADDRESSBOOKOPERATOR) by U.ADMIN(a). • Management of User Password (U.ACCOUNTMANAGER/U.NORMAL/U.ADDRESSBOOKOPERATOR) by U.ACCOUNTMANAGER | - |
| | b) Authentication data management by a relative user | <ul style="list-style-type: none"> • Management of own User Password by U.NORMAL • Management of own User Password by U.ADDRESSBOOKOPERATOR | - |
| | c) List of actions to be taken before user authentication shall be managed. | None | It is a predefined action and not managed. |
| FIA_UAU.7 | There are no management activities foreseen. | None | - |
| FIA_UID.1 | a) Management of User Identity | Management of User ID | - |
| | b) If an authorized administrator can change the authorized actions before identification, the action list must be controlled. | None | It is a predefined action and not managed. |
| FIA_USB.1 | a) An authorized administrator can define security attributes for a default subject. | None | There are no permitted roles. |
| | b) An authorized administrator can change security attributes of a subject. | None | There are no permitted roles. |
| FMT_MOF.1 | a) Groups of roles which may affect reciprocally with the TSF Functions shall be managed. | None | It is a predefined action and not managed. |

| SFR | Management | Management Functions | Reason |
|---------------|--|---|---|
| FMT_MSA.1 | a) Groups of roles which may affect reciprocally with the Security Attributes shall be managed. | None | It is a predefined action and not managed. |
| | b) Rules for which the Security Attributes take over any particular values shall be managed. | None | It is a predefined action and not managed. |
| FMT_MSA.3 | a) Groups which may be able to identify the default value shall be managed. | None | There are no roles to specify the default value. |
| | b) Restrictive or permissive settings of the default value for the prescribed access control SFP shall be managed. | None | The default value is fixed and cannot be changed. |
| | c) Rules for which the Security Attributes take over any particular values shall be managed. | None | The rules cannot be changed. |
| FMT_MTD.1 | a) Groups of roles which may affect reciprocally with the TSF Data shall be managed. | None | It is a predefined action and not managed. |
| FMT_SMF.1 | There are no management activities foreseen. | None | - |
| FMT_SMR.1 | a) Management of Groups of Users who are part of the Role. | None | It is a predefined action and not managed. |
| FPT_SKP_EXT.1 | There are no management activities foreseen. | None | - |
| FPT_STM.1 | a) Management of time | Management of the time stamp settings | - |
| FPT_TST_EXT.1 | There are no management activities foreseen. | None | - |
| FPT_TUD_EXT.1 | There are no management activities foreseen. | Management of the Software | - |
| FTA_SSL.3 | a) Specification of the time in which an user who may cause termination of the interactive session between each user is non-active | None | Users cannot configure the setting individually. |
| | b) Specification of the default time in which an user who may cause termination of the interactive session is non-active | Specification of the default time in which a user is non-active after a session finishes. | - |

| SFR | Management | Management Functions | Reason |
|--------------|--|---|--|
| FTP_ITC.1 | a) Configuration of actions which require the trusted channel, if supported. | Secure channel settings | - |
| FTP_TRP.1(a) | a) Configuration of actions which require the trusted path, if supported. | None | It is a predefined action and not managed. |
| FTP_TRP.1(b) | a) Configuration of actions which require the trusted path, if supported. | None | It is a predefined action and not managed. |
| - | - | <ul style="list-style-type: none"> •Address Book management •SYSLOG Server Settings •FTP Server Settings | - |

6.6.6. 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(a)*, *U.ACCOUNTMANAGER*, *U.ADDRESSBOOKOPERATOR*, and *U.NORMAL*.

FMT_SMR.1.2 The TSF shall be able to associate users with roles.

6.7. Class FPT: Protection of the TSF

6.7.1. 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.

6.7.2. FPT_STM.1 Reliable time stamps

(for O.AUDIT)

Hierarchical to: No other components.

Dependencies: No dependencies.

FPT_STM.1.1 The TSF shall be able to provide reliable time stamps.

6.7.3. FPT_TST_EXT.1 Extended: TSF testing

(for O.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.

6.7.4. FPT_TUD_EXT.1 Extended: Trusted Update

(for O.UPDATE_VERIFICATION)

Hierarchical to: No other components.

Dependencies: FCS_COP.1(b) Cryptographic Operation (for signature generation/verification), FCS_COP.1(c) 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 [*no other functions*] prior to installing those updates.

6.7.5. FPT_KYP_EXT.1 Extended: Protection of Key and Key Material

(for O.KEY_MATERIAL)

Hierarchical to: No other components.

Dependencies: No dependencies.

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 Field-Replaceable Nonvolatile Storage Device**.

6.8. Class FTA: TOE Access

6.8.1. FTA_SSL.3 TSF-initiated termination

(for O.USER_I&A)

Hierarchical to: No other components.

Dependencies: No dependencies.

FTA_SSL.3.1 The TSF shall terminate an interactive session after a [*refer to Table 19*].

Table 19 Time Interval of User Inactivity

| Interface | Auto Logout Time |
|----------------|-------------------------------|
| Control Panel | 15 - 150 Sec. |
| Web Browser | 5 - 999 Min. |
| Printer Driver | There is no inactive sessions |

6.9. Class FTP: Trusted Paths/Channels

6.9.1. FTP_ITC.1 Inter-TSF trusted channel

(for O.COMMS_PROTECTION, O.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 [*TLS*] to provide a **trusted** communication channel between itself and **authorized IT entities supporting the following capabilities:** [*SYSDLOG server, Ftp server, mail server*] 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 [*SYSDLOG service, FTP service, mail service*].

6.9.2. 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 [*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.**

6.9.3. FTP_TRP.1(b) Trusted path (for Non-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(b) Refinement: The TSF shall use [*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 [*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.**

6.10. Security Assurance Requirements

Table 20 lists the security assurance requirements for the Protection Profile for Hardcopy Devices – v1.0. ASE_SPD.1 is added to the component set defined in EAL1 of the evaluation assurance level in this table.

Table 20 TOE Security Assurance Requirements

| Assurance Class | Assurance Component | Assurance Components Description |
|----------------------------|---------------------|---|
| Security Target Evaluation | ASE_CCL.1 | Conformance claims |
| | ASE_ECD.1 | Extended components definition |
| | ASE_INT.1 | ST introduction |
| | ASE_OBJ.1 | Security objectives for the operational environment |
| | ASE_REQ.1 | Stated security requirements |
| | ASE_SPD.1 | Security Problem Definition |
| | ASE_TSS.1 | TOE Summary Specification |
| Development | ADV_FSP.1 | Basic functional specification |
| Guidance Documents | AGD_OPE.1 | Operational user guidance |
| | AGD_PRE.1 | Preparative procedures |
| Assurance Class | ALC_CMC.1 | Labelling of the TOE |
| | ALC_CMS.1 | TOE CM coverage |
| Tests | ATE_IND.1 | Independent testing – Conformance |
| Vulnerability assessment | AVA_VAN.1 | Vulnerability survey |

6.11. Security Functional Requirements Rationale

6.11.1. Dependencies of Security Functional Requirements Documents

Table 21 shows the analysis results of dependencies for the TOE Security Functional Requirements in this ST.

Table 21 Analysis Results of Dependencies for Security Functional Requirements

| TOE Security Functional Requirements | Dependencies Required by CC and PP | Fulfilled Dependencies in ST | Un-fulfilled Dependencies in ST | Reason |
|--------------------------------------|--|---|---------------------------------|--------|
| FAU_GEN.1 | FPT_STM.1 | FPT_STM.1 | None | |
| FAU_GEN.2 | FAU_GEN.1, FIA_UID.1 | FAU_GEN.1, FIA_UID.1 | None | |
| FAU_STG_EXT.1 | FAU_GEN.1, FTP_ITC.1 | FAU_GEN.1, FTP_ITC.1 | None | |
| FCS_CKM.1(a) | [FCS_COP.1(b), or FCS_COP.1(i)], FCS_CKM_EXT.4 | FCS_COP.1(b), FCS_CKM_EXT.4 | None | |
| FCS_CKM.1(b) | [FCS_COP.1(a), or FCS_COP.1(d), or FCS_COP.1(e), or FCS_COP.1(f), or FCS_COP.1(g), or FCS_COP.1(h)], FCS_CKM_EXT.4, FCS_RBG_EXT.1 | FCS_COP.1(a), FCS_COP.1(g), FCS_CKM_EXT.4, FCS_RBG_EXT.1(a), FCS_RBG_EXT.1(b) | None | |

