# Korean National

# Protection Profile for

# Single Sign-On

# V3.1

**2025. 6. 27.**

The certified Protection Profile is written in Korean. This document is a translation of the original from Korean into English.

# Foreword

This Protection Profile has been developed with the support of National Security Research Institute (NSR) under the agreement between National Intelligence Service (NIS) and Ministry of Science and ICT (MSIT). The Protection Profile author converted Part 2, Common Security Requirements of 'Security Requirements for Government V3.0 for the Information Security Systems and Network Devices' and Security Requirements described in 'Single Sign-On Product Testing Criteria(2024-01-15)' in conformity with the Common Criteria. The accurate interpretation of the requirements was made through the advice of the National Cyber Security Center of the National Intelligence Service. The Protection Profile includes application notes which give the additional interpretation and guidance for the evaluation and certification based on the Common Criteria, and the separated guidance supporting document (Korean only) for the Protection Profile is provided.

# Revision History

| Version | Date | Content |
|---|---|---|
| 3.0 | 2022. 10. 14 | o Korean National Protection Profile for Single Sign-On V3.0 First Issue |
| 3.1 | 2025. 6. 27. | o CC:2022 R1 based transition<br>o Others: Reflection of the latest testing criteria, reinforcement of content, correction of editing errors, etc |

# Table of Contents

# 1. PP introduction

## 1.1. PP reference

| | |
|---|---|
| Title | Korean National Protection Profile for Single Sign-On |
| Version | 3.1 |
| Evaluation Assurance Level | EAL1+(ATE_FUN.1) |
| Developer | National Security Research Institute |
| Evaluation Criteria | Common Criteria for Information Technology Security Evaluation |
| Common Criteria version | CC:2022 R1 |
| Certification Number | KECS-PP-1348-2025 |
| Keywords | Single Sign-On, SSO |

## 1.2. TOE overview

### 1.2.1. Single Sign-On overview

'Single Sign-On (SSO)' (hereinafter referred to as "TOE") is used to enable the user to access various business systems and use the service through a single user login without additional login action. The TOE performs user identification and authentication, authentication token(hereinafter referred to as "token") issue and validity verification according to the user authentication policy.

The TOE shall provide the user login capability using various authentication methods (e.g., ID and password, certificate, security card), issue a token during user login, and verify the issued token if accessing another business system after user login. Authentication functions based on ID and password for authorized administrators and authorized end users in the TOE are mandatorily required. For end users, however, authentication functions are only applied when the TOE, not external authentication system, provides them in the initial authentication phase of Single Sign-On.

The primary security features provided by the TOE include user identification and authentication, token issue, storage, verification and destruction. During the generation of authentication token and user Single Sign-On based on the authentication token, the TOE must use a validated cryptographic module whose security and implementation conformance are validated by the Korea Cryptographic Module Validation Program (KCMVP).

### 1.2.2. TOE type and scope

The TOE defined by this Protection Profile is SSO that enables the user to access various business systems through a single user login, and the TOE components are provided in the form of hardware appliance or software.

The agent and the server are the indispensable TOE component defined in this PP. In compliance with PP, the ST author can include a management console or client as an option, if necessary. The TOE is composed of the server that processes user login, manages the token, and sets the policy, etc; and the agent that is installed in each business system performs the function of token issue and verification, etc. In addition, the agent can be one of the 'API type' composed of the library file, the 'process type' composed of the executable file, or a combination of these two types.

If a client or management console is added as a TOE component, the ST author shall define the role of the added component from the viewpoint of 'Single Sign-On'.

This PP defines the minimum mandatory security functional requirements, conditionally mandatory security functional requirements, and optional security functional requirements that shall be provided by the agent and server, which are the indispensable TOE component, and the TOE shall implement those security functional requirements. If a client or management console is added to the ST in compliance with PP, the mandatory security functional requirement, conditionally mandatory security functional requirements, and optional security functional requirement shall be applied to the client and management console according to the application notes.

### 1.2.3. TOE usage and major security features

The TOE performs user identification and authentication to enable the user to access various business systems and use the service through a single user login without additional login action, and the TOE can be supported by user identification and authentication that the external authentication systems(e.g., RADIUS, TACACS, Kerberos, or other authentication server within the organization) provide. The support by the external authentication system, however, is only allowed for the authorized end user.

The TOE provides the security audit function that records and manages a critical events as audit data when activating the security functionality and management function, function of protecting the data that stored in the TSF controlled repository, and TSF protection function including TSF self-testing, etc. In addition, the TOE provides identification and authentication function such as authentication failure handling, mutual authentication between the TOE components, cryptographic support function such as cryptographic key management and cryptographic operation for issuing a token, security management function such as management of security functions behaviour and configuration setting, and the TOE access function to manage the authorized administrator's access session.

In addition, the token requires confidentiality and integrity protection, and the TOE executable code requires integrity protection.

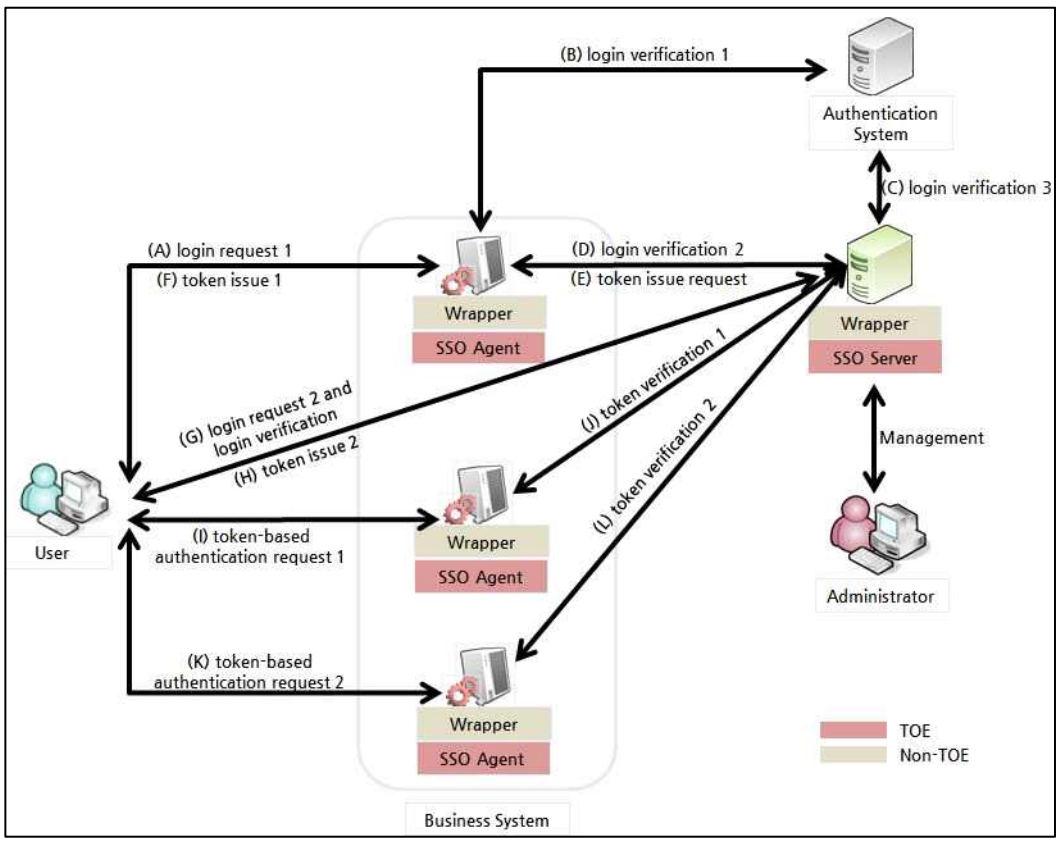
Figure 1 shows the user identification and authentication procedure of the general TOE. The detailed execution procedure can vary depending on the TOE implementation.

The user identification and authentication procedure can be grouped into the initial authentication phase using ID/PW alone or in parallel with ID/PW, certificate, security card, etc., and the token-based authentication phase that accesses the business system using the token issued during the initial authentication procedure. The detailed execution procedure of each authentication phase

can vary according to the implementation of the TOE. The following describes one process among the general authentication procedure.

The execution procedure of the initial authentication phase is as follows. The user requests login by using ID/PW alone or ID/PW and certificate, etc. in parallel, and the SSO agent that receives the login request message sends a login verification request to the SSO server, which in turn checks the authorized user status. Upon receiving the login verification request, the SSO server performs login verification directly using the user information stored in the DBMS, or by interfacing with the authentication system. The SSO server issues a token or requests token issue to the SSO agent if the login verification result is valid. The SSO server or SSO agent transfers an issued token to the user.

The token-based authentication phase is performed only when the token has been normally issued in the initial authentication phase. When the user utilizes business system services, the issued token is transferred to the SSO agent installed in the pertinent business system, and the SSO agent verifies the validity of the token by interfacing with the SSO server upon receiving the token.




[Figure 1] User identification and authentication procedure

The user identification and authentication procedure can be executed with various procedures depending on the TOE implementation. The following table shows the example of operation by phase.

| authentication phase | example of operation procedure |
|---|---|
| initial authentication | (A) login request 1 → (D) login verification 2 → (E) token issue request → (F) token issue 1 |
| | (A) login request 1 → (B) login verification 1 → (C) login verification 3 ↔ (E) token issue request → (F) token issue 1 |
| | (A) login request 1 → (D) login verification 2 → (C) login verification 3 ↔ (E) token issue request → (F) token issue 1 |
| | (G) login request 2 and login verification → (H) token issue 2 |
| | (G) login request 2 and login verification → (E) token issue request → (F) token issue 1 |
| | (G) login request 2 and login verification → (C) login verification 3 ↔ (E) token issue request → (F) token issue 1 |
| token-based authentication | (I) token-based authentication request 1 → (J) token verification 1 |
| | (K) token-based authentication request 2 → (L) token verification 2 |

[Table 1] example of operation procedure by authentication phase

In addition, the subject who issues, stores, and verifies the token can be different, depending on the implementation. The following is an example of the subject who issues, stores, and verifies the token.

- Subject who issues the token: SSO Server, SSO Server + SSO Agent, etc.
- Token storage location: User PC(Web browser/Client), User PC + SSO Agent, etc.
- Subject who verifies the token: SSO Server, SSO Server + SSO Agent, etc.

### 1.2.4. Non-TOE and TOE operational environment

Figure 2 shows the general TOE operational environment. Figure 2 is one of the various operational environments and is composed of the SSO server and SSO agent. The SSO server verifies user login attempts directly using the user information stored in the DBMS, or provides the user login verification resulted from the authentication system (e.g., RADIUS, TACACS, Kerberos, and other authentication servers inside the organization), the token management, and the policy configuration. The SSO agent is installed in each business system and requests user login verification to the SSO server or issues the token. In addition, the SSO agent can be one of the 'API type' composed of the library file, the 'process type' composed of the executable file, or a combination of two types. In addition, the client program that manages the token in the user PC and the management console for the TOE management can be included in the TOE component according to the implementation.

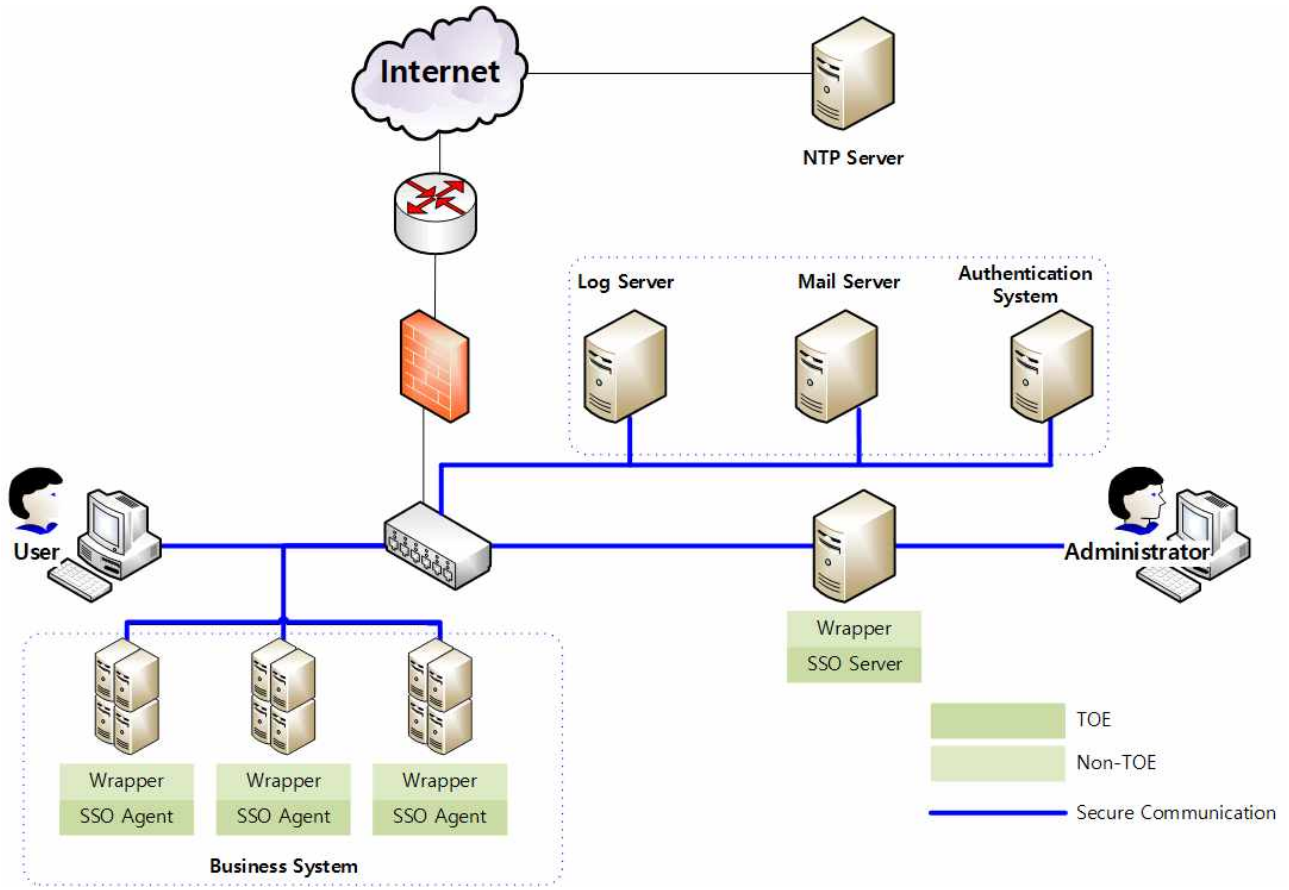
Authorized administrators may perform security management by accessing the SSO server through web browsers or management consoles. Wrappers which may be used to support various types of authentication mechanisms (e.g., OTP, certificate) or for compatibility with business systems in the

TOE operating environment are out of the TOE scope.

Cryptographic communication shall be performed in the communication section among TOE components, and Cryptographic communication shall also be performed when communication between external IT entities except for the NTP server and TOE components is required.

There may exist various external entities necessary for the operation of the TOE, including the NTP server to synchronize time, log server to store the audit data outside and manage the audit data, email server to notify the authorized administrator in case of audit data loss, and the authentication system for the end user identification and authentication.

The ST author complying with this PP, shall describe any external entities that interact with the TOE.




[Figure 2] TOE operational environment

The others, such as the NTP server, log server, email server, and authentication system except for the TOE correspond to the TOE operational environment. In addition, the parts that are not related to a security functional requirement (hereinafter referred to as "SFR"), e.g., functions that are irrelevant to the TOE security functionality, considering the physical components of the TOE, can be either 'excluded from the scope of the TOE' or 'included in the scope of the TOE but classified as non-TSF'.

The ST author shall include FAU_STG.2, which is the conditionally mandatory security functional requirement, in the ST if the TOE implements the protected audit trail storage function. If this

function is not implemented in the TOE, the operational environment shall provide the function (e.g. using DBMS, etc.) and accordingly, the security objective for the operational environment shall be added.

The ST author shall include FPT_STM.1, which is the optional security functional requirement, in the ST if the TOE implements the reliable time stamp function. If this function is not implemented in the TOE, the operational environment shall provide the function (e.g. provided by the operating system, etc.) and accordingly, the security objective for the operational environment shall be added.

The ST author must include conditionally mandatory security functional requirements defined in this PP if the following conditions are met.

- If the TOE provides additional identification and authentication mechanisms (e.g., certificate-based authentication method, OTP method, etc.) in addition to ID/PW-based identification and authentication, FIA_UAU.5 shall be included.

- When providing additional identification and authentication functions, the TOE can provide those functions by receiving the authentication results of external IT entities that interact with the TOE (e.g., 2FA support device that complies with the FIDO standards), and accordingly FPT_LEE.1(extended) shall be included instead of FIA_UAU.5. In this case, the authentication information used by external IT entities to perform additional identification and authentication methods is safely managed by external IT entities, so the security objectives for the operating environment shall be added accordingly.

- When providing additional identification and authentication functions, the TOE can provide those functions by receiving the authentication results of external IT entities that interact with the TOE (e.g., 2FA support device that complies with the FIDO standards), and accordingly FPT_LEE.1(Extended) shall be included instead of FIA_UAU.5. In this case, the authentication information used by external IT entities to perform additional identification and authentication methods is safely managed by external IT entities, so the security objectives for the operating environment shall be added accordingly.

- In case of users(authorized administrators and end users) directly access the SSO server through web browsers or terminal access programs, FTP_TRP.1 shall be included. Assuming that the web server is the TOE operating environment, and if a secure communication path is provided through communication between the user's web browser and web server, the ST author shall add the security objectives for the operational environment instead of including FTP_TRP.1. And if the user's web browser access the SSO server via the web server, such as when the web server and the TOE server are physically separated to perform communication, FTP_TRP.1 is included to provide a secure path between the SSO server and the user, and FTP_ITC.1 shall be included to provide a secure channel between the web server and the SSO server. FPT_ITT.1 shall be applied when transmitting TSF data between the TOE components which are physically separated.(eg, If communication between the TOE management console and the SSO server is directly implemented, FTT_ITT.1 shall be applied)

- When the TOE interacts with external IT entities(e.g., mail server, log server, etc.), FTP_ITC.1 shall be included.

Optional security functional requirements can be optionally implemented in the TOE. However, when the TOE additionally provides related capabilities, the ST author must include the corresponding SFRs. The ST author shall pay attention not to omit the security functional requirements for the security features provided by the TOE by referring to the application notes when applying each optional security functional requirement with regard to the applicability of the optional security functional requirements.

This PP has been developed considering various types of the TOE implementation. The ST author, complying with this PP, shall describe any non-TOE hardware, software or firmware required by the TOE to operate.

## 1.3. Conventions

The notation, formatting and conventions used in this PP are consistent with the Common Criteria for Information Technology Security Evaluation.

The CC allows several operations to be performed for functional requirements: iteration, assignment, selection and refinement. Each operation is used in this PP.

**Iteration**
Iteration is used when a component is repeated with varying operations. The result of iteration is marked with an iteration number in parenthesis following the component identifier, i.e., denoted as (iteration No.).

**Assignment**
This is used to assign specific values to unspecified parameters (e.g., password length). The result of assignment is indicated in square brackets like [ assignment_value ].

**Selection**
This is used to select one or more options provided by the CC in stating a requirement. The result of selection is shown as *underlined and italicized.*

**Refinement**
This is used to add details and thus further restrict a requirement. The result of refinement is shown in **bold text.**

**Security Target (ST) Author**

This is used to represent the final decision of attributes being made by the ST author. The ST author's operation is denoted in braces, as in {decided by the ST author}. In addition, operations of SFR not completed in the Protection Profile must be completed by the ST author.

"Application notes" is provided to clarify the intent of requirements, provide the information for the optional items in implementation, and define "Pass/Fail" criteria for a requirement. The application notes is provided with corresponding requirements if necessary.

## 1.4. Terms and definitions

**Agent Type1**
Antivirus products, Software-Based Security USB products, Host Data Loss Prevention products, etc.

- The endpoint on which the agent is located is typically a PC with Windows® operating system accessible to employees within the organization, and if the agent is compromised, data present on the user's host can be compromised and leaked, requiring strict security requirements in terms of confidentiality, integrity, and availability.

**Agent Type2**
Network Access Control products, Patch Management Systems, etc.

- The endpoint on which the agent is located is typically a PC with Windows® operating system accessible to employees in the organization, and if the agent is compromised, it is unlikely that data present on the user's host will be corrupted or leaked, but it can cause problems in using the resources provided by the organization, requiring security requirements in terms of confidentiality, integrity.

**Agent Type3**
Database Access Control products, Access Control in Operating System(Server) products, Enterprise security management products, etc.

- Since the endpoint where the agent is located is generally a physically secure environment that can only be accessed by authorized employees of the organization, it corresponds to a product type with a relatively low threat occurrence.

**Application Programming Interface (API)**
A set of software libraries that exist between the application layer and the platform system layer and facilitate the development of applications that run on the platform

**Approved cryptographic algorithm**
A cryptographic algorithm selected by Korea cryptographic Module Validation Authority for block cipher, secure hash algorithm, message authentication code, random bit generation, key agreement, public key cipher, digital signatures cryptographic algorithms, etc. considering safety, reliability and interoperability

**Approved mode of operation**
The mode of cryptographic module using approved cryptographic algorithm

**Assets**
Entities that the owner of the TOE presumably places value upon

**Assignment**
Specification of an identified parameter in a functional or assurance component

**Attack potential**

Measure of the effort needed to exploit a vulnerability in a TOE

Note 1 to entry: The effort is expressed as a function of properties related to the attacker (e.g. expertise, resources, and motivation) and properties related to the vulnerability itself (e.g. window of opportunity, time to exposure).

**Augmentation**
Addition of one or more requirement(s) to a package

Note 1 to entry: In case of a functional package), such an augmentation is considered only in the context of one package and is not considered in the context with other packages or PPs or STs.

Note 2 to entry: In case of an assurance package, augmentation refers to one or more SARs.

**Authentication Data**
Information used to verify a user's claimed identity

**Authentication token**
Authentication data that authorized end users use to access the business system

**Authorized Administrator**
Authorized user to securely operate and manage the TOE

**Authorized User**
Entity who may, in accordance with the SFRs, perform an operation on the TOE

**Automated recovery**

Recovery without the user’s intervention

**Business System**
An application server that authorized end users access through ‘SSO’

**Can/could**
The ‘can’ or ‘could’ presented in Application notes indicates optional requirements applied to the TOE by ST author’s choice

**Class**
Set of CC families that share a common focus

**Client**
Application program that can access the services of SSO server or SSO agent through network

**Client Type**
Vitual Private Network products, Wireless LAN Authentication Products, etc.

- The client is an entity installed on the user's host and serves to request communication with the server on behalf of the user.

**Component**
Smallest selectable set of elements on which requirements may be based

**Conditioning**
The process of increasing the entropy rate per bit by removing the bias from collected noise sources

**Critical Security Parameters (CSP)**
Information related to security that can erode the security of the encryption module if exposed or changed (e.g., verification data such as secret key/private key, password, or Personal Identification Number)

**Database Management System (DBMS)**
A software system composed to configure and apply the database.

**Decryption**
The act that restoring the ciphertext into the plaintext using the decryption key

**Dependency**
Relationship between components such that a PP, ST, functional package or assurance package including a component also includes any other components that are identified as being depended upon or include a rationale as to why they are not

**Deterministic Random Bit Generator (DRBG)**
It consists of an algorithm that generates a bit string from an initial value called a seed and produces the same bit string when the same seed is input.

**Element**
Self-contained description of a security need assigned to SAR or SFR

**Encryption**
The act that converting the plaintext into the ciphertext using the encryption key

**Endpoint**
The point where the TOE components such as agents, clients, etc. are installed and operated without any further sub-interacted entities

**End user**
Users of the TOE who want to use the business system, not the administrators of the TOE

**Entropy**
A measure used to evaluate the unpredictability of data.

A numerical representation of the amount of information contained in data.

It represents disorder or randomness, and the closer it is to a random bit, the higher the entropy.

**Entropy rate**
The entropy of the data divided by the size of the data, expressed as a value between 0 and 1.

**Entropy source**
A function or device that combines noise sources, health tests, and conditioning algorithms

**External Entity**
Human technical system or one of its components interacting with the target of evaluation TOE from outside of the TOE boundary

**Evaluation Assurance Level (EAL)**
Well-formed package of security assurance requirements representing a point on the pre defined assurance scale

Note 1 to entry: EALs are defined in CC Part 5.

**Family**
Set of components that share a similar goal but differ in emphasis or rigour

**Health test**
Implemented within a random bit generator to monitor noise sources in real time.

The health test is not a process for identifying statistical problems with noise sources; rather, it is a method for detecting cases where the collected noise sources do not operate normally due to equipment aging, etc.

※ For detailed information, refer to the health test defined in Section 5.2 of TTAK.KO-12.0306/R1.

**Identity**
Representation uniquely identifying entities (e.g. user, process or disk) within the context of the TOE

**Iteration**
Use of the same component to express two or more distinct requirements

**Kerberos**
A centralized authentication scheme, described in RFC 1510, that provides user authentication using symmetric cryptographic technique in a distributed computing environment

**Korea Cryptographic Module Validation Program (KCMVP)**

A system to validate the security and implementation conformance of cryptographic modules used for the protection of important but not classified information among the data communicated through the information and communication network of the government and public institutions.

**Local access**
Connection established through the console port between the administrator and the TOE

**Management access**
The access to the TOE by using the HTTPS, SSH, TLS, etc to manage the TOE by administrator, remotely

**Management Console**
Application program that provides GUI, CLI, etc. to the administrator and provides system management and configuration

**Manual recovery**
Recovery through an update server, etc. by user execution or user intervention

**Noise Source**
Functions or devices that generate non-deterministic data

**Object**
Entity in the TOE that contains or receives information, and upon which subjects perform operations

**Operation (on a component of the CC)**
Modification or repetition of a component. Allowed operations on components are assignment, iteration, refinement and selection

**Operation (on an object)**
〈on an object〉 specific type of action performed by a subject on an object

**Private Key**
A cryptographic key which is used in an asymmetric cryptographic algorithm and is uniquely associated with an entity(the subject using the private key), not to be disclosed

**Protection Profile (PP)**
Implementation-independent statement of security needs for a TOE type

**Public Key**
A cryptographic key which is used in an asymmetric cryptographic algorithm and is associated with an unique entity(the subject using the public key), it can be disclosed

**Public Key (asymmetric) cryptographic algorithm**
A cryptographic algorithm that uses a pair of public and private key

**Random bit generator (RBG)**
A device or algorithm that outputs a binary sequence that is statistically independent and is not biased. The RBG used for cryptographic application generally generates 0 and 1 bit string, and the sequence can be combined into a random bit block. The RBG is classified into the deterministic and non-deterministic type. The deterministic type RBG is composed of an algorithm that generates bit strings from the initial value called a "seed key," and the non-deterministic type RBG produces output that depends on the unpredictable physical source.

※ The cryptographic random bit generator consists of an entropy source used for seed construction and a deterministic random bit generator.

**Recommend/be recommended**
The 'recommend' or 'be recommended' presented in Application notes is not mandatorily recommended, but required to be applied for secure operations of the TOE

**Refinement**
Addition of details to a security component

**Remote Authentication Dial-In User Services (RADIUS)**

Service to identify and authenticate users by sending information such as user ID, password and IP address to the authentication server when a remote user requests a connection

**Role**
Predefined set of rules on permissible interactions between a user and the TOE

**Secret Key**
The cryptographic key which is used in symmetric cryptographic algorithm and is associated with on or more entity, it is not allowed to release

**Secure Sockets Layer (SSL)**
This is a security protocol proposed by Netscape to ensure confidentiality, integrity and security over a computer network

**Security Policy Document**
Document uploaded to the list of the validated cryptographic module with the module's name and specifying the summary for the cryptographic algorithms and operational environments of the TOE

**Security Target (ST)**
Implementation-dependent statement of security requirements for a TOE based on a security problem definition

**Security Token (HSM)**
A hardware device implemented to process key generation, electronic signature generation, etc., within the device in order to safely save and store confidential information.

**Seed**
The secret value used to initialize the random bit generator

**Selection**
Specification of one or more items from a list in a component

**Shall/must**
The 'shall' or 'must' presented in Application notes indicates mandatory requirements applied to the TOE

**Subject**
Entity in the TOE that performs operations on objects

**Symmetric cryptographic technique**
Encryption scheme that uses the same secret key in mode of encryption and decryption, also known as secret key cryptographic technique

**Target of Evaluation (TOE)**
Set of software, firmware and/or hardware possibly accompanied by guidance, which is the subject of an evaluation

**Terminal Access Controller Access Control System (TACACS)**
Authentication protocol that is common for UNIX networks, described in RFC 1492, used by remote access server to send user login passwords to an authentication server

**Threat Agent**
Entity that has potential to exercise adverse actions on assets protected by the TOE

**TOE Security Functionality (TSF)**
Combined functionality of all hardware, software, and firmware of a TOE that is relied upon for the correct enforcement of the SFRs

**Transport Layer Security (TLS)**
This is a cryptographic protocol between a SSL-based server and a client and is described in RFC 2246

**TSF Data**
Data for the operation of the TOE upon which the enforcement of the SFR relies

**User**
As a human technical system or one of its components interacting with the TOE from outside the TOE boundary, the user in the TOE is an authorized administrator and an authorized end user.

※ The types of users related to the SFR are divided into human users and external IT entities. Human users may further be differentiated as local human users, meaning they interact directly with the TOE via TOE devices (e.g. workstations), or remote human users, meaning they interact indirectly with the TOE through another IT product.

**Validated Cryptographic Module**
A cryptographic module that is validated and given a validation number by validation authority

**Wrapper**
Interfaces for interconnection between the TOE and various types of business systems or authentication systems

## 1.5. PP organization

Chapter 1 introduces to the Protection Profile, providing Protection Profile references and the TOE overview.

Chapter 2 provides the conformance claims to the CC, PP and package; and describes the claim's conformance rationale and PP conformance statement.

Chapter 3 is a security problem definition that describes security problems in the TOE and the TOE operational environment from the perspective of threats, organizational security policies, and assumptions.

Chapter 4 defines the security objectives for the operating environment supported by the operating environment so that the TOE security functionality can be accurately provided as security objectives. It also presents the rationale, which is a rational reason why the security objectives for the operational environment satisfy the security problem definition.

Chapter 5 defines the extended components additionally required based on the characteristics of Single Sign-On.

Chapter 6 describes security functional requirements and assurance requirements as security requirements. If required, Application notes are provided to clarify the meaning of requirements and provide an explanation of detailed guidelines to the ST author for correct operations. It also presents the rationale, which is a rational reason why the security requirements satisfy the security problem definitions and dependency relationships.

Reference describes the references for users who need more information about the related information than those described in this PP.

Abbreviated terms are listed to define frequently used terms in the PP.

# 2. Conformance claim

## 2.1. CC conformance claim

| | | |
|---|---|---|
| CC | | Common Criteria for Information Technology Security Evaluation, CC:2022, Revision 1<br>• Common Criteria for Information Technology Security Evaluation, Part 1: Introduction and General Model, CC:2022 R1 (CCMB-2022-11-001, 2022. 11.)<br>• Common Criteria for Information Technology Security Evaluation, Part 2: Security Functional Components, CC:2022 R1 (CCMB-2022-11-002, 2022.11.)<br>• Common Criteria for Information Technology Security Evaluation. Part 3: Security Assurance Components, CC:2022 R1 (CCMB-2022-11-003, 2022.11.)<br>• Common Criteria for Information Technology Security Evaluation. Part 4: Framework for the specification of evaluation methods and activities, CC:2022 R1 (CCMB-2022-11-004, 2022.11.)<br>• Common Criteria for Information Technology Security Evaluation. Part 5: Pre-defined packages of security requirements, CC:2022 R1 (CCMB-2022-11-005, 2022.11.)<br>Errata and Interpretation for CC:2022 (Release 1) and CEM:2022 (Release 1), CCMB-2024-07-002 Version 1.1, July 2024 |
| Conformance claim | Part 2 Security functional components | Extended : FIA_IMA.1, FIA_SOS.3, FMT_PWD.1, FPT_LEE.1, FPT_PST.1, FTA_TUD.1 |
| | Part 3 Security assurance components | *Conformant* |
| | Package | Augmented : EAL1 augmented (ATE_FUN.1) |

## 2.2. PP conformance claim

This Protection Profile does not claim conformance to other PPs.

## 2.3. Package conformance claim

This Protection Profile claims conformance to assurance package EAL1 augmented with ATE_FUN.1.

## 2.4. Conformance claim rationale

Since this Protection Profile does not claim conformance to other Protection Profiles, it is not necessary to describe the conformance claim rationale.

## 2.5. PP conformance statement

This Protection Profile requires "strict PP conformance" of any ST or PP, which claims conformance to this PP.

# 3. Security problem definition

The security problem definition defines the threats, organizational security policies, and assumptions that the TOE and TOE operational environment are intended to handle.

## 3.1. Assets

The basic assets protected by Single Sign-On are as follows.

- Internal IT resources and services interacting with Single Sign-On
- Important data related to the TOE itself and TOE operation (e.g. TSF data)

## 3.2. Threats

Threat agents are IT entities and human users that cause harm to assets through unauthorized access or abnormal methods, and can generate various threats as follows. At this time, threat agents to the TOE have a basic level of expertise, resources, and motivation.

### 3.2.1. Unauthorized access

T.SESSION_HIJACK

Threat agents can access user screens that are left unattended and logged in, or take advantage of user sessions that are not properly terminated while logged out to steal user authorization.

T.RETRY_AUTH_ATTEMPT

Using information gained from retrying authentication attempts, threat agents can successfully authenticate and then impersonate an authorized user to access the TOE.

T.IMPERSONATION

Threat agents can access the TOE by impersonating an authorized user, TOE components, etc.

T.REPLAY

Threat agents can find out and copy the authentication information, and replay it to access the TOE.

T.WEAK_PASSWORD

Threat agents can access the TOE by obtaining poorly managed passwords such as using the default values for passwords and then impersonating an authorized administrator. If low-level password rules are applied, threat agents can access the TOE by impersonating an authorized

administrator.