| TOE Security Functional Requirements | Dependencies Required by CC and PP | Fulfilled Dependencies in ST | Un-fulfilled Dependencies in ST | Reason |
|--------------------------------------|---|--|---------------------------------|--|
| FCS_CKM.4(a) | [FCS_CKM.1(a), or FCS_CKM.1(b)] | FCS_CKM.1(a), FCS_CKM.1(b) | None | |
| FCS_CKM.4(b) | [FCS_CKM.1(a), or FCS_CKM.1(b)] | FCS_CKM.1(a), FCS_CKM.1(b) | None | |
| FCS_CKM_EXT.4 | [FCS_CKM.1(a) or FCS_CKM.1(b)], FCS_CKM.4 | FCS_CKM.1(a), FCS_CKM.1(b), FCS_CKM.4(a), FCS_CKM.4(b) | None | |
| FCS_COP.1(a) | [FCS_CKM.1(b)], FCS_CKM_EXT.4 | FCS_CKM.1(b), FCS_CKM_EXT.4 | None | |
| FCS_COP.1(b) | [FCS_CKM.1(a)], FCS_CKM_EXT.4 | FCS_CKM.1(a), FCS_CKM_EXT.4 | None | |
| FCS_COP.1(c) | None | None | None | |
| FCS_COP.1(f) | FCS_CKM.1(b), FCS_CKM_EXT.4 | FCS_CKM.1(b), FCS_CKM_EXT.4 | None | |
| FCS_COP.1(g) | [FCS_CKM.1(b)], FCS_CKM_EXT.4 | FCS_CKM.1(b), FCS_CKM_EXT.4 | None | |
| FCS_COP.1(h) | FCS_CKM.1(b), FCS_COP.1(c), FCS_CKM_EXT.4 | FCS_CKM.1(b), FCS_COP.1(c), FCS_CKM_EXT.4 | None | |
| FCS_SMC_EXT.1 | FCS_COP.1(c) | FCS_COP.1(C) | None | |
| FCS_RBG_EXT.1(a) | None | None | None | |
| FCS_RBG_EXT.1(b) | None | None | None | |
| FCS_TLS_EXT.1 | FCS_CKM.1(a), FCS_COP.1(a), FCS_COP.1(b), FCS_COP.1(c), FCS_COP.1(g), FCS_RBG_EXT.1 | FCS_CKM.1(a), FCS_COP.1(a), FCS_COP.1(b), FCS_COP.1(c), FCS_COP.1(g), FCS_RBG_EXT.1(b) | None | |
| FCS_HTTPS_EXT.1 | FCS_TLS_EXT.1 | FCS_TLS_EXT.1 | None | |
| FPT_KYP_EXT.1 | None | None | None | |
| FCS_KYC_EXT.1 | [FCS_COP.1(e), FCS_SMC_EXT.1, FCS_COP.1(i), FCS_KDF_EXT.1, and/or FCS_COP.1(f)] | FCS_KDF_EXT.1, FCS_SMC_EXT.1, FCS_COP.1(f) | | |
| FCS_KDF_EXT.1 | FCS_COP.1(h) | FCS_COP.1(h) | None | |
| FDP_DSK_EXT.1 | FCS_COP.1(d) | None | FCS_COP.1(d) | A self-encrypting Field-Replaceable Nonvolatile Storage Device that is separately CC certified to conform to the |

| TOE Security Functional Requirements | Dependencies Required by CC and PP | Fulfilled Dependencies in ST | Un-fulfilled Dependencies in ST | Reason |
|--------------------------------------|--|---------------------------------------|---------------------------------|---------------------|
| | | | | FDE EE cPP is used. |
| FDP_ACC.1 | FDP_ACF.1 | FDP_ACF.1 | None | |
| FDP_ACF.1 | FDP_ACC.1, FMT_MSA.3 | FDP_ACC.1, FMT_MSA.3 | None | |
| FDP_FXS_EXT.1 | None | None | None | |
| FIA_AFL.1 | FIA_UAU.1 | FIA_UAU.1 | None | |
| FIA_ATD.1 | None | None | None | |
| FIA_PMG_EXT.1 | None | None | None | |
| FIA_UAU.1 | FIA_UID.1 | FIA_UID.1 | None | |
| FIA_UAU.7 | FIA_UAU.1 | FIA_UAU.1 | None | |
| FIA_UID.1 | None | None | None | |
| FIA_USB.1 | FIA_ATD.1 | FIA_ATD.1 | None | |
| FMT_MOF.1 | FMT_SMR.1, FMT_SMF.1 | FMT_SMR.1, FMT_SMF.1 | None | |
| FMT_MSA.1 | [FDP_ACC.1], FMT_SMR.1, FMT_SMF.1 | FDP_ACC.1, FMT_SMR.1, FMT_SMF.1 | None | |
| FMT_MSA.3 | FMT_MSA.1, FMT_SMR.1 | FMT_MSA.1, FMT_SMR.1 | None | |
| FMT_MTD.1 | FMT_SMR.1, FMT_SMF.1 | FMT_SMR.1, FMT_SMF.1 | None | |
| FMT_SMF.1 | None | None | None | |
| FMT_SMR.1 | FIA_UID.1 | FIA_UID.1 | None | |
| FPT_SKP_EXT.1 | None | None | None | |
| FPT_STM.1 | None | None | None | |
| FPT_TST_EXT.1 | None | None | None | |
| FPT_TUD_EXT.1 | FCS_COP.1(b), FCS_COP.1(c) | FCS_COP.1(b), FCS_COP.1(c) | None | |
| FTA_SSL.3 | None | None | None | |
| FTP_ITC.1 | [FCS_IPSEC_EXT.1, or FCS_TLS_EXT.1, or FCS_SSH_EXT.1, or FCS_HTTPS_EXT.1] | FCS_TLS_EXT.1, FCS_HTTPS_EXT.1 | None | |
| FTP_TRP.1(a) | [FCS_IPSEC_EXT.1, or FCS_TLS_EXT.1, or FCS_SSH_EXT.1, or FCS_HTTPS_EXT.1] | FCS_TLS_EXT.1, FCS_HTTPS_EXT.1 | None | |
| FTP_TRP.1(b) | [FCS_IPSEC_EXT.1, or FCS_TLS_EXT.1, or FCS_SSH_EXT.1, or FCS_HTTPS_EXT.1] | FCS_TLS_EXT.1, FCS_HTTPS_EXT.1 | None | |

6.11.2. Security Assurance Requirements Rationale

The rationale for choosing these security assurance requirements is that they define a minimum security baseline that is based on the anticipated threat level of the attacker, the security of the Operational Environment in which the TOE is deployed, and the relative value of the TOE itself. The assurance activities throughout the ST are used to provide tailored guidance on the specific expectations for completing the security assurance requirements.

7. TOE Summary Specification

Summary Specification of the TOE Security Functionality (TSF) is described in this Chapter.

7.1. Audit

The Summary Specification of the Class FAU Requirements is described as follows.

FAU_GEN.1

The TOE generates audit logs and record them in the audit log file when audit-relevant events occur. This causes FAU_GEN.1 to be realized.

Table 22 Recorded Events and Audit Logs

| Auditable events | Events | Recorded User ID | Result |
|---|---|--------------------------------|---------------------|
| Start-up of audit functions | MFP power-on | None | None |
| Shutdown of audit functions | MFP power-off | None | None |
| Job completion | Print job completion | Job owner | Success or failure |
| | Scan job completion | Job owner | Success or failure |
| | Copy job completion | Job owner | Success or failure |
| | Fax transmission job completion | Job owner | Success or failure |
| | Fax reception job completion | Job owner | Success or deletion |
| Unsuccessful user authentication and identification | Failure of login | Logged in User | Success or failure |
| Unsuccessful user identification | Failure of login (Print Job) | User not registered in the TOE | Failure |
| Use of management functions | Addition of User | User who made modifications | Success or failure |
| | Change of User ID | User who made modifications | Success or failure |
| | Deletion of User | User who made modifications | Success |
| | Management of unsuccessful user authentication processing, Minimum Password Length management, Management of User Password (U.ACCOUNTMANAGER/U.ADMIN(a)/U.NORMAL/U.ADDRESSBOOKOPERATOR) by U.ADMIN(a), Management of User Password(U.ACCOUNTMANAGER/U.NORMAL/U.ADDRESSBOOKOPERATOR) by U.ACCOUNTMANAGER, Management of own User Password by U.NORMAL, Management of own User Password by U.ADDRESSBOOKOPERATOR, | User who made modifications | Success |

| Auditable events | Events | Recorded User ID | Result |
|--|--|-----------------------------|--------------------|
| | Management of the Software, Specification of the default time in which a user is non-active after a session finishes, Secure channel settings, Address Book management, SYSLOG Server Settings, FTP Server Settings | | |
| Modification to the group of Users that are part of a role | Change of the role information | User who made modifications | Success |
| Changes to the time | Modification of the time | User who made modifications | Success |
| Failure to establish session | Failure of TLS session establishment | None | Success or failure |

The TOE adds the following data to the events to be audited.

- Date and Time: Time when an error/event occurred.
- Message: Sentence which describes the event content (Reason of failure when session failed)
- Error Code: An event is defined as a code, and represented as 4-digit hexadecimal numbers.
- User ID: Identifier of a Logged in user
- Result: Result of event implementation

[Relevant TSFI]

- Control Panel: Login, Home screen, Copy, Simple Copy, Scan, Simple Scan, Fax transmission, Print, Job display and Log display, Admin settings, Power key
- TopAccess: Login, Job status, Account, User management, Admin settings
- Printer Driver: Interface to a Print request
- Others: Main switch, PSTN Fax interface

FAU_GEN.2

If an auditable event occurs, the TOE realizes FAU_GEN.2 by attaching the user ID of a user who caused the event to the audit log.

[Relevant TSFI]

- Control Panel: Login, Home screen, Copy, Simple Copy, Scan, Simple Scan, Fax transmission, Print, Job display and Log display, Admin settings, Power key
- TopAccess: Login, Job status, Registration, Account, User management, Admin settings
- Printer Driver: Interface to a Print request
- Others: Main switch, PSTN Fax interface

FAU_STG_EXT.1

U.ADMIN(a) can set the SYSLOG server as the server where an audit log is transferred from the Admin settings in TopAccess.

The TOE can save the generated audit log to the internal storage device first, then transfer the data to the SYSLOG server which is the external audit log server using the communication protocol TLS1.2. The maximum number of records which can be stored in the storage area of

the audio log in the internal storage is as follows: 10,000 message logs, 5,000 print logs, 5,000 scan logs, 5,000 Fax transmission journals, and 5,000 Fax reception journals. When the maximum number of records of each log reaches the limit, the oldest audit data will be deleted to save the newest one.