### 3.2.2. Information leak

T.STORED_DATA_LEAKAGE

Threat agents can leak important data (e.g. cryptographic keys, TOE settings, etc.) stored inside the TOE or in external entities (e.g. DBMS) that interact with the TOE in an unauthorized manner.

T.TRANSMISSION_DATA_DAMAGE

Threat agents can leak or modify transmission data between TOE components and with external IT entities in an unauthorized manner.

T.WEAK_CRYPTO_PROTOCOLS

Threat agents can analyze traffic that uses weak cryptographic communication protocols or low cryptographic strength to infer crypto key information or find out the content of communication ciphertext.

### 3.2.3. TOE functionality compromise

T.TSF_COMPROMISE

Threat agents can compromise the TSF through unauthorized access, etc. to cause malfunction of the TOE functions or disable the TOE functions.

## 3.3. Organizational security policy

P.AUDIT

To track accountability for security-related actions, security-related events shall be recorded and maintained, and the recorded data shall be reviewed. In addition, the available space on the disk for storing audit data shall be regularly checked to prevent the loss of audit data, and to protect the stored audit data from unauthorized modification or deletion.

P.SECURE_OPERATION

Management means must be provided so that administrators can securely set up the TOE to comply with the organization's Single Sign-On security policy and operate it accurately according to the TOE operation manual.

P.CRYPTO_STRENGTH

Organizations shall apply encryption measures for storage and transmission of important data, such as passwords for user authentication, and use secure cryptographic algorithms.

Application notes

o The cryptographic algorithm used to store and transmit important information shall use a standard algorithm with a security strength of 112 bits or higher.

## 3.4. Assumptions

It is assumed that the following conditions exist in the TOE operational environment that accepts this PP.

A.PHYSICAL_PROTECTION

The place where SSO agent and SSO server among the TOE components are installed and operated shall be equipped with access control and protection facilities so that only authorized administrator can access.

A.TRUSTED_ADMIN

The authorized administrator of the TOE is non-malicious, has been appropriately trained for the TOE management functions, and accurately fulfills their duties in accordance with administrator guidelines.

A.OPERATION_SYSTEM_REINFORCEMENT

The reliability and security of the operating system shall be ensured by reinforcing the latest vulnerabilities in the operating system on which the TOE is installed and operated.

A.SECURE_DEVELOPMENT

The developer who uses the TOE to interoperate with the user identification and authentication function in the operational environment of the business system shall ensure that the security functions of the TOE are securely applied in accordance with the requirements of the manual provided with the TOE.

A.AUTHENTICATION_SYSTEM_SECURITY

If TOE receives the support of the external authentication system (RADIUS, TACACS, Kerberos, or other authentication server within the organization) regarding the initial end user identification and authentication function, the external authentication system shall support the function of storing and managing the authentication information of the authorized end user safely.

# 4. Security objectives

The followings are the security objectives handled by technical and procedural method supported from operational environment in order to provide the TOE security functionality accurately.

## 4.1. Security objectives for the operational environment

OE.LOG_BACKUP

The authorized administrator shall periodically check a spare space of audit data storage in case of the audit data loss, and carry out the audit data backup (external log server or separate storage device, etc.) to prevent audit data loss.

OE.PHYSICAL_CONTROL

The place where SSO agent and SSO server among the TOE components are installed and operated shall be equipped with access control and protection facilities so that only authorized administrator can access.

OE.TRUSTED_ADMIN

The authorized administrator of the TOE shall be non-malicious, has been appropriately trained for the TOE management functions, and accurately fulfills their duties in accordance with administrator guidelines.

OE.OPERATION_SYSTEM_REINFORCEMENT

The reliability and security of the operating system shall be ensured by reinforcing the latest vulnerabilities in the operating system on which the TOE is installed and operated.

Application notes

o Depending on the implementation type of the TOE, the TOE components(SSO agent, SSO server) may not use the operating system independently, so care shall be taken that the operating system related settings of other external entities operating in the same operating system do not affect the secure operation of the TOE.

OE.SECURE_DEVELOPMENT

The developer who uses the TOE to interoperate with the user identification and authentication function in the operational environment of the business system shall ensure that the security functions of the TOE are securely applied in accordance with the requirements of the manual provided with the TOE.

Application notes

o This security objective for the operational environment is applied when a Wrapper is used for

compatibility between the SSO agent that is the TOE component and business system.

OE.AUTHENTICATION_SYSTEM_SECURITY

If TOE receives the support of the external authentication system (RADIUS, TACACS, Kerberos, or other authentication server within the organization) regarding the initial end user identification and authentication function, the external authentication system shall support the function of storing and managing the authentication information of the authorized end user safely.

Application notes

- o This security objective for the operational environment applies only when the initial end user identification and authentication function is supported by the external authentication system, Therefore, this does not apply to the identification and authentication of the administrator or the token-based end user authentication.
- o If TOE implements the initial authentication function for the end user, the security objective for the operational environment 'OE.AUHTENTICATIO_SYSTEM_SECURITY' shall be deleted, and the following SFR related to the initial user authentication function shall be satisfied by the TOE.
  - FAU_GEN.1, FIA_AFL.1, FIA_SOS.1, FIA_UAU.1, FIA_UAU.4, FIA_UAU.5, FIA_UAU.7, FIA_UID.1, FPT_LEE.1 (Extened), FPT_PST.1 (Extened), FTA_SSL.1, FTA_SSL.3, FTA_TSE.1(2)

## 4.2. Security objectives rationale

### 4.2.1. Security objectives rationale for operational environment

| | OE.LOG_BACKUP | OE.PHYSICAL_PROTECTION | OE.TRUSTED_ADMIN | OE.SECURE_DEVELOPMENT | OE.OPERATION_SYSTEM_REINFORCEMENT | OE.AUTHENTICATION_SYSTEM_SECURITY |
|---|---|---|---|---|---|---|
| P.AUDIT | O | | | | | |
| P.SECURE_OPERATION | | | O | | | |
| A.PHYSICAL_PROTECTION | | O | | | | |
| A.TRUSTED_ADMIN | O | | O | | | |
| A.SECURE_DEVELOPMENT | | | | O | | |
| A.OPERATION_SYSTEM_REINFORCEMENT | | | | | O | |
| A.AUTHENTICATION_SYSTEM_SECURITY | | | | | | O |

[Table 2] correspondence with the 'security problem definition' and the 'security objectives for the operational environment'

| P.AUDIT | OE.LOG_BACKUP |
|---|---|

**P.AUDIT** is performed by **OE.LOG_BACKUP.**

**OE.LOG_BACKUP** ensures that regular audit data storage space is checked by the administrator as well as the TOE function, and regular log backups or log transmission to an external log server are performed to prevent log records from being lost.

| P.SECURE_OPERATION | OE.TRUSTED_ADMIN |
|---|---|

**P.SECURE_OPERATION** is performed by **OE.TRUSTED_ADMIN.**

**OE.TRUSTED_ADMIN** ensures that the administrator operates TOE accurately in accordance with the organization's Single Sign-On policy and operating manual.

| A.PHYSICAL_PROTECTION | OE.PHYSICAL_PROTECTION |
|---|---|

**A.PHYSICAL_PROTECTION** is supported by **OE.PHYSICAL_PROTECTION.**

**OE.PHYSICAL_PROTECTION** places the SSO server and the server with the SSO agent in a place equipped with protective equipment and controls access to ensure that only authorized administrators can enter.

| A.TRUSTED_ADMIN | OE.TRUSTED_ADMIN, OE.LOG_BACKUP |
|---|---|

**A.TRUSTED_ADMIN** is supported by **OE.TRUSTED_ADMIN, OE.LOG_BACKUP**.

**OE.TRUSTED_ADMIN** has no malicious intent, are properly trained in TOE management functions, and ensure that they perform their duties accurately according to administrator guidelines.

**OE.LOG_BACKUP** ensures that the authorized administrator periodically checks a spare space of audit data storage in case of the audit data loss, and carries out the audit data backup (external log server or separate storage device, etc.) to prevent audit data loss.

| A.SECURE_DEVELOPMENT | OE.SECURE_DEVELOPMENT |
|---|---|

**A.SECURE_DEVELOPMENT** is supported by **OE.SECURE_DEVELOPMENT.**

**OE.SECURE_DEVELOPMENT** ensures that developers who use the TOE to link user identification and authentication functions in the operating environment of the business system comply with the requirements of the operational user guidence provided with the TOE so that the security functions of the TOE can be applied safely.

| A.OPERATION_SYSTEM_REINFORCEMENT | OE.OPERATION_SYSTEM_REINFORCEMENT |
|---|---|

**A.OPERATION_SYSTEM_REINFORCEMENT** is supported by **OE.OPERATION_SYSTEM_REINFORCEMENT**.

**OE.OPERATION_SYSTEM_REINFORCEMENT** ensures the reliability and safety of the operating system by reinforcing the latest vulnerabilities of the operating system in which the TOE is installed and operated.

| A.AUTHENTICATION_SYSTEM_SECURITY | OE.AUTHENTICATION_SYSTEM_SECURITY |
|---|---|

**A.AUTHENTICATION_SYSTEM_SECURITY** is supported by **OE.AUTHENTICATION_SYSTEM_SECURITY.**

**OE.AUTHENTICATION_SYSTEM_SECURITY** guarantees that if the TOE end user identification and authentication functions are supported by external authentication systems (e.g., RADIUS, TACACS, Kerberos, and other authentication servers within the organization) in the initial authentication stage, the external authentication system supports the ability to store and manage authentication information of the authorized end user.

# 5. Extended components definition

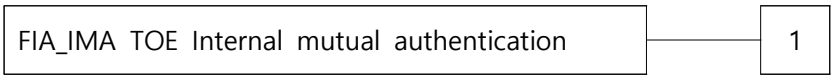
## 5.1. Identification and authentication

### 5.1.1. TOE Internal mutual authentication

Family Behaviour

This family defines requirements for providing mutual authentication between TOE components in the process of user identification and authentication.

Component leveling




FIA_IMA.1 TOE Internal mutual authentication requires that the TSF provides mutual authentication function between TOE components in the process of user identification and authentication.

Management: FIA_IMA.1
There are no management activities foreseen.

Audit: FIA_IMA.1

The following actions should be auditable if FAU_GEN Security audit data generation is included in the PP, PP-Module, functional package or ST:

a) Minimal: Success and failure of mutual authentication

#### 5.1.1.1. FIA_IMA.1 TOE Internal mutual authentication

| Component relationships | |
|---|---|
| Hierarchical to | No other components. |
| Dependencies | No dependencies. |
| FIA_IMA.1.1 | The TSF shall perform mutual authentication between [assignment: *different parts of TOE*] using the [assignment: *authentication protocol*] that meets the following [assignment: *list of standards*]. |

### 5.1.2. Specification of Secrets

Family Behaviour

This family defines requirements for mechanisms that enforce defined quality metrics on provided secrets and generate secrets to satisfy the defined metric.

Component leveling


The specification of secrets family in CC Part 2 is composed of 2 components. It is now composed of three components, since this PP adds one more component as below.

※ The description on two components included in CC Part 2 is omitted.

FIA_SOS.3 Destruction of secrets requires, that the secret information be destroyed according to the specified destruction method, which can be based on the assigned standard.

Management: FIA_SOS.3
There are no management activities foreseen.

Audit: FIA_SOS.3
The following actions should be auditable if FAU_GEN Security audit data generation is included in the PP, PP-Module, functional package or ST:

a) Minimal : Success and failure of the activity

### 5.1.2.1. FIA_SOS.3 Destruction of Secrets

| Component relationships | |
|---|---|
| Hierarchical to | No other components. |
| Dependencies | FIA_SOS.2 TSF Generation of secrets |

| | |
|---|---|
| FIA_SOS.3.1 | The TSF shall destroy secrets in accordance with a specified secrets destruction method [assignment: *secret destruction method*] that meets the following: [assignment: *list of standards*]. |

Application notes

o This SFR can be applied to the user's token.

## 5.2. Security Management

### 5.2.1. ID and password

Family Behaviour

This family defines the capability that is required to control ID and password management used in the TOE, and set or modify ID and/or password by authorized users.

Component leveling

| | |
|---|---|
| FMT_PWD ID and password | 1 |

FMT_PWD.1 ID and password management, requires that the TSF provides the management function of ID and password.

Management: FMT_PWD.1

The following actions could be considered for the management functions in FMT:
a) Management of ID and password configuration rules.

Audit: FMT_PWD.1

The following actions should be auditable if FAU_GEN Security audit data generation is included in the PP, PP-Module, functional package or ST:

a) Minimal: All changes of the password

#### 5.2.1.1. FMT_PWD.1 Management of ID and password

| Component relationships | |
|---|---|
| Hierarchical to | No other components. |
| Dependencies | FMT_SMF.1 Specification of management functions<br>FMT_SMR.1 Security roles |
| FMT_PWD.1.1 | The TSF shall restrict the ability to manage the password of [assignment: *list of functions*] to [assignment: *the authorized identified roles*].<br>1. [assignment: *password combination rules and/or length*]<br>2. [assignment: *other management such as management of special characters unusable for password, etc.*] |

FMT_PWD.1.2 The TSF shall restrict the ability to manage the ID of [assignment: *list of functions*] to [assignment: *the authorized identified roles*].

1. [assignment: *ID combination rules and/or length*]
2. [assignment: *other management such as management of special characters unusable for ID, etc.*]

FMT_PWD.1.3 The TSF shall provide the capability for [selection, choose one of: *setting ID and password when installing, setting password when installing, changing the ID and password when the authorized administrator accesses for the first time, changing the password when the authorized administrator accesses for the first time*].

Application notes

- o If the TOE does not provide the capability for managing the ID and password combination rules by authorized roles, etc., 'None.' may be specified in assignment operations of FMT_PWD.1.1, FMT_PWD.1.2.
- o The ID and password combination rules that can be set by authorized roles may include minimum and maximum length setting, mixing rule setting involving English upper case/lower case/number/special characters, etc.

## 5.3. Protection of the TSF

### 5.3.1. Linkable external entities

Family Behaviour

This family (FPT_LEE, Linkable external entities) defines the requirement for the TSF to perform security functions with the support of external entities. In this family, external entities refer to software or hardware, but human users are not counted as external entities.

Component leveling

| | |
|---|---|
| FMT_LEE Linkable external entities | 1 |

FPT_LEE.1 Linkable external entities requires that the TSF provide security functions in connection with external entities.

Management: FPT_LEE.1

There are no management activities foreseen.

Audit: FPT_LEE.1

The following actions should be auditable if FAU_GEN Security audit data generation is included in the PP, PP-Module, functional package or ST:

a) Minimal: Result of the execution of the security function provided by linking with external entities

#### 5.3.1.1. FPT_LEE.1 Linkable external entities

| | |
|---|---|
| Component relationships | |
| Hierarchical to | No other components. |
| Dependencies | No dependencies. |

| | |
|---|---|
| FPT_LEE.1.1 | The TSF shall perform [assignment: *list of actions*] and provide [assignment: *list of functions*] in connection with external entities. |

Application notes

- In FPT_LEE.1.1, [assignment: List of actions] means the way the TSF is linked with external entities, such as API function call.
- In FPT_LEE.1.1, [assignment: List of functions] shall specify the security functions (e.g. verification of secrets, protection of authentication feedback, etc.) provided by the TSF in linkage with external entities

### 5.3.2. Protection of stored TSF data

Family Behaviour

This family defines rules to protect TSF data stored within containers controlled by the TSF from the unauthorized modification or disclosure.

Component leveling

| | |
|---|---|
| FPT_PST Protection of stored TSF data | 1 |

FPT_PST.1 Basic protection of stored TSF data, requires the protection of TSF data stored in containers controlled by the TSF.

Management: FPT_PST.1

There are no management activities foreseen.

Audit: FPT_PST.1

There are no auditable events foreseen.

#### 5.3.2.1. FPT_PST.1 Basic protection of stored TSF data

| Component relationships | |
|---|---|
| Hierarchical to | No other components. |
| Dependencies | No dependencies. |

| | |
|---|---|
| FPT_PST.1.1 | The TSF shall protect [assignment: *TSF data*] stored in containers controlled by the TSF from the unauthorized [selection: *disclosure, modification*]. |

Application notes

- o Containers controlled by the TSF mean storage in the TOE or external entities (DBMS, etc.) that interact with the TOE.
- o Examples of TSF data to be protected as follows:
  - User password, cryptographic key (pre-shared key, symmetric key, private key, etc), TOE configuration values (security policy, environment setting, configuration parameters), audit data, etc.
- o The TSF data can be encrypted and stored to be protected from the unauthorized disclosure or modification.

### 5.3.3. TSF update

Family Behaviour

This family defines TOE firmware/software update requirements.

Component leveling

| | |
|---|---|
| FPT_TUD TSF update | 1 |

FPT_TUD.1 TSF security patch update, requires trusted update of the TOE firmware/software including the capability to verify the validity on the update file before installing updates.

Management: FPT_TUD.1

The following actions could be considered for the management functions in FMT:
a) Management of update file verification mechanism

Audit: FPT_TUD.1
The following actions should be auditable if FAU_GEN Security audit data generation is included in the PP, PP-Module, functional package or ST:

a) Minimal: Update file verification result (success, failure)

#### 5.3.3.1. FPT_TUD.1 TSF security patch update

| Component relationships | |
|---|---|
| Hierarchical to: | No other components. |
| Dependencies: | No dependencies. |

| | |
|---|---|
| FPT_TUD.1.1 | The TSF shall provide the capability to view the versions information of the TOE to [assignment: *the authorized identified roles*]. |
| FPT_TUD.1.2 | The TSF shall verify validity of the update files using [selection: *hash value comparison, digital signature verification*] before installing updates. |

Application notes

- o The TSF shall provide the capability to check the current version of the TOE that most recently installed and executed by authorized roles.
- o The latest updates and security patches are essential to remove security vulnerabilities. The validity verification on the update files is required since the installation of update files without any verification can result in system malfunction, or service failures, etc.

# 6. Security requirements

The security requirements specify security functional requirements and assurance requirements that must be satisfied by the TOE that claims conformance to this PP.

The security functional requirements included in this PP are derived from CC Part 2 and Chapter 5 Extended Components Definition.

In addition, the security functional requirements are classified into mandatory SFRs and conditionally mandatory SFRs, optional SFRs, as follows.

- Mandatory SFRs: are required to be mandatorily implemented in the 'Single Sign-On'
- Conditionally mandatory SFRs: are required to be mandatorily implemented in 'Single Sign-On' if the stated conditions are met.
- Optional SFRs: are not required to be mandatorily implemented in 'Single Sign-On'. However, when the TOE additionally provides related capabilities, the ST author must include the corresponding SFRs.

The following table summarizes the security functional requirements used in the PP.

| Functional class | Security functional components | | Remarks |
|---|---|---|---|
| FAU | FAU_ARP.1 | Security alarms | Mandatory SFR |
| | FAU_GEN.1 | Audit data generation | Mandatory SFR |
| | FAU_SAA.1 | Potential violation analysis | Mandatory SFR |
| | FAU_SAR.1 | Audit review | Mandatory SFR |
| | FAU_SAR.3 | Selectable audit review | Mandatory SFR |
| | FAU_STG.1 | Audit data storage location | Mandatory SFR |
| | FAU_STG.2 | Protected audit data storage | Conditionally mandatory SFR |
| | FAU_STG.4 | Action in case of possible audit data loss | Conditionally mandatory SFR |
| | FAU_STG.5 | Prevention of audit data loss | Conditionally mandatory SFR |
| FCS | FCS_CKM.1 | Cryptographic key generation | Mandatory SFR |
| | FCS_CKM.2 | Cryptographic key distribution | Optional SFR |
| | FCS_CKM.5 | Cryptographic key derivation | Conditionally mandatory SFR |
| | FCS_CKM.6 | Timing and event of cryptographic key | Mandatory SFR |

| Functional class | Security functional components | | Remarks |
|---|---|---|---|
| | | destruction | |
| | FCS_COP.1 | Cryptographic operation | Mandatory SFR |
| | FCS_RBG.1 | Random bit generation (RBG) | Mandatory SFR |
| | FCS_RBG.2 | Random bit generation (External seeding) | Conditionally mandatory SFR |
| | FCS_RBG.3 | Random bit generation (Internal seeding – Single source) | Conditionally mandatory SFR |
| | FCS_RBG.4 | Random bit generation (Internal seeding – Multiple sources) | Conditionally mandatory SFR |
| | FCS_RBG.5 | Random bit generation (Combining entropy sources) | Conditionally mandatory SFR |
| FIA | FIA_AFL.1 | Authentication failure handling | Mandatory SFR |
| | FIA_IMA.1 | TOE Internal mutual authentication (Extended) | Mandatory SFR |
| | FIA_SOS.1 | Verification of secrets | Mandatory SFR |
| | FIA_SOS.2 | TSF generation of secrets | Mandatory SFR |
| | FIA_SOS.3 | Destruction of secrets (Extended) | Mandatory SFR |
| | FIA_UAU.1 | Timing of authentication | Mandatory SFR |
| | FIA_UAU.4 | Single-use authentication mechanisms | Mandatory SFR |
| | FIA_UAU.5 | Multiple authentication mechanisms | Conditionally mandatory SFR |
| | FIA_UAU.7 | Protected authentication feedback | Mandatory SFR |
| | FIA_UID.1 | Timing of identification | Mandatory SFR |
| FMT | FMT_MOF.1 | Management of security functions behaviour | Mandatory SFR |
| | FMT_MTD.1 | Management of TSF data | Mandatory SFR |
| | FMT_PWD.1 | Management of ID and password (Extended) | Mandatory SFR |
| | FMT_SMF.1 | Specification of management functions | Mandatory SFR |
| | FMT_SMR.1 | Security roles | Mandatory SFR |
| FPT | FPT_FLS.1 | Failure with preservation of secure state | Mandatory SFR |
| | FPT_ITT.1 | Basic internal TSF data transfer protection | Mandatory SFR |
| | FPT_LEE.1 | Linkable external entities – authentication (Extended) | Conditionally mandatory SFR |
| | FPT_PST.1 | Basic protection of stored TSF data (Extended) | Mandatory SFR |
| | FPT_RCV.1 | Manual recovery | Conditionally mandatory SFR |
| | FPT_RCV.2 | Automated recovery | Conditionally |

| Functional class | Security functional components | | Remarks |
|---|---|---|---|
| | | | mandatory SFR |
| | FPT_STM.1 | Reliable time stamps | Optional SFR |
| | FPT_TST.1 | TSF testing | Mandatory SFR |
| | FPT_TUD.1 | TSF security patch update (Extended) | Conditionally mandatory SFR |
| FTA | FTA_MCS.2 | Per user attribute limitation on multiple concurrent sessions | Mandatory SFR |
| | FTA_SSL.1 | TSF-initiated session locking | Conditionally mandatory SFR |
| | FTA_SSL.3 | TSF-initiated termination | Conditionally mandatory SFR |
| | FTA_TSE.1(1) | TOE session establishment | Mandatory SFR |
| | FTA_TSE.1(2) | TOE session establishment | Conditionally mandatory SFR |
| FTP | FTP_ITC.1 | Inter-TSF trusted channel | Conditionally mandatory SFR |
| | FTP_TRP.1 | Trusted path | Conditionally mandatory SFR |

[Table 3] Security functional requirements

## 6.1. Security functional requirements (Mandatory SFRs)

The 'Single Sign-On' that claims conformance to this PP must meet the following 'Mandatory SFRs'.

| Functional class | Security functional component | |
|---|---|---|
| FAU | FAU_ARP.1 | Security alarms |
| | FAU_GEN.1 | Audit data generation |
| | FAU_SAA.1 | Potential violation analysis |
| | FAU_SAR.1 | Audit review |
| | FAU_SAR.3 | Selectable audit review |
| | FAU_STG.1 | Audit data storage location |
| FCS | FCS_CKM.1 | Cryptographic key generation |
| | FCS_CKM.6 | Cryptographic key destruction timing and event |
| | FCS_COP.1 | Cryptographic operation |
| | FCS_RBG.1 | Random bit generation (RBG) |
| FIA | FIA_AFL.1 | Authentication failure handling |

| Functional class | Security functional component | |
|---|---|---|
| | FIA_IMA.1 | TOE Internal mutual authentication (Extended) |
| | FIA_SOS.1 | Verification of secrets |
| | FIA_SOS.2 | TSF Generation of secrets |
| | FIA_SOS.3 | Destruction of secrets (Extended) |
| | FIA_UAU.1 | Timing of authentication |
| | FIA_UAU.4 | Single-use authentication mechanisms |
| | FIA_UAU.7 | Protected authentication feedback |
| | FIA_UID.1 | Timing of identification |
| FMT | FMT_MOF.1 | Management of security functions behaviour |
| | FMT_MTD.1 | Management of TSF data |
| | FMT_PWD.1 | Management of ID and password (Extended) |
| | FMT_SMF.1 | Specification of management functions |
| | FMT_SMR.1 | Security roles |
| FPT | FPT_FLS.1 | Failure with preservation of secure state |
| | FPT_ITT.1 | Basic internal TSF data transfer protection |
| | FPT_PST.1 | Basic protection of stored TSF data (Extended) |
| | FPT_TST.1 | TSF testing |
| FTA | FTA_MCS.2 | Per user attribute Limitation on multiple concurrent sessions |
| | FTA_TSE.1(1) | TOE session establishment |

[Table 4] Mandatory security functional requirements

## 6.1.1. Security audit (FAU)

### 6.1.1.1. FAU_ARP.1 Security alarms

| Component relationships | |
|---|---|
| Hierarchical to | No other components. |
| Dependencies | FAU_SAA.1 Potential violation analysis. |

| | |
|---|---|
| FAU_ARP.1.1 | The TSF shall take [assignment: *list of actions*] upon detection of a potential security violation. |

Application notes

o If the TOE self-test result is a failure, response functions shall be performed.

- Examples of response functions to be performed when the self-test result is a failure are as follows:
  - *Termination of program execution, warning message screen display, restart process, etc.*

o If the TOE integrity verification result is a failure, response functions shall be performed.

- Examples of response functions to be performed when the integrity verification result is a failure are as follows:
  - *Termination of program execution, warning message screen display, etc.*

o Agents or clients shall verify integrity periodically or upon the authorized administrator's request and provide the administrator with a result notification function.

- △ In case of abnormality in the integrity verification result, △ integrity verification result by the administrator shall be notified to the administrator.

### 6.1.1.2. FAU_GEN.1 Audit data generation

| Component relationships | |
|---|---|
| Hierarchical to | No other components. |
| Dependencies | FPT_STM.1 Reliable time stamps |

| | |
|---|---|
| FAU_GEN.1.1 | The TSF shall be able to generate audit data of the following auditable events:<br>a) Start-up and shutdown of the audit functions;<br>b) All auditable events for the *not specified* level of audit;<br>c) [assignment: *other specifically defined auditable events*]. |
| FAU_GEN.1.2 | The TSF shall record within the audit data at least the following information:<br>a) Date and time of the auditable event, type of event, subject identity (if |

applicable), and the outcome (success or failure) of the event;

b) For each audit event type, based on the auditable event definitions of the functional components included in the PP, PP-Module, functional package or ST, [assignment: *other audit relevant information*].

Application notes

## 1. Generatation of audit records related to Single Sign-On

| Security Functional Components | Audit events | Additional audit information |
|---|---|---|
| FIA_SOS.2 | Rejection by the TSF of any tested secret | |
| FIA_SOS.3 (Extened) | Success and failure of the activity(applicable to the destruction of SSO token only) | |

## 2. Generation of other audit records

o The TOE shall generate audit records for major audit events.

- [Table 5] below shows the audit events for which audit records must be generated.

| Sub-category | Audit events | Additional audit information |
|---|---|---|
| Identification and authentication | User login and logout | |
| | User registration, change and deletion | |
| | The reaching of the threshold for the unsuccessful user authentication attempts and the actions taken | |
| | All changes of the password | |
| Security management | IP registration, deletion and change of administrative terminals | |
| | Execution of security management function and all changes and deletions of security attribute values.<br>** However, among the security management functions, 'Audit record inquiry' and 'TOE version information inquiry' functions are excluded. | Changed security attribute data |
| | Default account(ID)/Password change | |
| | Management terminal access IP blocking | |
| Trusted session management | User's session locking or termination | |
| | Response actions when duplicate login attempts of the same account are detected | |
| | Denial of new sessions based on the limit on the number of concurrent sessions | |
| Cryptographic | Cryptographic key generation failure | |

| | | |
|---|---|---|
| key generation | | |
| Cryptographic operation | Cryptographic operation failure (including cryptographic operation type) | |
| Audit record | Start-up and shutdown of the TOE audit functions in the form of H/W appliance | |

[Table 5] Major mandatory audit events to be recorded

- [Table 6] below shows the audit events for which audit records must be generated when providing a function.

| **Sub-category** | **Audit events** | **Additional audit information** |
|---|---|---|
| Self-protection | Execution of self-test | Failed security function |
| | Execution of integrity verification of the TOE itself | Components with failed integrity verification |
| Update protection | Updated files validity verification by the administrator | |
| | Performance of update file validity verification | |
| Audit records | Start-up and shutdown of the TOE audit function in the form of software | |
| | Response actions when audit record fails to be stored | |
| Security management | Changes in agent registration status | |

[Table 6] Audit events that must be recorded when providing a function

o If the TOE detects an attempt to reuse authentication information that is prohibited for reuse, authentication shall fail and an audit record of the authentication failure event shall be generated.

o Audit records shall be generated for self-test results.

o Integrity verification contents and results shall be confirmed through *screen display, audit records*.

o Audit records shall be generated for integrity verification results.

o Update file validation results(success•failure) shall be recorded in audit records.

o Audit records shall be generated for the update installation results and the reason for failure.

o Audit records shall be generated when the session locking or termination function is activated.

o Audit records shall be generated when blocking duplicate access.

o Audit records shall not contain more information than necessary.

- Items that shall be included at least in audit records are as follows.
  - The date and time of the event, the type of event, the identity of the subject that caused the event (e.g., *account, process, IP, etc.*), and the outcome of the event (success•failure)
- Information such as authentication information (e.g., *password, etc.*) and cryptographic key shall not be stored in the audit records.

o Sensitive data (e.g., password, resident registration number, etc.) shall not be recorded, or shall be generated by processing with masking if record is inevitable.

o Each component of the TOE shall generate audit records using trusted time information.

- Trusted time information should use the time information provided by the NTP server or the operating system.

o If the WAS(*Tomcat, Jesus, etc.*) is included in the TOE package, the TOE shall be implemented so that important information is not included in the WAS log.

- It can be implemented so that the log may be left only in the TOE's audit record storage without leaving the WAS log.
- Important information such as passwords and cryptographic keys shall not be left in plain text in the WAS log.

o Clients and agents shall generate audit records listed in the following [Table 7].

| Security function | Audit event | Additional audit information |
|---|---|---|
| Self-protection | Execution of integrity verification and its results | |
| Security management | When providing security management functions, execution of security management functions and any changes of security attribute values. | Changed security attribute data |
| Audit record | Agent start | |
| | When end users can request the audit record to be transmitted to the server through security management, execution of transmission of the audit record. | |
| Secure update and file distribution | (When providing online update function) Execution of digital signature verification of files received from the server and external update server and its results | Files that has failed digital signature verification |

[Table 7] Major audit events to be generated

- The sponsors shall describe the audit list for major events provided by agents or clients in the guidance documents.

- The integrity verification results shall be generated as audit records.

o The audit records of clients and agents shall include key information for each event.

- The date and time, event type, identity of the subject who caused the event, and the outcome of the event shall be included.

o If there is a server, the function to transmit the major audit records generated by agents or clients to the server shall be provided.

- [Table 7] The server transmission function of the audit records described in the major audit events to be generated shall be implemented.
- After disconnection from the server, the audit records loaded after the disconnection shall be all transmitted to the server when it is recovered.
- Protection of audit records transmitted to the server shall satisfy the requirements of FPT_ITT.1.

o The update file digital signature verification result (success or failure) shall be recorded in the audit.

#### 6.1.1.3. FAU_SAA.1 Potential violation analysis

Component relationships

| | |
|---|---|
| Hierarchical to | No other components. |
| Dependencies | FAU_GEN.1 Audit data generation |

| | |
|---|---|
| FAU_SAA.1.1 | The TSF shall be able to apply a set of rules in monitoring the audited events and based upon these rules indicate a potential violation of the enforcement of the SFRs. |
| FAU_SAA.1.2 | The TSF shall enforce the following rules for monitoring audited events:<br>a) Accumulation or combination of [assignment: *subset of defined auditable events*] known to indicate a potential security violation;<br>b) [assignment: *any other rules*]. |

Application notes

o If the result of the TOE's self-test is failure, the response function shall be performed.

o The TOE shall perform the response function if the integrity verification fails.

o The TOE agents or clients shall verify the integrity periodically or upon the authorized administrator's request and provide the administrator with a result notification function.

- △In case of abnormality in the integrity verification results △Integrity verification results by the administrator shall be notified to the administrator.

#### 6.1.1.4. FAU_SAR.1 Audit review

Component relationships

| | |
|---|---|
| Hierarchical to | No other components. |

| | |
|---|---|
| Dependencies | FAU_GEN.1 Audit data generation |
| FAU_SAR.1.1 | The TSF shall provide [authorized administrator] with the capability to read [all the audit data] from the audit data. |
| FAU_SAR.1.2 | The TSF shall provide the audit data in a manner suitable for the **authorized administrator** to interpret the information. |

Application notes

o The TOE shall provide a function for the authorized administrator to inquire the audit record.
- The audit record shall be inquired only through the security function provided by the TOE.
- The TOE shall provide audit records for the authorized administrator to properly interpret the information.

#### 6.1.1.5. FAU_SAR.3 Selectable audit review

Component relationships

| | |
|---|---|
| Hierarchical to | No other components. |
| Dependencies | FAU_SAR.1 Audit review |
| FAU_SAR.3.1 | The TSF shall provide the ability to apply [assignment: *methods of selection and/or ordering*] of audit data based on [assignment: *criteria with logical relations*]. |

Application notes

o The TOE shall provide a function for the administrator to select a logical condition when inquiring audit records, and to search or sort the records according to various conditions.