Only U.ADMIN(a) can refer to all the audit logs which were saved to the internal storage and other users can refer to own job log only by access control.

[Relevant TSFI]

- Control Panel: Login, Home screen, Copy, Simple Copy, Scan, Simple Scan, Fax transmission, Print, Job display and Log display, Admin settings, Power key
- TopAccess: Login, Job status, Registration, Account, User management, Admin settings
- Printer Driver: Interface to a Print request
- Others: Main switch, PSTN Fax interface

7.2. Cryptographic Support

The following describes the summary specifications for requirements of Class FCS.

FCS_CKM.1(a)

The TOE creates the RSA key pair as the asymmetric cryptographic key used for server certificate for TLS communication by the rsakpg1-crt method described in Section 6.3.1.3. of NIST SP 800-56B, Revision 1. Random numbers used for key creation is created by CTR_DRBG (AES-256) according to FCS_RBG_EXT.1(b). The Server certificate and server private key, including the generated public key is saved to the self-encrypting drive after being encrypted. The TOE does not include the TOE-specific extensions, unique processing which is not written in HCD-PP, or another implementation which is permitted, for the TSF.

The following shows the TSFI related to this requirement.

[Relevant TSFI]

- TopAccess: Admin settings

FCS_CKM.1(b)

The TSF creates a session key and HMAC key for communication at the TLS communication negotiation. The session key and HMAC key are created from the random number shared between the server and client. The random number is created by CTR_DRBG (AES-256) according to FCS_RBG_EXT.1(b). The parameters of each key differ depending on the selected Cipher Suite as shown below.

- Session key
A session key is used for encrypting the communication data. The used cryptographic algorithm and key length differ depending on the selected Cipher Suite. The cryptographic algorithm uses AES-CBC, and 128bit and 256bit can be selected as the session key length.
- HMAC key
A HMAC key is used to verify the pseudo random function (PRF) and communication data for key extension. The key for key extension generates the 256-bit MAC key and the key for data verification generates the MAC key with the key length according to Cipher Suite.

These keys are saved to the volatile memory and deleted by turning off the power.

[Relevant TSFI]

- Conform to TSFI of FTP_ITC_EXT.1, FTP_TRP.1(a) and FTP_TRP.1(b)

The TSF generates a key derivation key by Hash_DRBG (SHA-512) according to FCS_RBG_EXT.1(a) before switching to the TOE settings. At this time, the TSF derives the host authentication key 256bit used for the self-encrypting drive to authenticate the MFP according to FCS_KDF_EXT.1 and FCS_SMC_EXT.1 based on the key derivation key. A challenge code used for protecting the host authentication key is generated by a random number which was generated by the random number generation function of the self-encrypting drive (JCMVP authentication No.: F0022).

[Relevant TSFI]

- Control Panel: Power key (Only for the first start-up after TOE establishment)
- Others: Main switch (Only for the first start-up after TOE establishment)

FCS_CKM_EXT.4/FCS_CKM.4(a)

The following keys and BEV handled by the TSF are discarded when they became unnecessary.

- Host authentication key for self-encrypting drive

This key is handled as an unnecessary key when the MFP is disposed of, and the area where the key is stored is destroyed by overwriting it once with a random number using Hash_DRBG (SHA-512) with a random number generator according to FCS_RBG_EXT.1(a).

The following shows the TSFI related to this requirement.

[Relevant TSFI]

- Control Panel: Power key (At the first start-up after HDD initialization)
- Others: Main switch (At the first start-up after HDD initialization)

- Key derivation key, intermediate key (output value of FCS_KDF_EXT.1), host authentication key, challenge code, response code, session key and HMAC key for communication.

They are saved to the volatile memory and deleted by turn off the power.

[Relevant TSFI]

- Control Panel: Power key
- Others: Main switch

FCS_CKM_EXT.4/FCS_CKM.4(b)

The following keys handled by the TSF are discarded when they are unnecessary.

- Secret key of the server

The secret key of the server is stored in the nonvolatile storage of the self-encrypting drive by being encrypted. It is handled as an unnecessary key when the administrator generates a new certificate during operation, and the area where the key is stored is overwritten three times with a fixed value. The key stored in the volatile memory is deleted by turning off the power.

The TSFI related to this requirement is as shown below.

[Relevant TSFI]

- TopAccess: Admin settings
- Control Panel: Power key
- Others: Main switch

FCS_COP.1(a)

The TSF encrypts and decrypts the communication data by operating the 128 bit or 256 bit cryptographic key generated by FCS_CKM.1(b) and AES cryptographic algorithm conforms to FIPS PUB197 in the CBC mode complies with NIST SP 800-38A so as to protect the communication data

in FTP_ITC.1, FTP_TRP.1(a), and FTP_TRP.1(b).
The TSFI related to this requirement is as shown below.

[Relevant TSFI]

- Conform to TSFI of FTP_ITC.1, FTP_TRP.1(a), and FTP_TRP.1(b)

FCS_COP.1(b)

The TSF uses the RSA digital signature algorithm (rDSA) of which the key length is 2048bit which complies with the Digital Signature Standard prescribed in FIPS PUB 186-4 for creation of signatures during device certificate creation and verification of the server certificate by FTP_ITC.1 and firmware update by FPT_TUD_EXT.1. The TSF uses RSASSA-PKCS1-v1_5 for creation of the signatures during device certificate creation and verification of the server certificate, and RSASSA-PSS for verification of firmware update. Also, the RSA key generated by FCS_CKM.1 (a) is used for creation of the certificate.

The TSFI related to this requirement is as shown below.

[Relevant TSFI]

- Conform to TSFI of FCS_ITC.1 and FPT_TUD_EXT.1.
- TopAccess: Admin settings

FCS_RBG_EXT.1(a)

The TSF generates a random number using entropy source and DRBG when generating and destroying the host authentication key for storage encryption of TOE. This DRBG uses Hash_DRBG (SHA-512) to generate random numbers according to NIST SP 800-90A. The entropy source includes a hardware-based noise source, and outputs an entropy input which has at least 256-bits entropy from the entropy source to DRBG according to ISO/IEC 18031:2011 Table C.1 “Security Strength Table for Hash Functions”. The noise source uses the ES of the hardware embedded in SoC (Intel Celeron Processor N3350) of the TOE. Output from the noise source is used for seeding the DRBG in SoC, and outputted by the RDRAND instruction after processing according to CTR_DRBG (AES) of NIST SP 800-90A. It is known that the noise source includes the minimum entropy, 0.5bit or more per 1bit, by the description in [Rambus 2012], the RDRAND instruction is the output of the DRBG with the security strength of 128 bits which was initialized at the seed of 256 bit entropy from the noise source. The RDRAND instruction is reseeded from the ES after outputting 511 of 128 bits. Thus, the rngd daemon process which constitutes the entropy source collects the RDRAND instruction output of which the seed differs per 16 bytes by compressing $128 \times 512 = 65,536 \text{ bit} = 8,192 \text{ byte}$ acquired by the RDRAND instruction into 16 bytes by the AES-CBC-MAC processing, and temporarily compiles almost full entropy data in the three 2,500-byte buffers of rngd. When this TSF is used, the parameters are set such that the Linux PRNG holds more than 2048 bits of entropy, so the 128 bytes of data that the TSF's Hash_DRBG (SHA-512) reads from the Linux PRNG's /dev/urandom output is , which is assumed to be almost full entropy. Of the 128 bytes, 96 bytes are used as Entropy Input and Nonce, and are supplied as a seed value for Hash_DRBG(SHA-512). From the Minimum entropy estimate in Section 6 of NIST SP800-90B, the TSF developer confirmed that the /dev/urandom output included the minimum entropy, 0.91 bits or more per 1 bit, within the TOE operation conditions range. Even if it is pessimistically estimated that it is not full entropy, it is estimated that the 96-byte bit string of the /dev/urandom output contains $698.88 (=96 \times 0.91)$ bits of entropy by evaluating the lower limit of the amount of entropy according to Section 3.1.5 of NIST SP800-90B.

FCS_RGB_EXT.1 (a) is realized by making this bit string as the Entropy Input and Nonce and supplying the seed value to Hash_DRBG (SHA-512).

[Relevant TSFI]

- Control Panel: Power key (Only for the first start-up after TOE establishment)
- Others: Main switch (Only for the first start-up after TOE establishment)

FCS_RBG_EXT.1(b)