#### 6.1.1.6. FAU_STG.1 Audit data storage location

Component relationships

| | |
|---|---|
| Hierarchical to | No other components. |
| Dependencies | FAU_GEN.1 Audit data generation<br>FTP_ITC.1 Inter-TSF trusted channel |
| FAU_STG.1.1 | The TSF shall be able to store generated audit data on the [ selection: *TOE itself, transmit the generated audit data to an external IT entity using a trusted channel according to FTP_ITC, [assignment: other storage location(s)]*. ] |

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o A function to store audit records in local storage or transmit them to an external IT entity in real time shall be implemented.

o If audit records are stored in a log server outside the TOE, cryptographic communication shall be performed.

- If syslog is supported, it shall support cryptographic transmission through *syslog over TLS(RFC 5424), or syslog over DTLS(RFC 6012), etc*.
- The cryptographic algorithm used, cryptographic key security, and cryptographic key storage method shall satisfy the requirements of FCS class and 'Protection when storing cryptographic key' of FPT_PST.1.

## 6.1.2. Cryptographic support (FCS)

### 6.1.2.1. FCS_CKM.1 Cryptographic key generation

| | |
|---|---|
| Component relationships | |
| Hierarchical to | No other components. |
| Dependencies | [FCS_CKM.2 Cryptographic key distribution, or<br>FCS_CKM.5 Cryptographic key derivation, or<br>FCS_COP.1 Cryptographic operation]<br>FCS_CKM.3 Cryptographic key access<br>[FCS_RBG.1 Random bit generation, or<br>FCS_RNG.1 Generation of random numbers]<br>FCS_CKM.6 Timing and event of cryptographic key destruction |
| FCS_CKM.1.1 | The TSF shall generate cryptographic keys in accordance with a specified cryptographic key generation algorithm [assignment: *cryptographic key generation algorithm*] and specified cryptographic key sizes [assignment: *cryptographic key sizes*] that meet the following: [assignment: *list of standards*]. |

Application Notes

**1. Authentication token-related cryptographic key generation**

o The TOE shall use the validated cryptographic module when generating a cryptographic key required for cryptographic operation to generate the authentication token.

- When using random bits for generating a cryptographic key, the random bit generator of the validated cryptographic module shall be used, and the entropy of the random bit generator SEED value shall be $2^{112}$ or higher.

**2. Other cryptographic key generation**

o The TOE shall generate cryptographic keys in a secure method.

- Examples of secure cryptographic key generation methods are as follows:
  - *Key generation using random bit generator(CTR_DRBG, HASH_DRBG, HMAC_DRBG, etc.)*
- The random bit generator shall be implemented in compliance with domestic/foreign standards.
- It is possible to generate asymmetric key pairs (public keys/private keys) or symmetric keys using random bits generated by the random bit generator.

#### 6.1.2.2. FCS_CKM.6 Timing and event of cryptographic key destruction

| | |
|---|---|
| Component relationships | |
| Hierarchical to | No other components. |
| Dependencies | [FDP_ITC.1 Import of user data without security attributes, or<br>FDP_ITC.2 Import of user data with security attributes, or<br>FCS_CKM.1 Cryptographic key generation, or<br>FCS_CKM.5 Cryptographic key derivation] |
| FCS_CKM.6.1 | The TSF shall destroy [assignment: *list of cryptographic keys (including keying material)*] when [ selection: *no longer needed, [assignment: other circumstances for key or keying material destruction]* ]. |
| FCS_CKM.6.2 | The TSF shall destroy cryptographic keys and keying material specified by FCS_CKM.6.1 in accordance with a specified cryptographic key destruction method [assignment: *cryptographic key destruction method*] that meets the following: [assignment: *list of standards*]. |

응용 시 주의사항

**1. Destruction of authentication token-related cryptographic keys and critical security parameters**

o The TOE shall delete the used key encryption key(KEK).

o When terminating execution, all cryptographic keys and critical security parameters loaded in the memory shall be deleted.

- When destroying cryptographic keys and critical security parameters, a method of overwriting at least 3 times with 0 or 1 can be used.

**2. Destruction of other cryptographic keys**

o The TOE shall securely destroy the cryptographic keys generated or used in the TOE.

- △When terminating execution of the TOE, △When calling cryptographic key deletion function, △When terminating cryptographic communication, etc., all cryptographic keys and information related to cryptographic key that have expired shall be destroyed.

- When destroying cryptographic keys, a method of overwriting at least 3 times with values of 0 or 1 can be used.
- For details, refer to the cryptographic key destruction method of the 'Encryption Key Management Guide' (Ministry of Science and ICT, 2014).

#### 6.1.2.3. FCS_COP.1 Cryptographic operation

| Component relationships | |
|---|---|
| Hierarchical to | No other components. |
| Dependencies | [FDP_ITC.1 Import of user data without security attributes, or<br>FDP_ITC.2 Import of user data with security attributes, or<br>FCS_CKM.1 Cryptographic key generation, or<br>FCS_CKM.5 Cryptographic key derivation]<br>FCS_CKM.6 Timing and event of cryptographic key destruction |
| FCS_COP.1.1 | The TSF shall perform [assignment: *list of cryptographic operations*] in accordance with a specified cryptographic algorithm [assignment: *cryptographic algorithm*] and cryptographic key sizes [assignment: *cryptographic key sizes*] that meet the following: [assignment: *list of standards*]. |

Application notes

**1. Authentication token-related cryptographic operation**

o The TOE shall use the cryptographic algorithm of the validated cryptographic module to perform cryptographic operations to generate the authentication token.

- The TOE must comply with the following when using the block cipher algorithm.
  - When using the ECB operation mode, it must be applied only to single blocks.
  - In CBC and CFB modes, the IV must satisfy unpredictability, and in OFB, CCM, and GCM modes, the IV must satisfy uniqueness. For this purpose, random IVs are generally used in CBC, CFB, OFB, CCM, and GCM modes.
  - In CTR mode, the counter value must satisfy uniqueness, and for this purpose, random values are used for more than half of the counter values.
  - When decryption is performed in CCM or GCM mode, the tag result value must be verified and then the plain text must be output.
- Refer to the type of product to be equipped with a validated cryptographic module posted on the website of the National Cyber Security Center and list of validated cryptographic module.

**2. Other cryptographic operation related to TSF data transfer and storage**

o The TOE shall use the recommended cryptographic algorithm when transmitting and storing important information.

- The recommended cryptographic algorithm is a standard algorithm with a security strength of 112 bits or higher. Refer to the supporting document. Examples are as follows:
  - *Hash Algorithm: SHA-224 or higher*
  - *Symmetric key Algorithm: Key length 128 bits or higher*
  - *Public key Algorithm: RSA 2048 or higher, DSA(2048, 224) or higher*
  - *Digital signature Algorithm: RSA-PSS 2048 or higher, KCDSA(2048, 224) or higher, ECDSA/EC-KCDSA (B-233, B-283, K-223, K-283, P-224, P-256)*
- However, the use of TDES( including 2 keys and 3 keys) is not permitted.
- When using block cipher, ECB mode shall not be used if the plain text size is larger than the encryption block size.
- When using block cipher, fixed IV shall not be used in CFB or OFB mode.
- Domestic/foreign standard cryptographic algorithms shall be used, and the use of the national cryptographic algorithm is recommended.
- For details of cryptographic algorithm with a security strength of 112 bits or higher, refer to 'Guide to Cryptographic Algorithm and Key Length' (Ministry of Science and ICT, 2018), 'Software Cryptographic Module Validation Criteria' and 'NIST SP 800-131Ar2'.

#### 6.1.2.4. FCS_RBG.1 Random bit generation (RBG)

| Component relationships | |
|---|---|
| Hierarchical to | No other components. |
| Dependencies | [FCS_RBG.2 Random bit generation (external seeding), or<br>FCS_RBG.3 Random bit generation (internal seeding – single source)]<br>FPT_FLS.1 Failure with preservation of secure state<br>FPT_TST.1 TSF self-testing |
| FCS_RBG.1.1 | The TSF shall perform deterministic random bit generation services using [assignment: *DRBG algorithm*] in accordance with [assignment: *list of standards*] after initialization. |
| FCS_RBG.1.2 | The TSF shall use a [selection: TSF entropy source [assignment: *name of entropy source], TSF interface for obtaining entropy*] for initialization and reseeding. |
| FCS_RBG.1.3 | The TSF shall update the DRBG state by [selection: *reseeding, uninstantiating and re-instantiating*] using a [ selection: *TSF entropy source [assignment: name of entropy source], TSF interface for obtaining entropy [assignment: name of the interface]* ] in the following situations: |

[ selection:

— *never;*

— *on demand;*

— *on the condition: [assignment: condition];*

— *after [assignment: time]* ]

in accordance with [assignment: *list of standards*].

Application notes

**1. Random bit generation related to authentication token**

o The TOE shall use the random bit generator of the validated cryptographic module when generating cryptographic key, and the entropy of the random bit generator SEED value shall be $2^{112}$ or higher.

**2. Other random bit generation related to TSF data**

o Examples of secure cryptographic key generation methods are as follows:

- *Password-based key derivation(PKCS#5 v2.1(RFC 8018), NIST SP 800-132, etc.)*
- *Key derivation with pre-shared keys(TTAK.KO-12.0272)*
- *Key generation using random bit generator(CTR_DRBG, HASH_DRBG, HMAC_DRBG, etc.)*

o The random bit generator shall be implemented in compliance with domestic and foreign standards.

o It is possible to generate asymmetric key pairs (public keys/private keys) or symmetric keys using random bits generated by the random bit generator.

o User password used by the TOE for user identification and authentication shall be stored using a one-way encryption(Hash) to prevent decryption.

- When performing a one-way encryption, it is necessary to add and apply a randomly generated value called salt to the password.
- The salt value does not need to be confidential. It shall be generated using random bit generator and the size must be at least 48 bits.
- The iteration count shall be applied as large as possible. (at least 1000 times)

## 6.1.3. Identification and authentication (FIA)

### 6.1.3.1. FIA_AFL.1 Authentication failure handling

| Component relationships | |
|---|---|
| Hierarchical to | No other components. |
| Dependencies | FIA_UAU.1 Timing of authentication |

| | |
|---|---|
| FIA_AFL.1.1 | The TSF shall detect when [ selection: *[assignment: positive integer number], an administrator configurable positive integer within [assignment: range of acceptable values]* ] unsuccessful authentication attempts occur related to [assignment: *list of authentication events*]. |
| FIA_AFL.1.2 | When the defined number of unsuccessful authentication attempts has been *met,* the TSF shall [assignment: *list of actions*]. |

Application notes

o If user authentication fails consecutively as many times as the set number in the TOE, the identification and authentication functions shall be deactivated.

- Examples of how to activate after deactivating the identification and authentication functions are as follows:
  - *Activation after a specified period of time after account lock-out*
  - *Provision of other identification and authentication means for activation after account lock-out*
- Additional identification and authentication means specified in FIA_UAU.1 may be provided. In case of authentication failure with additional identification and authentication means, it shall be included in the number of user authentication failures.
- The number of consecutive authentication failures in which identification and authentication are deactivated shall be fixed or settable at a value of 5 or less.
- When implementing to deactivate the authentication function for a certain period of time, the time required for re-activation shall be fixed or settable at a value of 5 minutes or more.

o If administrator authentication fails consecutively as many times as the set number, the TOE shall notify the administrator through means that can be immediately checked.

- Notification shall be made through at least one of *alarm, text messaging, e-mail, etc.*

### 6.1.3.2. FIA_IMA.1 TOE Internal mutual authentication (Extended)

Component relationships

| | |
|---|---|
| Hierarchical to | No other components. |
| Dependencie | No dependencies. |
| FIA_IMA.1.1 | The TSF shall perform mutual authentication between [assignment: *different parts of TOE*] in accordance with a specified [assignment: *authentication protocol*] that meets the following: [assignment: *list of standards*]. |

Application notes

o This SFR must be applied among the TOE components that are physically separated.

o If the TOE components include the server and the agent that receives the security policy from it, the agent shall perform identification and authentication for the server.

- Agents shall perform identification and authentication to confirm the legitimacy of the server.
- One of the server IP address and domain name must be included in the server identification information, and additional identification information can be used.
- The authentication method for the server includes a *certificate-based authentication method, etc*.
- When using a certificate, verification of the validity of the certificate(within 1 year of validity) shall be performed.

#### 6.1.3.3. FIA_SOS.1 Verification of secrets

Component relationships

Hierarchical to: No other components.

Dependencies: No dependencies.

FIA_SOS.1.1: The TSF shall provide a mechanism to verify that secrets meet [assignment: *a defined quality metric*].

Application notes

o If ID/password is the only means of user identification and authentication, the TOE shall meet the security criteria of <Password Security Criteria Type(1)> when registering and changing passwords.

<Password Security Criteria Type(1)>

| Description | Contents | Remarks |
|---|---|---|
| Compliance | Secure the length of more than 9 digits | Mandatory |
| | Contains at least one number, uppercase letter(english), lowercase letter(english), and special character each | Mandatory |
| Prohibition | Do not set the same password as the user account (ID) | Mandatory |
| | Prohibition of consecutive repeated input of the same letter/number | Mandatory |
| | Prohibit sequential input of consecutive letters or numbers on the keyboard | Mandatory |
| | Prohibition of reuse of the password used immediately before | Implement either one of the two. |
| | Prohibition of reuse of the password used within the past 3 months | |

o If ID/password input and additional identification and authentication functions are performed concurrently, the TOE shall meet the security criteria of <Password Security criteria Type(2)>

when registering and changing passwords.

<Password Security Criteria Type(2)>

| Description | Contents | Remarks |
|---|---|---|
| Compliance | Secure the length of more than 6 digits | Mandatory |
| | Contains at least one number, uppercase letter(english), lowercase letter(english), and special character each | Optional |
| Prohibition | Do not set the same password as the user account (ID) | Mandatory |
| | Prohibition of consecutive repeated input of the same letter/number | Optional |
| | Prohibit sequential input of consecutive letters or numbers on the keyboard | Optional |
| | Prohibition of reuse of the password used immediately before | Optional |
| | Prohibition of reuse of the password used within the past 3 months | Optional |

#### 6.1.3.4. FIA_SOS.2 TSF Generation of secrets

Component relationships

Hierarchical to: No other components.

Dependencies: No dependencies.

FIA_SOS.2.1: TSF shall provide a mechanism to generate **an authentication token** that meet [assignment: *a defined quality metric*].

FIA_SOS.2.1: TSF shall be able to enforce the use of TSF-generated **authentication token** for [assignment: *list of TSF functions*].

Application notes

o The TOE shall generate the authentication token for user Single Sign-On.

- When generating the authentication token, the TOE shall configure the authentication token to ensure uniqueness for each authentication token. 'One-time authentication data' can be used as a way to ensure uniqueness, and examples of 'one-time authentication data' are as follows.
  - One Time Password
  - Encrypted time stamps and/or random numbers from a secret lookup table, etc.
- When generating the authentication token, important information(e.g., random number used for authentication information) included in the authentication token shall be protected by providing confidentiality and integrity, and the reuse of authentication tokens shall be prevented.

- The cryptographic function for generating the token must use the approved cryptographic algorithms of the validated cryptographic module whose security and implementation conformance are validated by the Korea Cryptographic Module Validation Program (KCMVP) and the validated cryptographic module must run in approved mode of operation when performing cryptographic operation.
- The cryptographic algorithm used, cryptographic key security, and cryptographic key storage method shall satisfy the requirements of FCS class and 'Protection when storing cryptographic key' of FPT_PST.1.

o The TOE shall perform user Single Sign-On using the authentication token.

o The TOE shall perform cryptographic operations to generate authentication tokens using the cryptographic algorithm of the validated cryptographic module.

#### 6.1.3.5. FIA_SOS.3 Destruction of secrets (Extended)

| Component relationships | |
|---|---|
| Hierarchical to | No other components. |
| Dependencies | FIA_SOS.2 TSF Generation of secrets |
| FIA_SOS.3.1 | The TSF shall destroy **authentication tokens** in accordance with a specified **authentication token** destruction method [assignment: secrets *destruction method*] that meets the following: [assignment: *list of standards*]. |

Application notes

o The TOE shall safely destroy the authentication tokens.

- The authentication token can only be used until the user session is terminated, and it shall be safely destroyed when a session is terminated.
  - When a session is terminated, or the TOE execution is finished, all tokens loaded onto the memory shall be destroyed.
  - When destroying the authentication tokens, a method of overwriting at least 3 times with 0 or 1 can be used.

#### 6.1.3.6. FIA_UAU.1 Timing of authentication

| Component relationships | |
|---|---|
| Hierarchical to | No other components. |
| Dependencies | FIA_UID.1 Timing of identification |
| FIA_UAU.1.1 | The TSF shall allow [assignment: *list of TSF mediated actions*] on behalf of the user to be performed before the user is authenticated. |
| FIA_UAU.1.2 | The TSF shall require each user to be successfully authenticated before allowing any other TSF-mediated actions on behalf of that user. |

Application notes

## 1. TOE user(administrators, end users, external IT entity) authentication

o The TOE shall provide user account/password-based identification and authentication functions to verify the identity of the user.