The TSF generates a random number using an entropy source and DRBG to protect the communication data of FTP_ITC.1, FTP_TRP.1(a) and FTP_TRP.1(b) at the time of server key generation for TLS communication and negotiation of TLS communication. The DRBG generates a random number using CTR_DRBG (AES) according to NIST SP 800-90A. This CTR_DRBG (AES) uses the Entropy Input and Nonce as the seed materials to use the derivation function. This nested chain of the DRBG consists of two CTR_DRBG(AES) according to the entropy source construction method in Chapter 6 of NIST SP800-90C. The entropy source and the inner part of the nested chain are called as the master DRBG and the outer part of the nested chain, which outputs random numbers used for key generation, etc., is called as the private DRBG. The entropy source includes a hardware-based noise source, and outputs an entropy input which has at least 128-bit entropy and Nonce which has 64-bit entropy from the entropy source to DRBG according to ISO/IEC 18031:2011 Table C.1 “Security Strength Table for Hash Functions”. The noise source uses the ES of the hardware embedded in SoC (Intel Celeron Processor N3350) of the TOE. Output from the noise source is used for seeding the DRBG in SoC, and outputted by the RDRAND instruction after processing according to CTR_DRBG (AES) of NIST SP 800-90A. It is known that the noise source includes the minimum entropy, 0.5bit or more per 1bit, by the description in [Rambus 2012], the RDRAND instruction is the output of the DRBG with the security strength of 128 bits which was initialized at the seed of 256 bit entropy from the noise source. The RDRAND instruction is reseeded from the ES after outputting 511 of 128 bits. Thus, the rngd daemon process which constitutes the entropy source collects the RDRAND instruction output of which the seed differs per 16 bytes by compressing $128 \times 512 = 65,536 \text{ bit} = 8,192 \text{ byte}$ acquired by the RDRAND instruction into 16 bytes by the AES-CBC-MAC processing, and temporarily compiles almost full entropy data in the three 2,500-byte buffers of rngd. The necessary entropy is sufficiently supplied from rngd to Linux PRNG. So the 32 byte data read from the /dev/random output of Linux PRNG by the TSF is supposed to be almost full entropy. The TSF developers confirmed that the /dev/random output contains a minimum entropy of more than 0.82 bits per bit over the range of the TOE operating conditions, according to the minimum entropy estimate in Section 6 of NIST SP800-90B. Even if pessimistically estimating that it is not full entropy, it is estimated that the 32-byte bit string of /dev/random output contains $209.92 (= 32 \times 8 \times 0.82)$ bits of entropy, based on a lower bound evaluation of the amount of entropy according to section 3.1.5 of NIST SP800-90B. Similarly, it is estimated that the 16-byte bit string in the /dev/random output contains $104.96 (= 16 \times 8 \times 0.82)$ bits of entropy. By using these bit strings as the Entropy Input and Nonce, respectively, and supplying the seed value to CTR_DRBG(AES) of the master DRBG, the master DRBG has a security strength of 128 bits. Furthermore, CTR_DRBG(AES) of the private DRBG, which receives the 256-bit Entropy Input and 128-bit Nonce seed from the master DRBG, has a security strength of 128 bits, to achieve FCS_RGB_EXT.1(b).

[Relevant TSFI]

- Conform to TSFI of FTP_ITC_EXT.1, FTP_TRP.1(a) and FTP_TRP.1(b)

7.3. Storage Encryption (Conditionally mandatory)

The following describes the summary specifications for the conditional requirements B.1.

FPT_KYP_EXT.1

The following keys constitute the key chain in FCS_KYC_EXT.1 of this TOE.

- Key derivation key

A key derivation key is a 256-bit random number generated by using Hash_DRBG (SHA-512) according to FCS_RBG_EXT.1, and saved to the volatile storage.

- Intermediate key (Output value of FCS_KDF_EXT.1)

An intermediate key is a 256-bit key derived from the key derivation key according to FCS_KDF_EXT.1, and saved to the volatile storage.

- Host authentication key

The value which XORed the 256-bit intermediate key (Output value of FCS_KDF_EXT.1) with the 256-bit value according to FCS_SMC_EXT.1 is used as the host authentication key. This host authentication key is saved to the volatile storage and the FROM. The FROM is a nonvolatile storage which is not field-replaceable.

- Challenge code

A challenge code is a 256-bit random number generated by using the random number generating function in the self-encryption drive, and saved to the volatile storage.

- Response code

A response code is an encrypted value used for encryption of the host authentication key by AES-CBC according to FCS_COP.1(f) using the challenge code as the cryptographic key, and saved to the volatile storage.

- Handling of keys and key material stored on volatile memory

- The TSF stores the key derivation keys, intermediate keys, challenge codes, and response codes in a plain text format in volatile memory, but does not provide access to all users. In addition, these CSPs are erased when the power is turned off.
- TSF stores the host authentication key in FROM in a plain text format, but does not provide access to all users.

FCS_KYC_EXT.1

- Host authentication key generation

An intermediate key is derived from the key derivation key according to FCS_KDF_EXT.1. The key derivation key is a 256-bit random number generated by using Hash_DRBG (SHA-512) according to FCS_RBG_EXT.1(a). The KDF processing prescribed in FCS_KDF_EXT.1 is performed for the key derivation key to derive the intermediate key. In FCS_COP.1(h), HMAC-SHA-512 is selected so that the security strength is maintained to be more than 256 bits. This random number was generated by giving a sufficient entropy amount (256 bits or more) to the DRBG. Then, use the value which XORed the intermediate key with the 256-bit value according to FCS_SMC_EXT.1 as the host authentication key.

- Challenge response authentication

A challenge code is a 256-bit random number generated by using the random number generating function in the self-encryption drive. This challenge code is transmitted to the system control board from the self-encrypting drive. In the system control board, the host authentication key is encrypted by AES-CBC according to FCS_COP.1(f) by making the challenge code as the cryptographic key. The encrypted value is sent to the self-encrypting drive from the system control board as the 256-bit response code. The BEV of the key chain in this TOE is this response code.

From the above, the security strength more than 256 bits is secured in each phase of the key chain.

[Relevant TSFI]

- Control Panel: Power key
- Others: Main switch

FDP_DSK_EXT.1

The TSF encrypts the user data and confidential TSF data by saving them to the self-encrypting drive (JCMVP authentication No.: F0022). A host authentication key is saved to the MFP and self-encrypting drive when the MFP is configured as the TOE. This host authentication key is used so that the self-encrypting drive authenticates the system control board per power on. If authentication successfully finishes, data writing to the self-encrypting drive is enabled and the written data is automatically encrypted. There is no area which cannot be encrypted in the self-encrypting drive area used by the TOE. All the user data are encrypted and saved.

[Relevant TSFI]

- Conform to TSFI of FDP_ACC.1/FDP_ACF.1 and FMT_SMF.1.

7.4. Storage Encryption (Selective requirements)

The following describes the summary specifications for the requirements D.4 selected in Storage Encryption.

FCS_COP.1(f)

TSF encrypts the random numbers generated by the random number generator in the self-encrypting drive (hereinafter referred to as "challenge code") with AES-CBC, a combination of ISO/IEC 18033-3 AES and ISO/IEC 10116 CBC, using the host authentication key as the encryption key each time the power is activated. The value in which the challenge code is encrypted is sent to the system control board from the self-encrypting drive of the TOE. The system control board encrypts the host authentication key by AES-CBC by using the challenge code as the key encryption key. The value in which the host authentication key is encrypted is sent to the self-encrypting drive from the system control board of the TOE.

[Relevant TSFI]

- Control Panel: Power key
- Others: Main switch

FCS_KDF_EXT.1

The TSF derives the intermediate key by the method conforms to KDF in Counter Mode of NIST SP800-108 using the random number which was generated by the random number generator at Hash_DRBG (SHA-512) according to FCS_RBG_EXT.1(a) as a sub mask with the hash function with a key according to FCS_COP.1(h)

[Relevant TSFI]

- Control Panel: Power key (Only for the first start-up after TOE establishment)
- Others: Main switch (Only for the first start-up after TOE establishment)

FCS_SMC_EXT.1

The TSF function outputs the value which XORed the intermediate key outputted by FCS_KDF_EXT.1 with the 256-bit value. This value is used as the host authentication key.

[Relevant TSFI]

- Control Panel: Power key (Only for the first start-up after TOE establishment)
- Others: Main switch (Only for the first start-up after TOE establishment)

FCS_COP.1(h)

The TSF uses HMAC-SHA-512 which conforms to ISO/IEC 9797-2:2011, Section 7 “MAC Algorithm 2”, and ISO/IEC 10118 for calculating the hash message function with a key in FCS_KDF_EXT.1 during derivation of the intermediate key from the key derivation key. The HMAC key length is 256 bits, hash function is SHA-512, block length is 512 bits, and outputted MAC length is 512 bits.

[Relevant TSFI]

- Control Panel: Power key (Only for the first start-up after TOE establishment)
- Others: Main switch (Only for the first start-up after TOE establishment)

7.5. Communication Protection (Selective requirements)

The following describes the summary specifications for the selective requirements D.2.

FCS_TLS_EXT.1

The TSF supports the TLS communication for communication with each type of servers mentioned in FTP_ITC.1 and communication with the client PC mentioned in FTP_TRP.1(a)/FTP_TRP.1(b). The TLS communication supported by the TSF is TLS1.2 (RFC 5246).

- TLS_RSA_WITH_AES_128_CBC_SHA
- TLS_RSA_WITH_AES_256_CBC_SHA
- TLS_RSA_WITH_AES_128_CBC_SHA256
- TLS_RSA_WITH_AES_256_CBC_SHA256

Communication between TSF and Client PC

- The TSF generates the server secret key and public key of the RSA used for the TLS communication according to FCS_RBG_EXT.1(b) and FCS_CKM.1(a). The signature of the server certificate is generated by using the secret key and hash algorithm according to FCS_COP.1(b) and FCS_COP.1(c).
- The following shows how to share the secret random number data.
 - ◇ The TSF decrypts the secret random number encrypted by the RSA public key which was sent from the client PC using the server secret key. The TSF generates the session key and HMAC key from the secret random number through the pseudo random function (PRF) using the hashing (HMAC) with a key for message authentication according to FCS_COP.1(c) and FCS_COP.1(g).
- The following shows how to encrypt and verify the communication data.
 - ◇ The TSF verifies alteration of the communication data by using the HMAC key according to FCS_COP.1(c) and FCS_COP.1(g).
 - ◇ The TSF encrypts and decrypts the communication data in the AES-CBC mode according to FCS_COP.1 (a).

[Relevant TSFI]

- Conform to TSFI of FTP_TRP.1(a) and FTP_TRP.1(b).

Communication between TSF and Servers

- The following shows how TSF verifies the digital signature of the server certificate sent from various servers.
 - ◇ TSF calculates the hash value for server certificate verification according to FCS_COP.1(c).