- Identification and authentication must be performed to confirm that the user is a legitimate user of the TOE.
- If it is required to identify and authenticate users who exist in the agents or clients constituting the TOE, the identification value shall be a unique value that is not registered in duplicate.
  - When authenticating the user, the additional attributes of the registered agents or clients shall also be authenticated.
  - Additional attributes: IP address is mandatory, and at least one of *the MAC address, Serial Number, and information that can uniquely identify the agent itself* shall be additionally used.

o In case of the TOE supports additional identification and authentication methods, for user identification and authentication, the TOE must provide additional identification and authentication functions on its own or by interacting with external IT entities in parallel with user account and password-based identification and authentication.

- In order to provide additional identification and authentication functions, *△2FA support device complying with FIDO standards, △certificates, △one-time password generator(OTP), etc.* can be used.
  - If it is supported in the TOE operating environment, '2FA support device complying with FIDO standards' is recommended.
- If additional identification and authentication functions are provided by the TOE, the functions can be provided by receiving the authentication results from the inside of the TOE or from interaction with the external IT entities.
  - If the TOE provides a certification utilization method, certification validation shall be performed.
  - The authentication information used by external IT entities to perform additional identification and authentication methods shall be securely managed by the external IT entities. If the TOE stores authentication information use to perform additional identification and authentication methods, the requirements of FPT_PST.1 shall be applied.

o If the TOE authenticates external IT entities, the TOE shall authenticate the interacted external IT entities.

## 2. End user Single Sign-On

o The TOE shall generate the authentication token for user Single Sign-On.

o The TOE shall perform user Single Sign-On using the authentication token.

- The TOE shall use the authentication token generated according to FIA_SOS.2.
- After issuing the authentication token, the TOE shall verify the validity of the authentication token when the user accesses the business system.

o The TOE shall safely destroy the authentication token.

### 6.1.3.7. FIA_UAU.4 Single-use authentication mechanisms

Component relationships

| | |
|---|---|
| Hierarchical to | No other components. |
| Dependencies | No dependencies. |

FIA_UAU.4.1 The TSF shall prevent reuse of authentication data related to [assignment: *identified authentication mechanism(s)*].

Application notes

o The TOE shall prevent reuse of user's authentication information(*using timestamp, encrypting session ID, etc.*)

- It is mandatory to apply to authentication information to be used for user account/password-based identification and authentication specified in FIA_UAU.1.
- If the TOE receives authentication information from the user to provide additional identification and authentication methods specified in FIA_UAU.1, it is mandatory to apply to the corresponding authentication information.
- It can be prevented by encrypting the session ID or guaranteeing the uniqueness of the session ID*(including timestamp and random bit values, setting session expiration time, etc.)*
- If the TOE detects an attempt to reuse authentication information that is prohibited from being reused, authentication shall fail and an audit record shall be generated for the authentication failure event.

o When generating the authentication token, the TOE shall configure the authentication token to ensure uniqueness for each authentication token. 'One-time authentication data' can be used as a way to ensure uniqueness, and examples of 'one-time authentication data' are as follows.

- One Time Password
- Encrypted time stamps and/or random numbers from secret information search tables, etc.

### 6.1.3.8. FIA_UAU.7 Protected authentication feedback

Component relationships

| | |
|---|---|
| Hierarchical to | No other components. |
| Dependencies | FIA_UAU.1 Timing of authentication |

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

Application notes

o The TOE shall not display the contents when displaying the information used for authentication on the output device.

- It shall be applied when the authentication information specified in FIA_UAU.1 is displayed on the output device.
- The information used for authentication shall be output in the form of *no-display of input contents, display of "*" instead of input characters, etc.*
- When users log in, the authentication information shall not be exposed with plain text in the memory area.

o In case of identification and authentication failures, the TOE shall not provide the feedback for the cause of failure (*e.g. non-existent account(ID), password error, etc.*).

### 6.1.3.9. FIA_UID.1 Timing of identification

Component relationships

Hierarchical to No other components.

Dependencies No dependencies.

FIA_UID.1.1 The TSF shall allow [assignment: *list of TSF-mediated actions*] on behalf of the user to be performed before the user is identified.

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

Application notes

o The TOE shall provide user account/password-based identification and authentication functions to verify the identity of the user.

- Identification and authentication must be performed to confirm that the user is a legitimate user of the TOE.

o In case of the TOE supports additional identification and authentication methods, for user identification and authentication, the TOE must provide additional identification and authentication functions on its own or by interacting with external IT entities in parallel with user account and password-based identification and authentication.

o If the TOE authenticates external IT entities, the TOE shall authenticate the interacted external IT entities.

### 6.1.4. Security management (FMT)

#### 6.1.4.1. FMT_MOF.1 Management of security functions behaviour

| Component relationships | |
|---|---|
| Hierarchical to | No other components. |
| Dependencies | FMT_SMF.1 Specification of Management Functions<br>FMT_SMR.1 Security roles |
| FMT_MOF.1.1 | The TSF shall restrict the ability to ***conduct management actions*** of the functions [assignment: *list of functions*] to [assignment: *the authorized identified roles*]. |

Application notes

o The TOE shall provide the authorized administrator with the security management functions to set and manage security functions, security policies, important data, etc.

- The security management functions include the followings:
  - A function to add, delete or change conditions or rules that can determine the behavior of the security function.
  - A function to add, remove or change the actions to be performed by the TOE in accordance with the conditions or rules.
  - A function to select or change TOE settings
- The security management functions to be implemented by the TOE are shown in [Table 8] below.

| Sub-category | Security management | Remarks |
|---|---|---|
| Identification and authentication | User registration, deletion and change, grant privileges | Not applicable, if the user registered in the TOE is the only one. |
| | Setting user's password combination/length policy | Mandatory when providing the function |
| | Setting the allowed number of user's authentication failures | Mandatory when providing the function |
| | Setting the response methods to user's authentication failures | Mandatory when providing the function |
| | Setting the time from deactivation of user's authentication function to re-activation | Mandatory when providing the function |
| | Setting the authentication information of external IT entities that is authenticated by the TOE. | Mandatory when providing the function |

| | | |
|---|---|---|
| Security management | IP registration, deletion and change of management terminals | |
| | Backup of important data, configuration information, audit records, etc. | Mandatory when providing the function |
| | Recovery of important data, configuration information, audit records, etc. | Mandatory when providing the function |
| Security management | Enabling and disabling management access service | Mandatory when providing the function |
| | Agent inquiry - status, version, and applied security policy | Mandatory when including agents |
| | Agent security policy management – policy settings, policy transmission | Mandatory when including agents |
| | Setting the authentication information for access to external IT entities | Mandatory when providing the function |
| Self-protection | Performing self-test for TOE's security function by administrator's request | Mandatory when providing the function |
| | Setting response actions when self-test fails | Mandatory when providing the function |
| | Performing an integrity verification of the TOE setting values and the TOE itself by the administrator's request | |
| | Setting response actions when integrity verification fails | Mandatory when providing the function |
| Update protection | Manual validation of update files by administrator | Mandatory when providing the function |
| | Manual recovery of failed installation of update files by administrator | Mandatory when providing the function |
| | Inquiry of TOE version information | |
| Safe session management | User session locking time, user session timeout time setting | Mandatory when providing the function |
| | (In case session locking) Administrator or individual user authentication when unlocking sessions | |
| | Setting the number of concurrent user access sessions | Mandatory when providing the function |
| Audit records | Inquiry of audit records | |
| | Response-related settings for loss of audit records | Mandatory when providing the function |

[Table 8] Security management functions to be implemented by TOE

o The TOE shall provide enable/disable functions for all management access.

o If an agent is included in the TOE, the TOE shall provide the ability to centrally manage

the security policy and force the agent to apply the server's security policy.

- If an agent is included in the TOE, the server shall centrally manage the policy and be able to enforce the server's security policy regardless of whether the agent itself has a security management function.
- If the agent itself has a security management function, the server shall be able to enable/disable the agent's configuration function.

o The communication service that does not support Cryptographic communication channels shall be able to be disabled.

o During TOE operation, it shall support the self-test execution periodically or by administrator's request.

o To ensure correct operation, the TOE shall perform the response function implemented on its own or the response function set by the administrator when the self-test fails.

o The TOE shall provide the administrator with the function to perform integrity verification.

o The TOE shall perform the response function implemented on its own or the response function set by the administrator when the integrity verification fails.

o If the TOE provides online update or manual update function, only the update files that have succeeded in validation shall be installed or applied.

o If the TOE does not provide the function of automatically maintaining the existing version when the update installation fails, manual recovery by the administrator shall be supported.

o Locked sessions shall be unlocked by the administrator or through the user authentication function for each session, after the locking time has elapsed.

o Additionally, the TOE may provide a function to send audit records to external log servers by administrator.

- *If syslog is supported, it shall support cryptographic transmission through syslog over TLS(RFC 5424), or syslog over DTLS(RFC 6012).*
- The cryptographic algorithm used, cryptographic key security, and cryptographic key storage method shall satisfy the requirements of FCS class and 'Protection when storing cryptographic key' of FPT_PST.1.

o If an agent or client provides a management function, the agent or client shall provide a security management function that allows users to set and manage their own security functions, security policies, and important data, etc.

- If the TOE component includes a server and an agent, the agent shall be able to enforce the security policy transmitted by the server as the agent's settings.
- A user guidance shall be submitted that identifies and describes all security management functions provided by the agent or client.

o TOE agents or clients shall verify the integrity periodically or upon the authorized administrator's request, and provide the administrator with the result notification function.

### 6.1.4.2. FMT_MTD.1 Management of TSF data

Component relationships

| | |
|---|---|
| Hierarchical to | No other components. |
| Dependencies | FMT_SMF.1 Specification of Management Functions<br>FMT_SMR.1 Security roles |

FMT_MTD.1.1 The TSF shall restrict the ability to ***manage*** [assignment: *list of TSF data*] to [assignment: *the authorized identified roles*].

Application notes

- o The TOE shall provide the authorized administrator with the security management functions to set and manage security functions, security policies, important data, etc.
  - The security management functions include the followings:
    - A function to add, delete or change conditions or rules that can determine the behavior of the security function.
    - A function to add, remove or change the actions to be performed by the TOE in accordance with the conditions or rules.
    - A function to select or change TOE settings
  - The security management functions to be implemented by the TOE are shown in [Table 8] of FMT_MOF.1.
- o The administrator shall be able to grant privileges each user or each group.
- o The user account(ID) is a unique value and shall not be registered in duplicate.
- o The number of consecutive authentication failures in which identification and authentication are deactivated shall be fixed or settable at a value of 5 or less.
- o When implementing to deactivate the authentication function for a certain period of time, the time required for re-activation shall be fixed or settable at a value of 5 minutes or more.
- o If ID/password is the only means of user identification and authentication, the TOE shall meet the security criteria, <Password Security Criteria Type(1)> of FIA_SOS.1 when registering and changing passwords.
- o If ID/password input and additional identification and authentication functions are performed concurrently, the TOE shall meet the security criteria, <Password Security Criteria Type(2)> of FIA_SOS.1 when registering and changing passwords.
- o If authentication information necessary for external IT entity authentication is required to be set, the TOE shall provide the function to set the information necessary for external IT entity authentication.
  - The application target may be a *pre-shared key for the authentication server connection, an SNMP authentication/encryption password, etc*.

- When passwords are used for external IT entity authentication, the security criteria, <Password Security Criteria Type(1)> or <Password Security Criteria Type(2)>of FIA_SOS.1 shall be complied with.

o The TOE shall provide a function to limit the IP of the accessible management terminals.

- The IP address of the management terminals shall be able to be registered, deleted or changed.
- Management terminals that can be accessed by administrators who have only read permission instead of for management purpose (e.g., *monitoring administrators, etc.*) can be additionally registered and operated.
- Only one single host IP address can be added per time for accessible management terminals.
- A method of specifying an IP address range, such as 192.168.10.2~253, or registration using 0.0.0.0, 192.168.10.*, any, etc. which means the the entire network range is not allowed.

o When providing a function that requires a password to access internal components of the TOE or external IT entities, the TOE shall provide the default password change function used to access internal components or external IT entities.

- Examples of default passwords include DBMS passwords and web server/WAS server passwords.
- If the TOE stores the default password to access the DBMS, the TOE shall provide a function to change the default password.
- If the TOE stores the default password to access the WEB Server•WAS Server, the TOE shall provide a function to change the default password.
- Depending on whether additional identification and authentication functions are concurrently used when generating a password, the security criteria, <Password Security Criteria Type(1)> or <Password Security Criteria Type(2)> of FIA_SOS.1 shall be complied with.
- If a default account(ID) exists in the TOE to access DBMS/Web Server/WAS Server, a function to change it may be provided.

o If an external IT entity interacted with the TOE requests authentication information for TOE authentication, the TOE shall provide a function to set the authentication information required to be authenticated by the external IT entity.

- Examples of authentication information include the password used to authenticate the TOE in the SMTP server.
- It is recommended that passwords should comply with the security criteria, <Password Security Criteria Type (2)> of FIA_SOS.1.
  - However, even the characters included in the password security criteria may not include characters that are not permitted to be entered by the interacted external IT entity.

o If the TOE includes agents, the TOE shall provide a function to inquire information about the agent.

- The essential inquiry information for the agent is as follows.
  - Agent version, security policy applied to the agent, agent operation status (enabled/disabled),

agent integrity verification result (success/failure)

- Additional information about the agent is as follows.
  - *Additional agent attributes, others (operating system information of the managed system where the agent is installed, IP information, other information, etc.), etc.*

o If the TOE includes agents, the TOE shall centrally manage the security policy and provide a function to enforce the server's security policy to the agent.

- If the TOE includes agents, the server must centrally manage the policy and shall be able to enforce the server's security policy regardless of the agent's own security management function.

o The TOE shall provide an interface that allows only authorized administrators to access the TOE settings, and other persons than authorized administrators shall not be able to access the TOE settings.

- Access means operations such as read, change, and delete, etc.

o When providing the function to backup the TOE settings in the form of external file, an encryption function shall be provided.

o For encryption, the cryptographic algorithm used, cryptographic key security, and cryptographic key storage method shall satisfy the requirements of FCS class and 'Protection when storing cryptographic key' of FPT_PST.1.

o The TOE shall provide a function for the administrator to check the contents and results of integrity verification.

- The contents and results of integrity verification shall be confirmed through *screen display, audit records*.

o The TOE shall provide a function for users to check 'the unique identification information of the TOE'.

- The TOE identification information must be unique, can be checked by the user through the interface, and cannot be modified or changed. It shall include the following:
  - TOE name, TOE version, TOE release or build number
- If the TOE includes multiple components that are physically separated, the identification information of each component shall be unique, can be checked, and cannot be modified or changed by users. It shall include the following:
  - The name and version of the TOE including the component, the component name, the component version, and the component release or build number
- A version management system shall be applied to check the patch of the TOE/components and whether functions are improved.

(e.g., In case of patch and function improvement, a system for changing the major version, minor version, release number, and build number for each case is established to track the reason for the change of TOE/components with version information)

- In case of hardware appliance, users shall be able to view the unique identification

information of the firmware in addition to TOE identification information through TOE interface.

o A certain amount of time, which is the cumulative amount of time after connection that triggers user session locking or session time-out, the administrator can fix the accumulated amount of time from a value of 10 minutes or less, or set it in proportion to the number of authentication failures.

o Audit records shall be inquired only through the security function provided by the TOE.

o The relevant user interface(UI) and CLI commands shall not be provided so that even an authorized administrator cannot delete or change audit records.

o Examples of conditions to notify administrators related to audit record loss response are as follows.

- *90% or more of the setup disk capacity, 100 MB or more, etc.*

o If an agent or client provides a management function, the agent or client shall provide a security management function that allows users to set and manage their own security functions, security policies, and important data, etc.

- If the TOE component includes a server and an agent, the agent shall be able to enforce the security policy transmitted by the server as the agent's settings.
- A user guidance shall be submitted that identifies and describes all security management functions provided by the agent or client.

#### 6.1.4.3. FMT_PWD.1 Management of ID and password (Extended)

| Component relationships | |
|---|---|
| Hierarchical to | No other components. |
| Dependencies | FMT_SMF.1 Specification of Management Functions<br>FMT_SMR.1 Security roles |
| FMT_PWD.1.1 | The TSF shall restrict the ability to manage the password of [assignment: *list of functions*] to [the authorized administrator].<br>1. [assignment: *password combination rules and/or length*]<br>2. [assignment: *other management such as management of special characters unusable for password, etc.*] |
| FMT_PWD.1.2 | The TSF shall restrict the ability to manage the ID of [assignment: *list of functions*] to [the authorized administrator].<br>1. [assignment: *ID combination rules and/or length*]<br>2. [assignment: *other management such as management of special characters unusable for ID, etc.*] |
| FMT_PWD.1.3 | The TSF shall provide the capability for [selection, choose one of: *setting ID and password when installing, setting password when installing, changing the ID and password when the authorized administrator accesses for the first time, changing the password when the authorized administrator* |

*accesses for the first time*].

Application notes

o The user account(ID) is a unique value and shall not be registered in duplicate.

o The TOE shall provide a function to forcibly change/generate the administrator default password during the initial access (management access, local access) to the TOE.

- If there is a default password, the function to change the default password shall be provided during the initial access to the TOE, and then management and local access to the TOE shall be possible.
- If there is no default password, a new password shall be created, and then management and local access to the TOE shall be possible.
  - Passwords shall comply with the security criteria, <Password Security Criteria Type (1)> or <Password Security Criteria Type (2)> of FIA_SOS.1.
- If there is no default account(ID), a new account(ID) shall be created, and then management and local access to the TOE shall be possible.

#### 6.1.4.4. FMT_SMF.1 Specification of Management Functions

| Component relationships | |
|---|---|
| Hierarchical to | No other components |
| Dependencies | No dependencies. |
| FMT_SMF.1.1 | The TSF shall be capable of performing the following management functions: [assignment: *list of management functions to be provided by the TSF*]. |

#### 6.1.4.5. FMT_SMR.1 Security roles

| Component relationships | |
|---|---|
| Hierarchical to | No other components. |
| Dependencies | FIA_UID.1 Timing of identification |
| FMT_SMR.1.1 | The TSF shall maintain the roles [assignment: *the authorized identified roles*]. |
| FMT_SMR.1.2 | TSF shall be able to associate users and their roles **defined in FMT_SMR.1.1.** |

### 6.1.5. Protection of the TSF (FPT)

#### 6.1.5.1. FPT_FLS.1 Failure with preservation of secure state

| Component relationships | |
|---|---|
| Hierarchical to | No other components |
| Dependencies | No dependencies. |

| | |
|---|---|
| FPT_FLS.1.1 | The TSF shall preserve a secure state when the following types of failures occur: [assignment: *list of types of failures in the TSF*]. |

#### 6.1.5.2. FPT_ITT.1 Basic internal TSF data transfer protection

| Component relationships | |
|---|---|
| Hierarchical to | No other components. |
| Dependencies | No dependencies. |

| | |
|---|---|
| FPT_ITT.1.1 | The TSF shall protect TSF data from *disclosure, modification* when it is transmitted between separate parts of the TOE. |

Application notes

o The TOE shall transmit using an encrypted channel to protect data transmitted among TOE components (e.g., *security policies, control commands, audit records, etc.*)

- For secure cryptographic communication, confidentiality and integrity shall be provided using standard protocols.
  - Secure cryptographic communication protocols include *HTTPS (implemented using TLS), TLS (TLS 1.2-RFC5246 or higher), SSH (SSH V2-RFC 4251, 4254), etc.*
- Use of its own protocol is not allowed.
- The cryptographic algorithm used, cryptographic key security, and cryptographic key storage method shall satisfy the requirements of FCS class and 'Protection when storing cryptographic key' of FPT_PST.1.

#### 6.1.5.3. FPT_PST.1 Basic protection of stored TSF data (Extended)

| Component relationships | |
|---|---|
| Hierarchical to | No other components. |
| Dependencies | No dependencies. |

| | |
|---|---|
| FPT_PST.1.1 | The TSF shall protect [assignment: *TSF data*] stored in containers controlled by the TSF from the unauthorized *disclosure.* |

Application notes

## 1. Protection when storing TSF data (important information)

o The TOE shall store important information in a secure way when storing it inside the TOE.

- At least when the TOE stores the following important information, it shall be encrypted and stored.
  - Password used by the TOE for user identification and authentication
  - Authentication information used by the TOE for additional identification and authentication
  - Data Encryption Key(DEK)
- The data encryption key(DEK) shall be encrypted and stored using the key encryption key(KEK).
- Requirements related to generation and storage of key encryption key(KEK) shall satisfy the requirements of FCS class and 'Protection when storing cryptographic key' of FPT_PST.1.
- When the TOE stores the following information, it must be stored using *encryption, access control, etc.*
  - Information used for mutual authentication when the TOE and external IT entities are interacted
  - DBMS/web server/WAS server's administrator password required for the TOE to access DBMS/web server/WAS server that exist inside or outside the TOE.
  - Cryptographic key (pre-shared key, symmetric key, private key)
- The user password used by the TOE for user identification and authentication shall be stored using one-way encryption(hash) to prevent decryption.
  - When performing one-way encryption, it is necessary to add and apply a randomly generated value called salt to the password.
  - The salt value does not need to be confidential. It shall be generated using a random bit generator and the size must be at least 48 bits.
  - The iteration count shall be applied as large as possible (at least 1000 times).
- DBMS/Web server/WAS server's administrator password, etc. required for TOE operation can be stored after being encrypted by applying the public key/symmetric key encryption algorithm.
- Cryptographic key means pre-shared key, symmetric key, private key, etc., and covers all keys used for TOE management access/local access, and interaction settings among TOE components.
- Passwords and cryptographic keys included in the minimum important information that shall be encrypted shall not be stored in the TOE by hard-coding.
- The cryptographic algorithm used, cryptographic key security, and cryptographic key storage method shall satisfy the requirements of FCS class and 'Protection when storing

cryptographic key' of FPT_PST.1.

## 2. Protection when storing TSF data (settings values, audit records)

ㅇ The TOE shall provide a function to protect the stored TOE setting values (security policies, environment setting parameters, etc.) so that only authorized administrators can access.

- For hardware appliance-type TOE, the TOE settings stored inside shall be protected, and for software-type TOE, the TOE settings stored in the store controlled by the TOE after installation.
- The TOE shall provide an interface that allows only authorized administrators to access TOE settings, and other persons than authorized administrators shall not be able to access TOE settings
  - Access means operations such as read, change, delete, etc.
- When providing the function to backup the TOE settings in the form of external files, an encryption function shall be provided.
- During encryption, the cryptographic algorithm used, cryptographic key security, and cryptographic key storage method shall satisfy the requirements of FCS class and 'Protection when storing cryptographic key' of FPT_PST.1.

o If WAS(*Tomcat, Jesus, etc.*) is included in the TOE package, the TOE shall implement not to include important information in the WAS log.

- Important information such as passwords and encryption keys shall not be left in plain text in the WAS log.

o The TOE may safely encrypt and store audit records when they are stored inside the TOE.

- The cryptographic algorithm used, cryptographic key security, and cryptographic key storage method shall satisfy the requirements of FCS class and 'Protection when storing cryptographic key' of FPT_PST.1.

## 3. Protection when storing cryptographic key

o The TOE shall store the cryptographic key in a secure way.

- Data encryption key(DEK) can be encrypted and stored by using key encryption key(KEK).
- Key Encryption Key(KEK) can be generated through multiple stages of key chain, among which the final key encryption key(KEK) can be encrypted and stored using the key encryption key(KEK) of the previous stage.
- The key encryption key(KEK) except the final key encryption key(KEK) in the key chain cannot be stored.
- When the cryptographic key is stored outside the TOE, it is recommended to use storage media that have been verified for safety such as smart cards, security USBs, and security tokens(HSM).

• It is recommended to use a product that has obtained a security function test report or a domestic/foreign CC certificate for the storage media.

- Hard-coding and storing the encryption key in the TOE are not permitted.
- As shown in the [Table 9] below, the sponsors shall identify all cryptographic keys used for storage and transmission in the TOE, and prove security by submitting a list and explanatory materials for key storage and destruction methods.

| Cryptographic key type | How to store and destroy keys |
|---|---|
| TLS private key | - Type: RSA Private Key<br>- Generator: Generated by TOE<br>- Storage/Protection: Store in the TOE/Block unauthorized access to TOE storage area<br>- Destruction: Overwrite 3 times with 0 and 1 when executing key destruction command |
| TLS session encryption key | - Type: ARIA Key<br>- Generator: Generated by TOE<br>- Storage/Protection: Store only in memory(RAM)<br>- Destruction: Overwrite 3 times with 0 and 1 when at the end of the session |
| TLS session integrity verification key | - Type: HMAC Key<br>- Generator: Generated by TOE<br>- Storage/Protection: Store only in memory(RAM)<br>- Destruction: Overwrite 3 times with 0 and 1 when at the end of the session |

[Table 9] How to store and destroy cryptographic keys

- When the TOE stores cryptographic keys (pre-shared key, symmetric key, private key, etc.) used for local/administrative access for TOE management and for interacted setting with separate equipment, it shall be protected and stored in a way such as *encryption, access control, etc.*

## 4. Protection when storing agent or client or management console TSF data (important information)

○ When the TOE agent or client stores important information in the file system or registry, the agent or client stores important information in the file system or registry, it shall be encrypted and stored.

- At least when the TOE stores the following important information, it shall be encrypted and stored.

- User password
- Cryptographic key (pre-shared key, symmetric key, private key)

- User password includes agent deletion key, and password shall be stored using one-way encryption(hash) not to be generally decrypted.
  - When performing one-way encryption, it is necessary to add a randomly generated salt to the password.
  - The salt value does not need to be confidential. It shall be generated using a random bit generator and it is the size of at least 48 bits.
  - The iteration count shall be applied as large as possible. (at least 1000 times)
- Cryptographic key means pre-shared key, symmetric key, private key, etc., and covers all keys used for TOE management access/local access, and interacting settings among TOE components.
- Passwords and cryptographic keys included in the minimum important information that shall be encrypted shall not be stored in the TOE by hard-coding.
- The cryptographic algorithm used, cryptographic key security, and cryptographic key storage method shall satisfy the requirements of FCS class and 'Protection when storing cryptographic key' of FPT_PST.1.
- Even if encryption is provided, it is recommended to protect in a way to additional file hiding, access control, etc.

## 5. Protection when storing agent or client or management console TSF data (setting values, audit data)

o When storing TOE settings and audit data in the file system or registry, a function to protect against unauthorized access may be provided.

- The relevant user interface(UI) and CLI commands shall not be provided to prevent deletion or modification of audit data even by agent users.
- Even agent users shall not be able to access the stored TOE settings.
  - Access means operations such as read, change, and delete.
- If the TOE security function cannot be fully implemented, it can be supported to protect the TOE settings storage in the TOE operating environment.
- When providing the function to backup the TOE settings in the form of external file, an encryption function shall be provided.

## 6. Protection when storing TSF data related to the authentication token (cryptographic key, critical security parameters)

o When the TOE stores the cryptographic key or critical security parameters, it shall be

encrypted with the key encryption key(KEK) through the encryption algorithm of the validated cryptographic module to store safely.

- The stored cryptographic key or critical security parameters shall be stored by using the key encryption key(KEK) generated in accordance with the FCS_CKM.1 'authentication token-related cryptographic key generation' requirements or FCS_CKM.5 'authentication token-related cryptographic key generation'.

#### 6.1.5.4. FPT_TST.1 TSF testing

Component relationships

| | |
|---|---|
| Hierarchical to | No other components. |
| Dependencies | No dependencies. |
| FPT_TST.1.1 | The TSF shall run a suite of the following self-tests [ selection: *during initial start-up, periodically during normal operation, at the request of the authorized* ***administrator****, at the conditions [assignment: conditions under which self-test should occur]* ] to demonstrate the correct operation of [selection: [assignment: parts of TSF], the TSF]: [assignment: *list of self-tests run by the TSF*]. |
| FPT_TST.1.2 | The TSF shall provide authorized **administrators** with the capability to verify the integrity of [ selection: *[assignment: parts of TSF data], TSF data* ]. |
| FPT_TST.1.3 | The TSF shall provide authorized **administrators** with the capability to verify the integrity of [ selection: *[assignment: parts of TSF], TSF* ]. |

Application notes

**1. TOE server self-test, response function, and audit record generation**

o The TOE shall perform self-test during initial start-up(or execution)/operation periodically or at the request of the administrator.

- When initial start-up(or execution) the TOE, it is mandatory to perform self-test, and during operation, it shall support the perform self-test periodically or at the request of the administrator.
- The self-test target means the main process of the TOE, and shall check whether the process is running normally.
- The target of self-test can be selected by the sponsors, but if the entity's abnormal state(*e.g., error, stop, etc.*) affects the security function of the TOE, the corresponding entity shall be included as the target of self-test.
- The history of self-testing shall be confirmed through *screen output, audit records.*
- The hardware appliance-type TOE shall satisfy the following requirements.

- A self-test shall be performed to detect errors in hardware(*e.g., memory, flash, NIC, etc.*) and software(*e.g., process, etc.*) included in the scope of the TOE at the start-up and during operation of the TOE.

- If physically separated TOE components exist, self-test shall be performed by selecting the targets to include all components.

- The sponsors shall describe the self-test function in detail in the submission document.

o If the TOE self-test result is a failure, it shall perform the response function.

- The TOE shall perform the implemented response function or the response function set by the administrator to ensure correct operation.

- Audit records shall be generated for self-test results.

- Examples of response functions performed when the self-test result is a failure are as follows.

  - *Termination of program execution, warning message screen display, restart process, etc.*

- A security management function may be provided for the administrator to set the response function.

## 2. TOE server integrity verification, response function, and audit record generation

o The TOE shall provide a function to verify the integrity of itself and its setting values.

- Integrity verification covers the TOE setting values(*configuration files, etc.)* and the TOE itself(*processes, libraries, executable files, etc.*).

- Integrity verification shall be performed when the TOE is initial executed(or start-up), and periodic integrity verification can be performed additionally.

- The target of integrity verification can be selected by the sponsor, but if the entity's abnormal state(e.g., *error, stop, etc.*) affects the security function of the TOE, the corresponding entity shall be included as the target of integrity verification.

- If physically separated TOE components exist, integrity verification shall be performed by selecting the targets to include all components.

- A function for the administrator to perform integrity verification shall be provided.

- The cryptographic algorithm used, cryptographic key security, and cryptographic key storage method shall satisfy the requirements of FCS class and 'Protection when storing cryptographic key' of FPT_PST.1.

o If the operating system kernel or kernel level module is included in the scope of the TOE, the TOE shall provide a function to verify the integrity of the operating system kernel or kernel level module.

- When verifying integrity by hash value comparison method, the cryptographic algorithm used, cryptographic key security, and cryptographic key storage method shall satisfy the requirements of FCS class and 'Protection when storing cryptographic key' of FPT_PST.1.

o The TOE shall provide a function for the administrator to check the contents and results of the integrity verification.

- The contents and results of the integrity verification shall be checked through *screen display, audit records.*

o The TOE shall perform response function if integrity verification fails.

- The TOE shall perform its own implemented response function or the response function set by the administrator.
- Audit records shall be generated for integrity verification results.
- Examples of response functions performed when the integrity verification result is a failure are as follows.
  - *Termination of program execution, warning message screen display, etc.*
- A security management function may be provided for the administrator to set the response function.

## 3. TOE agents, clients, management consoles integrity verification, response function, and audit record generation

o The agent or client shall provide the function to verify the integrity of the TOE setting values and its own at the initialization phase and periodically or at the request of authorized administrators.

- Integrity verification covers agent or client setting values(*policies, environment settings, etc.*) and the TOE itself (*executable files, filter drivers, etc.*).
- In the case of a TOE running on a Windows® operating system, the modification shall be detected during normal booting of the operating system, if integrity is compromised in the safe mode of the operating system.
- In the case that integrity verification is performed periodically or at the request of authorized administrators, △when an abnormality occurs in the integrity verification result, △the integrity verification result by the administrator shall be notified to the administrator.
- Audit records shall be generated for integrity verification results.
- Cryptographic-related parts shall satisfy the requirements of FCS class and 'Protection when storing cryptographic key' of FPT_PST.1.

o The agent or client shall provide a function to can recover modified information(*setting values, executable files, filter drivers, etc.*).

- 'Modified information' shall identify and include all files that affect the normal operation and of security functions of the TOE.
- 'Agent Type 1' shall provide an automatic recovery function, and △Agent Type 2 △ Agent Type 3 and △Client Type may provide a manual recovery function.

o In the case of an agent or client installed on the endpoint in Windows® environment, the agent or client shall provide an integrity verification function for the server/update server address.

o If there are two or more servers or update servers on the file transfer path, the receiving server shall perform integrity verification for the address of the sending server.

### 6.1.6. TOE access (FTA)

#### 6.1.6.1. FTA_MCS.2 Per user attribute limitation on multiple concurrent sessions

| Component relationships | |
|---|---|
| Hierarchical to | FTA_MCS.1 Basic limitation on multiple concurrent sessions |
| Dependencies | FIA_UID.1 Timing of identification |
| FTA_MCS.2.1 | The TSF shall restrict the maximum number of concurrent sessions belong to the same user according to the rules [ limiting the maximum number of concurrent sessions to 1 for users who have the same privilege and the same user, [assignment: *: rules for the number of maximum concurrent sessions {determined by the ST author}*] ]. |
| FTA_MCS.2.2 | The TSF shall enforce, by default, a limit of [1] sessions per user. |

Application notes

o The TOE shall not allow duplicate access to the TOE with the same user account or the same privilege.

- If a user logs in with the same account on another terminal after logging in, it is required to block a new access or terminate the previous access.
- Duplicate logins with the same privilege shall not be allowed.
- An audit record should be generated when duplicate access is blocked.

#### 6.1.6.2. FTA_TSE.1(1) TOE session establishment

| Component relationships | |
|---|---|
| Hierarchical to | No other components. |
| Dependencies | No dependencies. |
| FTA_TSE.1.1 | The TSF shall be able to deny **the administrator's management access session** establishment based on [ access IP, [selection: *[assignment: other attributes], none*] ]. |

Application notes

o The TOE shall provide a function to restrict the IP of the accessible management terminals.