- ◇ TSF decrypts the digital signature of the server certificate by RSA signature verification according to FCS_COP.1 (b), and verifies the tampering of the server certificate by comparing it with the hash value for server certificate verification described above.
- The following shows how to share the secret random number data.
 - ◇ The TSF generates a secret random number according to FCS_RBG_EXT.1(b) for generating the session key and HMAC key.
 - ◇ The TSF encrypts the secret random number using the RSA server public key which was sent from each server. The TSF generates the session key and HMAC key from the secret random number through the pseudo random function using the hashing (HMAC) with a key for message authentication according to FCS_COP.1(c) and FCS_COP.1(g).
- The following shows how to encrypt and verify the communication data.
 - ◇ The TSF verifies alteration of the communication data by using the HMAC key according to FCS_COP.1(c) and FCS_COP.1(g).
 - ◇ The TSF encrypts and decrypts the communication data in the AES-CBC mode according to FCS_COP.1 (a).

[Relevant TSFI]

- Conform to TSFI of FTP_ITC.1.

Communication between TSF and Client PC using IPPS

- The TSF generates the server secret key and public key of the RSA used for the TLS communication according to FCS_RBG_EXT.1(b) and FCS_CKM.1(a). The signature of the server certificate is generated by using the secret key and hash algorithm according to FCS_COP.1(b) and FCS_COP.1(c).
- The TSF decrypts the secret random number encrypted by the RSA public key which was sent from the client PC using the server secret key. The TSF generates the session key and HMAC key from the secret random number through the pseudo random function using the hashing (HMAC) with a key for message authentication according to FCS_COP.1(c) and FCS_COP.1(g).
- The TSF verifies alteration of the communication data by using the HMAC key according to FCS_COP.1(c) and FCS_COP.1(g).
- The TSF encrypts and decrypts the communication data in the AES-CBC mode according to FCS_COP.1(a).

[Relevant TSFI]

- Printer Driver:Interface to a Print request

FCS_HTTPS_EXT.1

The HTTP protocol which complies with RFC2818 is implemented so as to establish the trusted communication path between the TOE and the remote users. FCS_HTTPS_EXT.1 is realized by enabling the HTTPS communication using the TLS protocol which is specified at FCS_TLS_EXT.1.

[Relevant TSFI]

- TopAccess: Login, Job status, Account, User management, Admin settings

FCS_COP.1(g)

The TSF is used for the pseudo random function (PRF) which is used for generating the session key and HMAC key from a secret random number during the TLS communication. The TSF is also used

for verifying alteration of the communication data in TLS communication. The Keyed-Hash Message Authentication is performed according to HMAC-SHA-1 with a message length and key length of 160 bits and HMAC-SHA256 with a message length and key length of 256 bits that satisfy FIPS PUB 198-1 “The Keyed-Hash Message Authentication Code” and FIPS PUB 180-3 “Secure Hash Standard”. The hash function used at this time conforms to FCS_COP.1(c). From the above, FCS_COP.1(g) is realized.

[Relevant TSFI]

- Conform to FTP_TRP.1(a), FTP_TRP.1(b) and FTP_ITC.1

7.6. Trusted Update (Selective requirements)

The following describes the summary specifications for the selective requirements D.3.

FCS_COP.1(c)

A digital signature must be attached to the firmware to verify the authenticity of the firmware during firmware update at FPT_TUD_EXT.1. The cryptographic hash function conforms to SHA-256 which complies with ISO/IEC 10118-3:2004. The TSF performs signature generation or verification of the server certificate for TLS communication according to FCS_TLS_EXT.1. The cryptographic hash function used in that case complies with SHA-1, SHA-256, SHA-384 or SHA-512 conforming to ISO/IEC 10118-3:2004. The TSF authenticates the hash message with a key according to FCS_COP.1(g) during verification of the communication data integrity. The cryptographic hash function which is used at that time conforms to SHA-1 and SHA-256 which comply with ISO/IEC 10118-3:2004. The TSF authenticates the hash message with a key according to FCS_COP.1(h) during generation of the host authentication key. The cryptographic hash function which is used at that time conforms to SHA-512 which comply with ISO/IEC 10118-3:2004.

From the above, FCS_COP.1(c) is realized.

[Relevant TSFI]

- Conform to FTP_TRP.1(a), FTP_TRP.1(b) and FTP_ITC.1

7.7. User Data Protection

The following describes the summary specifications for the requirements for Class FDP.

FDP_ACC.1/FDP_ACF.1

The TOE performs access control for the user document data and operation for the user document data. Access control for the user document data allows access only when the user ID linked to the document data matched the user ID of a user who has been identified and authenticated at login. The access control for the user document operation is performed according to the roles retained by the user as shown in **Table 13** and **Table 14**.

FCC_ACC.1 and FDP.AFC.1 are realized by the access control shown in the table below.

Table 23 Print Access Control for D.USER.DOC

| User | Access Control Rules |
|--|--|
| Job Owner | <ul style="list-style-type: none"> • Assign U.ADMIN(a) and U.NORMAL(a) as the Job owners who submit the documents to be printed. • Allow browse and output of the documents submitted by the Job Owner. • Deny modification of the documents submitted by the Job Owner. • Allow deletion of the documents submitted by the Job Owner. |
| U.ADMIN(a) | <ul style="list-style-type: none"> • Allow submission of the documents to be printed. • Deny browse of the print documents submitted by other users. • Deny modification of the print documents submitted by other users. • Allow deletion of the print documents stored by other users. |
| U.NORMAL(a) | <ul style="list-style-type: none"> • Allow submission of the documents to be printed. • Deny browse of the print documents submitted by other users. • Deny modification of the print documents submitted by other users. • Deny deletion of the print documents stored by other users. |
| U.ACCOUNTMANAGER U.FAXOPERATOR U.ADDRESSBOOKOPERATOR | <ul style="list-style-type: none"> • Deny submission of the documents to be printed. • Deny browse of all submitted print documents. • Deny modification of all submitted print documents. • Deny deletion of all stored print documents. |
| Unauthorized User | <ul style="list-style-type: none"> • Allow the print documents submitted by the identified U.ADMIN(a) and U.NORMAL(a). • Deny browse of all submitted print documents. • Deny modification of all submitted print documents. • Deny deletion of all stored print documents. |

[Relevant TSFI]

- Control Panel: Print
- Printer Driver: Interface to a Print request

Table 24 Scan Access Control for D.USER.DOC

| User | Access Control Rules |
|------------|--|
| Job Owner | <ul style="list-style-type: none"> • Assign U.NORMAL(a) as the Job owner who submits the document to be scanned. • Allow browse of the images scanned by the Job Owner. • Allow modification and deletion of the image scanned by the Job Owner. |
| U.ADMIN(a) | <ul style="list-style-type: none"> • Allow submission of the documents to be scanned. • Deny browse of the images scanned by other users. • Deny modification of the images scanned by all users. • Allow deletion of the images scanned by the self and deny deletion of the images scanned by other users. |

| User | Access Control Rules |
|--|---|
| U.NORMAL(a) | <ul style="list-style-type: none"> • Allow submission of the documents to be scanned. • Deny browse of the images scanned by other users. • Deny modification and deletion of images scanned by other users. |
| U.ACCOUNTMANAGER U.FAXOPERATOR U.ADDRESSBOOKOPERATOR | <ul style="list-style-type: none"> • Deny submission of the documents to be scanned. • Deny browse of all scanned images. • Deny modification and deletion of the images scanned by all users. |
| Unauthorized User | <ul style="list-style-type: none"> • Deny submission of the documents to be scanned. • Deny browse of all scanned images. • Deny modification and deletion of all scanned images. |

[Relevant TSFI]

- Control Panel: Scan, Simple Scan

Table 25 Copy Access Control for D.USER.DOC

| User | Access Control Rules |
|--|---|
| Job Owner | <ul style="list-style-type: none"> • Assign U.ADMIN(a) and U.NORMAL(a) as the Job owners who submit the documents to be copied. • Allow output of the copied documents printed by the Job Owner. • Deny modification of images saved by the job owner. • Allow deletion of images saved by the job owner. |
| U.ADMIN(a) | <ul style="list-style-type: none"> • Allow submission of the documents to be copied. • Deny browse of the images copied by the other users. • Deny modification of the images copied and saved by the other users. • Allow deletion of the images copied and saved by the other users. |
| U.NORMAL(a) | <ul style="list-style-type: none"> • Allow submission of the documents to be copied. • Deny browse of the images copied by the other users. • Deny modification of the images copied and saved by the other users. • Deny deletion of the images copied and saved by the other users. |
| U.ACCOUNTMANAGER U.FAXOPERATOR U.ADDRESSBOOKOPERATOR | <ul style="list-style-type: none"> • Deny submission of the documents to be copied. • Deny browse of all copied images. • Deny modification of all copied and saved images. • Deny deletion of all copied and saved images. |
| Unauthorized User | <ul style="list-style-type: none"> • Deny submission of the documents to be copied. • Deny browse of all copied images. • Deny modification of all copied and saved images. • Deny deletion of all copied and saved images. |

[Relevant TSFI]

- Control Panel: Copy, Simple Copy, Job display and Log display

Table 26 Fax Transmission Access Control for D.USER.DOC

| User | Access Control Rules |
|---|---|
| Job Owner | <ul style="list-style-type: none"> • Assign U.ADMIN(a), U.NORMAL(a) and U.FAXOPERATOR as the Job owners of Fax transmission documents. • Allow browse of the images scanned by the Job Owner. • Allow modification of the images saved by the job owner. • Allow deletion of the images saved by the job owner. |
| U.ADMIN(a) | <ul style="list-style-type: none"> • Allow submission of Fax transmission documents. • Deny browse of the images scanned by the other users. • Deny modification of the images saved by the other users. • Allow deletion of the images saved by the other users. |
| U.NORMAL(a) U.FAXOPERATOR | <ul style="list-style-type: none"> • Allow submission of Fax transmission documents. • Deny browse of the images scanned by other users. • Deny modification of images saved by the other users. • Deny deletion of images saved by the other users. |
| U.ACCOUNTMANAGER U.ADDRESSBOOKOPERATOR | <ul style="list-style-type: none"> • Deny submission of Fax transmission documents. • Deny browse of all scanned images. • Deny modification of all saved images. • Deny deletion of all saved images. |
| Unauthorized User | <ul style="list-style-type: none"> • Deny submission of Fax transmission documents. • Deny browse of all scanned images. • Deny modification of all saved images. • Deny deletion of all saved images. |

[Relevant TSFI]

- Control Panel: Fax, Job display and Log display

Table 27 Fax Reception Access Control for D.USER.DOC

| User | Access Control Rules |
|--|--|
| Job Owner | <ul style="list-style-type: none"> • Assign U.ADMIN(a) and U.FAXOPERATOR as the Job owners of Fax-received documents. • Allow browse and print of all Fax-received documents. • Deny modification of all Fax-received documents. • Allow deletion of all Fax-received documents. |
| U.ADMIN(a) U.FAXOPERATOR | <ul style="list-style-type: none"> • Allow all Fax receptions regardless of the user's operation. • Allow browse and print of all Fax-received documents. • Deny modification of all Fax-received documents. • Allow deletion of all Fax-received documents. |
| U.NORMAL(a) U.ACCOUNTMANAGER U.ADDRESSBOOKOPERATOR | <ul style="list-style-type: none"> • Allow all Fax receptions regardless of the user's operation. • Deny browse and print of all Fax-received images. • Deny modification of all Fax-received images. • Deny deletion of all Fax-received images. |
| Unauthorized User | <ul style="list-style-type: none"> • Allow all Fax receptions regardless of the user's operation. • Deny browse and print of all Fax-received images. • Deny modification of all Fax-received images. • Deny deletion of all Fax-received images. |

| User | Access Control Rules |
|------|--|
| None | <ul style="list-style-type: none"> All Fax-received images are received from the outside of the TOE regardless of the user's operation. |

[Relevant TSFI]

- Control Panel: Print
- Others: PSTN Fax Interface

Table 28 Print Access Control for D.USERJOB

| User | Access Control Rules |
|--|---|
| Job Owner | <ul style="list-style-type: none"> Assign U.ADMIN(a) and U.NORMAL(a) as the Job owners of the jobs printed by themselves. |
| U.ADMIN(a) | <ul style="list-style-type: none"> Allow creation of the print jobs. Allow browse of all print jobs. Deny modification of all print jobs. Allow cancel of all print jobs. |
| U.NORMAL(a) | <ul style="list-style-type: none"> Allow creation of the print jobs. Allow browse of all print jobs. Deny modification of all print jobs. Allow cancel of own print jobs, but deny cancel of other users' print jobs. |
| U.ACCOUNTMANAGER U.FAXOPERATOR U.ADDRESSBOOKOPERATOR | <ul style="list-style-type: none"> Deny creation of the print jobs. Allow browse of all print jobs. Deny modification of all print jobs. Deny cancel of all print jobs. |
| Unauthorized User | <ul style="list-style-type: none"> Allow creation of print jobs by the identified U.ADMIN(a) and U.NORMAL(a). Allow creation of the print jobs. Deny browse of all print jobs. Deny modification of all print jobs. Deny cancel of all print jobs. |

[Relevant TSFI]

- Control Panel: Print, Job display and Log display
- TopAccess: Job status
- Printer Driver: Interface to a Print request

Table 29 Scan Access Control for D.USERJOB

| User | Access Control Rules |
|-------------|--|
| Job Owner | <ul style="list-style-type: none"> Assign U.ADMIN(a) and U.NORMAL(a) as the Job owners of the jobs scanned by themselves. |
| U.ADMIN(a) | <ul style="list-style-type: none"> Allow creation of the scanned jobs. Allow browse of all scanned jobs. Deny modification of all scanned jobs. Allow cancel of all scanned jobs. |
| U.NORMAL(a) | <ul style="list-style-type: none"> Allow creation of the scanned jobs. Allow browse of all scanned jobs. Deny modification of all scanned jobs. Allow cancel of own scanned jobs, but deny cancel of other users' scanned job. |

| User | Access Control Rules |
|--|---|
| U.ACCOUNTMANAGER U.ADDRESSBOOKOPERATOR U.FAXOPERATOR | <ul style="list-style-type: none"> • Deny creation of the scanned jobs. • Allow browse of all scanned jobs. • Deny modification of all scanned jobs. • Deny cancel of all scanned jobs. |
| Unauthorized User | <ul style="list-style-type: none"> • Deny creation of the scanned jobs. • Deny browse of all scanned jobs. • Deny modification of all scanned jobs. • Deny cancel of all scanned jobs. |

[Relevant TSFI]

- Control Panel: Scan, Simple Scan, Job display and Log display
- TopAccess: Job status

Table 30 Copy Access Control for D.USER.JOB

| User | Access Control Rules |
|--|--|
| Job Owner | <ul style="list-style-type: none"> • Assign U.ADMIN(a) and U.NORMAL(a) as the Job owners of the copy jobs executed by themselves. |
| U.ADMIN(a) | <ul style="list-style-type: none"> • Allow creation of the copy jobs. • Allow browse of all copy jobs. • Deny modification of all copy jobs. • Allow cancel of all copy jobs. |
| U.NORMAL(a) | <ul style="list-style-type: none"> • Allow creation of the copy jobs. • Allow browse of all copy jobs. • Deny modification of all copy jobs. • Allow cancel of own copy jobs, but deny cancel of other users' copy jobs. |
| U.ACCOUNTMANAGER U.FAXOPERATOR U.ADDRESSBOOKOPERATOR | <ul style="list-style-type: none"> • Deny creation of the copy jobs. • Allow browse of all copy jobs. • Deny modification of all copy jobs. • Deny cancel of all copy jobs. |
| Unauthorized User | <ul style="list-style-type: none"> • Deny creation of the copy jobs. • Deny browse of all copy jobs. • Deny modification of all copy jobs. • Deny cancel of all copy jobs. |

[Relevant TSFI]

- Control Panel: Copy, Simple Copy, Job display and Log display
- TopAccess: Job status

Table 31 Fax Transmission Access Control for D.USER.JOB

| User | Access Control Rules |
|------------|---|
| Job Owner | <ul style="list-style-type: none"> • Assign U.ADMIN(a), U.NORMAL(a), and U.FAXOPERATOR as the Job owners of the fax transmission jobs executed by themselves. |
| U.ADMIN(a) | <ul style="list-style-type: none"> • Allow creation of Fax transmission jobs. • Allow browse of all Fax transmission jobs. • Deny modification of all Fax transmission jobs. • Allow cancel of all Fax transmission jobs. |

| User | Access Control Rules |
|---|--|
| U.NORMAL(a) | <ul style="list-style-type: none"> • Allow creation of Fax transmission jobs. • Allow browse of all Fax transmission jobs. • Deny modification of all Fax transmission jobs. • Allow cancel of own Fax transmission jobs, but deny cancel of other users' Fax transmission jobs. |
| U.ACCOUNTMANAGER U.ADDRESSBOOKOPERATOR | <ul style="list-style-type: none"> • Deny creation of Fax transmission jobs. • Allow browse of all Fax transmission jobs. • Deny modification of all Fax transmission jobs. • Deny cancel of all Fax transmission jobs. |
| U.FAXOPERATOR | <ul style="list-style-type: none"> • Allow creation of Fax transmission jobs. • Allow browse of all Fax transmission jobs. • Deny modification of all Fax transmission jobs. • Allow cancel of own Fax transmission jobs, but deny cancel of other users' Fax transmission jobs. |
| Unauthorized User | <ul style="list-style-type: none"> • Deny creation of Fax transmission jobs. • Deny browse of all Fax transmission jobs. • Deny modification of all Fax transmission jobs. • Deny cancel of all Fax transmission jobs. |

[Relevant TSFI]

- Control Panel: Fax transmission, Job display and Log display
- TopAccess: Job status

Table 32 Fax Reception Access Control for D.USERJOB

| User | Access Control Rules |
|--|---|
| Job Owner | <ul style="list-style-type: none"> • Assign U.ADMIN(a) and U.FAXOPERATOR as the Job owners of the fax reception jobs executed by themselves. |
| U.ADMIN(a) U.FAXOPERATOR | <ul style="list-style-type: none"> • Allow creation of all Fax-received Jobs regardless of the user's operation. • Allow browse of all Fax-received Jobs. • Deny modification of all Fax-received Jobs. • Deny cancellation of all incoming fax jobs. |
| U.NORMAL(a) U.ACCOUNTMANAGER U.ADDRESSBOOKOPERATOR | <ul style="list-style-type: none"> • Allow creation of all Fax-received Jobs regardless of the user's operation. • Deny browse of all Fax-received Jobs. • Deny modification of all Fax-received Jobs. • Deny cancel of all Fax-received Jobs. |
| Unauthorized User | <ul style="list-style-type: none"> • Allow creation of all incoming fax jobs regardless of user operation. • Deny browse of all Fax-received Jobs. • Deny modification of all Fax-received Jobs. • Deny cancel of all Fax-received Jobs. |

[Relevant TSFI]

- Control Panel: Job display and Log display
- TopAccess: Job status
- Others: PSTN Fax Interface

7.8. PSTN Fax-Network Separation

The following describes the summary specifications for the conditional requirements B.2.

FDP_FXS_EXT.1

Fax transmission and reception are only the functions of the Fax modem.

The Fax interface of the TOE is used only for transmission and reception of the Fax document data with the external Fax machines, and is not used for other purposes.

The Fax interface of the TOE supports only ITU-T-compliant G3 as the transmission/reception protocol. Thus, only transmission and reception using the Fax protocol are accepted in communication between the TOE and PSTN. However, communication in which the negotiation with Phase B is not established does not move to the subsequent phase and fails in the communication error, so the TOE disconnects the communication line.

From the above, bridge connection between the PSTN and LAN is prohibited.

[Relevant TSFI]

- Others: PSTN Fax Interface

7.9. Identification and Authentication

The following describes the summary specifications for the requirements for Class FIA.

FIA_AFL.1

- When the user logs in from the control panel and TopAccess, the TOE locks out the user ID for a predetermined time when the number of authentication failures counted from the last successful authentication or login after account unlocking reaches the number of times (1 to 30) set by U.ADMIN (a).
- The function which releases the locked-out state of a user is provided for the U.ADMIN(a) and U.ACCOUNTMANAGER.

[Relevant TSFI]

- Control Panel: Login
- TopAccess: Login, Admin settings

FIA_ATD.1

- The TOE associates the user ID and role with a user as the security attributes and registers and maintains them.

[Relevant TSFI]

- TopAccess: User management

FIA_PMG_EXT.1

The TOE provides the function to investigate the user password at registration and change of the password. Any combination of the following characters is allowed as a password: Upper and lower case letters, numbers, punctuation marks (+, -, . / : ; = ? ¥ _ ` { | } ~ space), special characters (! @#\$%^*()), and European special characters (characters with the German umlauts and French cedilla: See **Table 15** for details.). It is also possible to set the minimum number of digits for a password to more than 15 letters by the U.ADMIN(a).

[Relevant TSFI]

- Control Panel: Home screen, Login, Admin settings
- TopAccess: Login, Account

FIA_UAU.7

If a user enters a password on the control panel, the TOE displays “●” as dummy characters on the control panel instead of the entered characters. Similarly, in the case that a user enters a password from the web browser, alternative characters are displayed instead of the entered characters. The alternative characters depend on the browser used by the user.

[Relevant TSFI]

- Control Panel: Login
- TopAccess: Login

FIA_UAU.1/FIA_UID.1

The TOE requires identification and authentication of a user. Identification and authentication of a user are executed to the user account database. If the user ID and password do not match the credential data which is internally saved, login is denied and an input prompt is displayed again for the user. The user ID of a job owner is associated with a print job performed from the client PC through the printer driver. The TOE identifies the user ID upon reception of a print job, and stores the print job in the print hold queue.

Also, the TOE saves a fax-received job internally without performing identification and authentication of the job.

[Relevant TSFI]

- Control Panel: Login
- TopAccess: Login
- Printer driver: Interface to a Print request
- Others: PSTN Fax Interface

FIA_USB.1

The TOE associates a user with the user ID and role if identification and authentication are successfully finished.

[Relevant TSFI]

- Control Panel: Login
- TopAccess: Login

7.10. Security Management

The following describes the summary specifications for the requirements for Class FMT.

FMT_MOF.1

The TOE provides the U.ADMIN(a) only with the function which switches the Enable/Disable settings for secure channel function.

[Relevant TSFI]

- Control Panel: Admin settings
- TopAccess: Admin settings

FMT_MSA.1

The TOE provides the U.ADMIN(a) with the following functions.

- Creation, change, inquiry, deletion, and export of all user IDs
- Creation, change, inquiry, deletion, and export of all roles

The TOE provides the U.ACCOUNTMANAGER with the following functions.

- Inquiry and export of all user IDs
- Creation, change, and deletion of the user IDs except for the U.ADMIN(a)
- Creation, change and deletion of the roles except for the U.ADMIN(a)

The TOE provides the U.NORMAL and U.ADDRESSBOOKOPERATOR with the following functions.

- Inquiry of own user ID
- Inquiry of own role

[Relevant TSFI]

- TopAccess: User management

FMT_MSA.3

When a new D.USER.DOC and D.USER.JOB are created, the TOE assigns the user ID of the user who created them as the initial value of the security attribute.

The TOE does not provide the function which overwrites the initial value of the user ID which is the security attribute when the D.USER.DOC and D.USER.JOB are created.

[Relevant TSFI]

- Control Panel: Copy, Simple Copy, Scan, Simple Scan, Fax transmission
- TopAccess: User management
- Printer Driver: Interface to a Print request

FMT_MTD.1

The TOE provides the U.ADMIN(a) with the following operation functions.

- Change and export of the user password for the U.ADMIN(a).
- Change and export of the user password for the U.ACCOUNTMANAGER.
- Change and export of the user password for the U.ADDRESSBOOKOPERATOR.
- Change and export of the user password for the U.NORMAL.
- Change of the Allowable Number of entry for Login Password.
- Change of the lockout time.
- Status clear for all locked-out accounts.
- Change of the auto logout time.
- Change of the date and time information.
- Change of the minimum password length.
- Creation, change, and deletion of the address book.
- Change of the SYSLOG server settings.
- Change of the FTP server settings.
- Software version check and update

The TOE provides the U.ACCOUNTMANAGER with the following operation functions.

- Change and export of the user password for the U.ACCOUNTMANAGER.
- Change and export of the user password for the U.ADDRESSBOOKOPERATOR.
- Change and export of the user password for the U.NORMAL.
- Status clear for the locked-out accounts other than the U.ADMIN(a).

The TOE provides the U.NORMAL with the following operation functions.

- Change of the own user password.

The TOE provides the U.ADDRESSBOOKOPERATOR with the following operation functions.

- Change of the own user password.

[Relevant TSFI]

- Control Panel: Login, Home screen, Job display and Log display, Admin settings
- TopAccess: Login, Account, User management, Admin settings

FMT_SMF.1

The TOE provides the following security management functions to realize FMT_SMF.1.

Time Stamp Settings Management:

- Change operation of the date and time information by the U.ADMIN(a).

User ID Management:

- Change operation of the user ID by the U.ADMIN(a) or U.ACCOUNTMANAGER.

User Password Management:

- Change and export operation of the user password for U.ACCOUNTMANAGER, U.NORMAL, U.ADMIN(a) and U.ADDRESSBOOKOPERATOR by the U.ADMIN(a).
- Change and export operation of the user password for the U.ACCOUNTMANAGER, U.NORMAL, and U.ADDRESSBOOKOPERATOR by the U.ACCOUNTMANAGER.
- Change operation of the own user password by the U.NORMAL.
- Change operation of the user password by the U.ADDRESSBOOKOPERATOR.

Unsuccessful User Authentication Processing Management:

- Change operation of the number of entries of the login password by the U.ADMIN(a).
- Change operation of the lockout time by the U.ADMIN(a).
- Locked-out account status clear operation by the U.ADMIN(a) or U.ACCOUNTMANAGER.

Minimum Password Length Management:

- Change operation of the minimum password length by the U.ADMIN(a).

Specification of the inactive predetermined time for the user after the session is finished:

- Change operation of the auto logout time by the U.ADMIN(a).

Secure Channel Settings:

- Change operation of the Enable/Disable settings for TLS communication by the U.ADMIN(a).

Address Book Management:

- Change operation of the Address Book by the U.ADMIN(a).

SYSLOG Server:

- Change operation of the SYSLOG server settings by the U.ADMIN(a).

FTP Server:

- Change operation of the FTP server settings by the U.ADMIN(a).

Software:

- Software version confirmation and update by U.ADMIN(a).

[Relevant TSFI]

- Control Panel: Login, Home screen, Job display and Log display, Admin settings
- TopAccess: Login, Account, User management, Admin settings

FMT_SMR.1

The TOE retains a role related to the U.ADMIN(a), U.ACCOUNTMANAGER, U.NORMAL, and U.ADDRESSBOOKOPERATOR, and associates the role with the applicable user when a user is registered.

[Relevant TSFI]

- TopAccess: User management

7.11. Protection of the TSF

The following describes the summary specifications for the requirements for Class FPT.

FPT_SKP_EXT.1

- The TSF stores the encrypted server secret key in the self-encrypting drive, but does not provide a function to access all users.
- The TSF stores the key derivation keys, intermediate keys, challenge codes, and response codes in a plain text format in volatile memory, but does not provide access to all users. In addition, these CSPs are erased when the power is turned off.
- The TSF saves the host authentication key to the FROM in the plain text, but does not provide a function to access all users.
- The TSF saves the session key and HMAC key for the TLS communication to the volatile memory in the plain text, but does not provide a function to access all users. These common keys are deleted by turning off the power.

From the above, FPT_SKP_EXT.1 is realized.

FPT_STM.1

The TOE uses “Year”, “Month”, “Day”, “Hour”, “Minute”, and “Second”, which are provided by the real clock IC embedded in the TOE for registration of the audit log, as a stamp to realize FPT_STM.1.

[Relevant TSFI]

- Conform to relevant TSFI of FAU_GEN.1, FAU_GEN.2

FPT_TST_EXT.1

The TOE conducts the following self-tests at power on.

- Health test of the firmware
Software that controls the MFP (SYSTEM FIRMWARE and SYSTEM SOFTWARE) implements verification by the electronic signature system which uses RSA as the public key system and SHA-256 as the hash function. Firmware of the printer unit (ENGINE FIRMWARE), scanner unit (SCANNER FIRMWARE), and fax unit (FAX1 FIRMWARE) respectively calculates 16-bit checksum to verify whether firmware is legitimate.
- Health test of the entropy source
Software that controls the MFP (SYSTEM SOFTWARE) starts the rngd process at power on and gets 4096 bytes from /dev/random of Linux PRNG to perform self verification according to NIST SP 800-90B. rngd calls the RDRAND instruction several times by retrying tight loop because

entropy is supplied to Linux PRNG at this time. The SYSTEM SOFTWARE outputs a log of the abnormal detection and terminates the rngd process upon detection of the continuous error (CF=0) 10 times during the call. If the constant monitoring of the process monitoring task detects the termination of the rngd process, Service Call is displayed on the panel, and the TOE stops operation. When the RDRAND instruction is called, the continuous health test is automatically performed by the Online Health Test (OHT) which is embedded in SoC so as to assure that the noise source inside the entropy source is not broken. The frequency of occurrence of the 6-type bit patterns which are from the 1-bit through 4-bit length to the raw output of the noise source, 256 bit, is counted in the test. If the frequency is within the appropriate range, it is recorded as acceptable. If not, it is recorded as rejected. The probability that the identically distributed random numbers are judged as failure is about 1%. On the other hand, it is known by the description in [Rambus 2012] that occurrence of fatal failures, such that the output patterns of the noise source are fixed to 0 or 1 or 0 and 1 appear alternately, are detected. The OHT retains the recent 256 histories. If the results are acceptable more than 129, the RDRAND instruction returns the value together with CF=1. If not, an error is returned by CF=0. Also, the Built in Self Test (BIST) embedded in SoC which is executed automatically at power on confirms that the OHT within SoC and CTR_DRBG work correctly by the known answer so as to verify that the OHT works correctly. If an abnormality is detected in the BIST, the RDRAND instruction always returns an error by CF=0. If an abnormality is detected in the above health test, an error code appears on the control panel, the TOE stops startup, and a user cannot use the TOE. The software TSF implemented in the firmware has verified the integrity of the execution code by the health test of the firmware. The hardware TSF uses the hardware-based noise source in the entropy source. Failures are detected by the verification whether the raw output of the noise source in the entropy source is correct by executing the functions of the health test embedded in SoC during the health test of the entropy source.

From the above, it is substantial as a test which verifies that the TSF works correctly at power on.

[Relevant TSFI]

- Control Panel: Power key
- Others: Main switch

FPT_TUD_EXT.1

The TSF provides the U.ADMIN(a) with the Admin settings screen on the Home screen of the control panel as an interface to confirm the current software version information of the TOE, and the Admin settings screen on the control panel and the admin settings screen in TopAccess as the interfaces to update software.

Also, the TSF provides the digital signature verification function which verifies the authenticity of software to be updated before starting update. The verification method is as follows: Compare the hash value which is decrypted from the digital signature provided in the files of each firmware to be updated (SYSTEM SOTWAER, SYSTEM FIRMWARE, ENGINE FIRMWARE, SCNNER FIRMARE, and FAX1 FIRMWARE) by RSASSA-PSS according to FCS_COP.1(b) and the hash value which is derived from each firmware to be updated by SHA-256 according to FCS_COP.1(c). If the values match, it can be verified that the firmware is correct.

[Relevant TSFI]

- Control Panel: Home screen, Admin settings
- TopAccess: Admin settings

7.12. TOE Access

The following describes the summary specifications for the requirements for Class FTA.

FTA_SSL.3

The TOE forcibly logs the user out if the user does not operate the control panel for a certain period of time. The time can be set from 15 through 150 seconds. Also, a session is forcibly terminated and a user is logged out when the user does not operate for a certain period of time after accessing the TOE through the web browser. The time can be set from 5 through 999 minutes. The TOE does not create an interactive session when submitting a print job from the printer driver, but ends the session immediately after processing a print request.

[Relevant TSFI]

- Control Panel: Login
- TopAccess: Login

7.13. Trusted Path/Channel

The following describes the summary specifications for the requirements for Class FTP.

FTP_ITC.1

The TOE starts communication using TLS1.2 to protect data during communication between each server. In the case that the TOE accesses the mail server, SYSLOG server, and FTP server through the trusted channel, start of the TLS communication is requested to each server.

[Relevant TSFI]

- Control Panel: Power key, Login, Home screen, Copy, Simple Copy, Scan, Simple Scan, Print, Fax transmission, Job display and Log display, Admin settings
- TopAccess: Login, Job status, Account, User management, Admin settings
- Printer Driver: Interface to a Print request
- Others: Main switch, PSTN Fax interface

FTP_TRP.1(a), FTP_TRP.1(b)

The TSF provides the following functions in order to prevent the communication data from leakage and provide the trusted path which detects alteration of the communication data in the communication path among the TOE, remote administrators, and remote users.

Communication with the WEB page:

- Connection is made by the HTTPS network protocol so as to establish the trusted path from the client PC to the web page of the TOE.
- Communication starts only in the case that the connection is made by the HTTPS protocol when a remote administrator and remote user connect to the web page of the TOE from the client PC using the web browser.
- The first administrator authentication, user authentication, and all remote user actions from the client PC are executed only for connection using the HTTPS protocol.

Print from the client PC:

- For printing from the client PC using the printer driver, connection should be made by the TLS communication protocol for establishing the trusted path during connection to the TOE.

[Relevant TSFI]

- TopAccess: Login, Job status, Account, User management, Admin settings
- Printer Driver: Interface to a Print request

Table 33 defines the TSFI related to this Chapter.

Table 33 Definition of TSFI

| TSFI Name | Details |
|------------------------------|---|
| Control Panel | |
| Power key | An interface which starts up and shuts down the MFP by turning off and on the main switch. |
| Login | An interface which identifies and authenticates a user who accesses the MFP from the control panel. |
| Home Screen | An interface which changes the user password and confirms the TOE version. |
| Copy | An interface which copies a document. |
| Simple Copy | An interface which copies a document. |
| Scan | An interface which scans an original as the image data, and previews, deletes, replaces, and inserts the scanned image data, saves the data to the folder in the FTP server, and sends the data to the specified email address. |
| Simple Scan | An interface which scans an original as the image data, and previews and deletes the scanned image data, and sends the data to the specified email address as an attached file. |
| Print | An interface which prints an original which was sent from the client PC and stored in the hold queue of the MFP and fax-received data. |
| Fax Transmission | An interface which scans an original as the image data, and previews, deletes, replaces, and inserts the scanned image data, and performs Fax transmission. |
| Job Display and Log Display | An interface which operates the execution status of Print and Scan and the Address Book data. |
| Admin Settings | An interface by which the Admin performs Security operations, such as change of the Admin password and Address Book data operation. |
| TopAccess | |
| Login | An interface which identifies and authenticates a user who accesses the MFP from the client PC. |
| Job Status | An interface which operates the active print job and scan job. |
| Account | An interface which changes the own password and displays the set role information. |
| User Management | An interface which executes management related to a user, such as registration of the user information. |
| Admin Settings | An interface which performs the MFP settings, such as the Auto Clear setting, and MFP management, such as the password policy setting and import of the Address Book. |
| Printer Driver | |
| Interface to a Print Request | An interface which holds (saves) the print data from the client PC to the MFP. |
| Others | |
| PSTN Fax Interface | An interface which receives the Fax data from the external Fax machines. |
| Main Switch | An interface which turns on the MFP and starts log collection to use the TOE. |

Appendix

This Appendix describes the definition of acronyms and reference documents.

Table 34 Definition of Acronyms

| Abbreviation | Definition |
|--------------|--|
| AES | Advanced Encryption Standard |
| BEV | Border Encryption Value |
| CBC | Cipher Block Chaining |
| CC | Common Criteria |
| cPP | Collaborative Protection Profile |
| CPU | Central Processing Unit |
| DRAM | Dynamic Random Access Memory |
| DRBG | Deterministic Random Bit Generator |
| EE | Encryption Engine |
| FDE | Full Drive Encryption |
| FIPS PUB | Federal Information Processing Standards Publication |
| FRAM | Ferroelectric Random Access Memory |
| FROM | Flash ROM |
| FTP | File Transfer Protocol |
| GCM | Galois Counter Mode |
| HCD | Hardcopy Device |
| HDD | Hard Disk Drive |
| HMAC | Hash Message Authentication Code |
| HTTPS | Hypertext Transfer Protocol over SSL |
| IPP | Internet Printing Protocol |
| IPPS | IPP over SSL |
| IT | Information Technology |
| ISO/IEC | International Organization for Standardization / International Electrotechnical Commission |
| LAN | Local Area Network |
| LCD | Liquid crystal display |
| LED | light emitting diode |
| MFP | Multifunction Product |
| NCU | Network control unit |
| NIC | Network Interface Controller |
| NIST | National Institute of Standards and Technology |
| PC | Personal Computer |
| PP | Protection Profile |
| PSTN | Public Switched Telephone Network |
| RFC | Request for Comments |
| RNG | Random Number Generator |
| RSA | Rivest-Shamir-Adleman |
| SAR | Security Assurance Requirement |
| SFP | Security Function Policy |
| SFR | Security Functional Requirement |
| SHA | Secure Hash Algorithm |
| SMTP | Simple Mail Transfer Protocol |
| Soc | System-on-a-chip |
| TLS | Transport Layer Security |

| Abbreviation | Definition |
|--------------|----------------------------|
| TOE | Target of Evaluation |
| TSF | TOE Security Functionality |

- Reference Documents

- [Rambus 2012]

- ✧ Analysis of Intel's Ivy Bridge Digital Random Number Generator, Cryptography Research a division of Rambus, 2012.
- ✧ Available: <https://www.rambus.com/intel-ivy-bridge-random-number-generator/>.