- It shall be possible to register, delete, and change the IP address of the management terminals.
- Management terminals accessible to administrators who only have read access instead of for management purposes(e.g., *monitoring administrators, etc.*) can be additionally registered for operation.
- The IP of accessible management terminals can only be added one by one per single host.
- It is not allowed to register by designating an IP address range such as 192.168.10.2~253, or by using 0.0.0.0, 192.168.10.*, any, etc. which means the entire network range.

## 6.2. Security functional requirements (Conditionally mandatory SFRs)

'Conditionally mandatory SFRs' in this PP are as follows. 'Conditionally mandatory SFRs' mandatorily require to be included in the ST, if they meet 'SFR additional conditions' in the table below.

| Functional class | Security functional components | | SFR additional conditions | Remark |
|---|---|---|---|---|
| FAU | FAU_STG.2 | Protected audit data storage | In case of the TOE server stores audit records in local storage | |
| | FAU_STG.4 | Action in case of possible audit data loss | In case of the TOE server stores audit records in local storage | |
| | FAU_STG.5 | Prevention of audit data loss | In case of the TOE server stores audit records in local storage | |
| FCS | FCS_CKM.5 | Cryptographic key derivation | In case the TOE provides a cryptographic key derivation function (e.g., KEK generation using a password-based key derivation standard) | |
| | FCS_RBG.2 | Random bit generation (external seeding) | In case a seed value is provided to DRBG by an external entropy source when generating random bits in FCS_RBG.1 | |
| | FCS_RBG.3 | Random bit generation (internal seeding – single source) | In case a seed value is provided to DRBG using a single entropy source by TSF when generating random bits in FCS_RBG.1 | |
| | FCS_RBG.4 | Random bit generation (internal seeding – multiple sources) | In case a seed value is provided to DRBG using multiple entropy sources by TSF when generating random bits in FCS_RBG.1 | |
| | FCS_RBG.5 | Random bit generation (combining entropy sources) | In case a seed value is provided to DRBG with combining internal• external entropy sources by TSF when generating random bits in FCS_RBG.1 | |
| FIA | FIA_UAU.5 | Multiple authentication mechanisms | In case of the TOE server supports additional identification and authentication functions by itself in addition to the ID/password-based authentication method | |
| FPT | FPT_LEE.1 | Linkable external entities - | In case the TOE server supports additional identification and | |

| Functional class | Security functional components | | SFR additional conditions | Remark |
|---|---|---|---|---|
| | | authentication (Extended) | authentication functions by interacting with external IT entities in addition to the ID/password-based authentication method | |
| | FPT_RCV.1 | Manual recovery | In case the TOE components include agents or clients | |
| | FPT_RCV.2 | Automated recovery | In case the TOE server update function is provided | |
| | FPT_TUD.1 | TSF security patch update (Extended) | In case the TOE update function is provided | |
| FTA | FTA_SSL.1 | TSF-initiated session locking | In case the TOE provides session locking function | One of the two must be implemented |
| | FTA_SSL.3 | TSF-initiated termination | In case the TOE provides session termination function | |
| | FTA_TSE.1(2) | TOE session establishment | In case it is necessary to identify and authenticate users existing in the agent, management console, or client constituting the TOE | |
| FTP | FTP_ITC.1 | Inter-TSF trusted channel | In case the interaction with external IT entities is supported | |
| | | | In case the audit records are transmitted and stored to external IT entities in real time | |
| | | | In case of providing the online update function through the developer update server. | |
| | FTP_TRP.1 | Trusted path | In case authorized administrators and end users directly access the TOE management server through web browsers or terminal access programs, etc. | |

[Table 10] Conditionally mandatory SFRs

## 6.2.1. Security audit (FAU)

### 6.2.1.1. FAU_STG.2 Protected audit data storage

Component relationships

Hierarchical to No other components

Dependencies FAU_GEN.1 Audit data generation

| | |
|---|---|
| FAU_STG.2.1 | The TSF shall protect the stored audit data in the audit trail from unauthorized deletion. |
| FAU_STG.2.2 | The TSF shall be able to *prevent* unauthorised modifications to the stored audit data in the audit trail. |

Application notes

o The TOE shall protect the audit records from being deleted or changed.

- A function shall be implemented to store audit records in a local storage or to transmit and store audit records to an external IT entity in real time.
- Relevant user interface(UI) and CLI commands shall not be provided so that even authorized administrators cannot delete or change audit records.
- Unauthorized person's access shall be controlled to protect the stored audit records.
- If the TOE security function cannot be fully implemented, the TOE operational environment can support the protected audit trail storage.
  - Example: When audit records are stored in the DBMS installed on the same operating system as the TOE, the DBMS' identification and authentication functions can be used to protect deletion or modification by unauthorized users.
- If audit records are stored in the log server outside the TOE, cryptographic communication shall be performed.
  - If syslog is supported, cryptographic transmission shall be supported through *syslog over DTLS(RFC 5424), syslog over DTLS(RFC 6012), etc.*

#### 6.2.1.2. FAU_STG.4 Action in case of possible audit data loss

| | |
|---|---|
| Component relationships | |
| Hierarchical to | No other components |
| Dependencies | FAU_STG.2 Protected audit data storage |

| | |
|---|---|
| FAU_STG.4.1 | The TSF shall [ Notification to the authorized administrator, [assignment: *actions to be taken in case of possible audit storage failure*] ] if the audit data storage exceeds [assignment: *pre-defined limit*]. |

Application notes

o In case of the size of the audit record reaches the predefined capacity, the TOE shall take response actions such as *notifying the administrator*.

- A function shall be implemented to store audit records in the local storage or to transmit and store audit records to an external IT entity in real time.
- A function to notify the administrator shall be provided. Examples of the function are as follows.

- *Screen alarm, sending email to the administrator, etc.*

- Examples of conditions for notifying the administrator in response to audit record loss are as follows.
  - *90% or more of the setup disk capacity, 100MB or more, etc.*
- In addition, a function for the administrator to send audit records to an external log server may be provided.
  - If syslog is supported, cryptographic transmission shall be supported through *syslog over DTLS(RFC 5424), syslog over DTLS(RFC 6012), etc.*
  - The cryptographic algorithm used, cryptographic key security, and cryptographic key storage method shall satisfy the requirements of FCS class and 'Protection when storing cryptographic key' of FPT_PST.1.

#### 6.2.1.3. FAU_STG.5 Prevention of audit data loss

| Component relationships | |
|---|---|
| Hierarchical to | FAU_STG.4 Action in case of possible audit data loss |
| Dependencies | FAU_STG.2 Protected audit data storage |

FAU_STG.5.1 The TSF shall [selection: *ignore audited events, "prevent audited events, except those taken by the authorized **administrator** with special rights", overwrite the oldest stored audit records*], [assignment: *other actions to be taken in case of audit storage failure and conditions for the actions*] if the audit data storage is full.

Application notes

o In case of the audit record storage capacity is full, the TOE shall respond to failure to save in an appropriate way.
- A function shall be implemented to store audit records in a local storage or to transmit and store audit records to an external IT entity in real time.
- Examples of response functions in case of failure to save are as follows.
  - *Overwriting the oldest audit records, save audit records compression, etc.*

### 6.2.2. Cryptographic support(FCS)

#### 6.2.2.1. FCS_CKM.5 Cryptographic key derivation

| Component relationships | |
|---|---|
| Hierarchical to | No other components |
| Dependencies | [FCS_CKM.2 Cryptographic key distribution or |

FCS_COP.1 Cryptographic operation]

FCS_CKM.6 Timing and event of cryptographic key destruction

FCS_CKM.5.1 The TSF shall derive cryptographic keys [assignment: *key type*] from [assignment: *input parameters*] in accordance with a specified key derivation algorithm [assignment: *key derivation algorithm*] and specified cryptographic key sizes [assignment: *list of key sizes*] that meet the following: [assignment: *list of standards*].

Application notes

## 1. Authentication token-related cryptographic key generation

o The TOE shall use the validated cryptographic module when generating a cryptographic key required for cryptographic operation to generate the authentication token.

- When using random bits for generating a cryptographic key, the random bit generator of the validated cryptographic module shall be used, and the entropy of the random bit generator SEED value shall be $2^{112}$ or higher.
- When generating a key encryption key(KEK), it is also allowed to derive a cryptographic key from the password.
  - A key encryption key(KEK) can be derived from the password entered by the user.
  - When deriving a key encryption key(KEK) from the password, a secure method shall be applied suggested in TTAK.KO-12.0334-Part1~Part4.
- Cryptographic keys generated by using the password is limited to the generation of a key encryption key(KEK).

## 2. Other cryptographic key generation

o The TOE shall generate cryptographic keys in a secure manner.

- Examples of secure cryptographic key generation methods are as follows.
  - *Password-based key derivation (PKCS#5 v2.1(RFC 8018), NIST SP 800-132, etc.)*
  - *Key derivation with pre-shared keys(TTAK.KO-12.0272)*
- The password-based key derivation function shall only be used to generate a key encryption key(KEK).
  - The first key encryption key(KEK) shall be generated differently for each TOE.
  - The initial data(e.g. password, etc.) required to generate a key encryption key(KEK) can be entered directly or used by injecting the values stored in storage media such as smart cards, secure USBs, or security tokens(HSM: Hardware Security Module).
  - It is recommended that storage media use products that have obtained a security function confirmation or domestic/international CC certificate.
  - For details, refer to the cryptographic key generation section of the 「Cryptographic Key

Management Guide」(Ministry of Science and ICT, 2014).

- When using a password as initial data for generating a key encryption key(KEK), the value entered during the initial installation of the TOE can be stored and used, and the stored data shall be protected from unauthorized disclosure attempts.

#### 6.2.2.2. FCS_RBG.2 Random bit generation (external seeding)

Component relationships

| | |
|---|---|
| Hierarchical to | No other components |
| Dependencies | FCS_RBG.1 Random bit generation (RBG) |
| FCS_RBG.2.1 | The TSF shall be able to accept a minimum input of [assignment: *minimum input length greater than zero*] from a TSF interface for obtaining entropy. |

#### 6.2.2.3. FCS_RBG.3 Random bit generation (internal seeding – single source)

Component relationships

| | |
|---|---|
| Hierarchical to | No other components |
| Dependencies | FCS_RBG.1 Random bit generation (RBG) |
| FCS_RBG.3.1 | The TSF shall be able to seed the DRBG using a [selection: choose one of: *TSF software-based entropy source, TSF hardware-based entropy source*] [assignment: *name of entropy source*] with [assignment: *number of bits*] bits of min-entropy. |

#### 6.2.2.4. FCS_RBG.4 Random bit generation (internal seeding – multiple sources)

Component relationships

| | |
|---|---|
| Hierarchical to | No other components |
| Dependencies | FCS_RBG.1 Random bit generation (RBG)<br>FCS_RBG.5 Random bit generation (combining entropy sources) |
| FCS_RBG.4.1 | The TSF shall be able to seed the DRBG using [selection: *[assignment: number] TSF software-based entropy source(s), [assignment: number] TSF hardware-based entropy source(s)*]. |

#### 6.2.2.5. FCS_RBG.5 Random bit generation (combining entropy sources)

Component relationships

| | |
|---|---|
| Hierarchical to | No other components |
| Dependencies | FCS_RBG.1 Random bit generation (RBG)<br>[FCS_RBG.2 Random bit generation (external seeding), or<br>FCS_RBG.3 Random bit generation (internal seeding – single source), or<br>FCS_RBG.4 Random bit generation (internal seeding – multiple sources)] |

| | |
|---|---|
| FCS_RBG.5.1 | The TSF shall [assignment: *combining operation*] [selection: *output from TSF entropy source(s), input from TSF interface(s) for obtaining entropy*] resulting in a minimum of [assignment: *number of bits*] bits of min-entropy to create the entropy input into the derivation function as defined in [assignment: *list of standards*]. |

### 6.2.3. Identification and authentication (FIA)

#### 6.2.3.1. FIA_UAU.5 Multiple authentication mechanisms

| | |
|---|---|
| Component relationships | |
| Hierarchical to | No other components. |
| Dependencies | No dependencies. |

| | |
|---|---|
| FIA_UAU.5.1 | The TSF shall provide [ password authentication mechanism, [assignment: *list of additional authentication mechanisms]* ] to support user authentication. |
| FIA_UAU.5.2 | The TSF shall authenticate any user's claimed identity according to the [assignment: *rules describing how the multiple authentication mechanisms provide authentication*]. |

Application notes

o In case of the TOE supports additional identification and authentication methods, the TOE shall provide additional identification and authentication functions on its own or by interacting with external IT entities, in parallel with user account/password-based identification and authentication.

- In order to provide additional identification and authentication functions, *△2FA support device complying with FIDO standards, △certificates, △one-time password generator(OTP), etc.* can be used.
  - If it is supported in the TOE operational environment, '2FA support device complying with FIDO standards' is recommended.
- If additional identification and authentication functions are provided in the TOE, the functions can be provided by receiving the authentication results from the inside of the TOE or from the interacted external IT entities.
  - If the TOE provides a certification utilization method, certificate validation shall be performed.
  - The authentication information used by external IT entities to perform additional identification and authentication methods shall be securely managed by the external IT entities. If the TOE stores authentication information use to perform additional identification and authentication methods, the requirements of FPT_PST.1 shall be applied.

## 6.2.4. Protection of the TSF (FPT)

### 6.2.4.1. FPT_LEE.1 Linkable external entities - authentication (Extended)

Component relationships

| | |
|---|---|
| Hierarchical to | No other components. |
| Dependencies | No dependencies. |

| | |
|---|---|
| FPT_LEE.1.1 | The TSF shall perform [assignment: *list of actions*] and provide [assignment: *list of functions*] by linking with external entities. |

Application notes

o In case of the TOE supports additional identification and authentication methods, the TOE shall provide additional identification and authentication functions on its own or by interacting with external IT entities, in parallel with user account/password-based identification and authentication.

- In order to provide additional identification and authentication functions, *△2FA support device complying with FIDO standards, △certificates, △one-time password generator(OTP), etc.* can be used.
  - If it is supported in the TOE operational environment, '2FA support device complying with FIDO standards' is recommended.
- If additional identification and authentication functions are provided in the TOE, the functions can be provided by receiving the authentication results from the inside of the TOE or from the interacted external IT entities.
  - If the TOE provides a certification utilization method, certificate validation shall be performed.
  - The authentication information used by external IT entities to perform additional identification and authentication methods shall be securely managed by the external IT entities. If the TOE stores authentication information use to perform additional identification and authentication methods, the requirements of FPT_PST.1 shall be applied.

### 6.2.4.2. FPT_RCV.1 Manual recovery

Component relationships

| | |
|---|---|
| Hierarchical to | No other components. |
| Dependencies | AGD_OPE.1 Operational user guidance |

| | |
|---|---|
| FPT_RCV.1.1 | After [assignment: *list of failures/service discontinuities*] the TSF shall enter a maintenance mode where the ability to return to a secure state is provided. |

Application notes

o The agent or client shall provide a function to can recover modified information(*setting values,*

*executable files, filter drivers, etc*.).

- 'Modified information' shall identify and include all files that affect the normal operation and of security functions of the TOE.
- 'Agent Type1' shall provide an automatic recovery function, and △Agent Type2 △Agent Type3 and △Client Type may provide a manual recovery function.

#### 6.2.4.3. FPT_RCV.2 Automated recovery

| Component relationships | |
|---|---|
| Hierarchical to | FRP_RCV.1 Manual recovery |
| Dependencies | AGD_OPE.1 Operational user guidance |
| FPT_RCV.2.1 | When automated recovery from [assignment: *list of failures/service discontinuities*] is not possible, the TSF shall enter a maintenance mode where the ability to return to a secure state is provided. |
| FPT_RCV.2.2 | For [assignment: *list of failures/service discontinuities*], the TSF shall ensure the return of the TOE to a secure state using automated procedures. |

Application notes

o If the update function is provided, the TOE shall provide a function to automatically maintain the existing version when the update installation fails.

- If it is not supported by the TOE, manual recovery by the administrator shall be supported.
- The sponsor shall describe the manual recovery procedure by the administrator in detail in the deliverables.

#### 6.2.4.4. FPT_TUD.1 TSF security patch update (Extended)

| Component relationships | |
|---|---|
| Hierarchical to | No other components. |
| Dependencies | No dependencies. |
| FPT_TUD.1.1 | The TSF shall provide the capability to view the **unique identification** information of the TOE to [assignment: *the authorized identified roles*]. |
| FPT_TUD.1.2 | The TSF shall verify validity of the update files using [selection: ***verification of published hash value***, *digital signature verification,* ***[assignment: other secure validation mechanism]*** ] before installing updates. |

Application notes

o The TOE shall provide a function for users to check the 'unique identification information of the TOE'.

- The TOE identification information shall be unique, can be checked by users through the interface, and cannot be modified or changed. It shall include the following.

• TOE name, TOE version, TOE release or build number

- If the TOE includes multiple components that are physically separated, the identification information of each component shall be unique, can be checked, and cannot be modified or changed by users. It shall include the following:

• The name and version of the TOE including the component, The component name, The component version, The component release or build number.

- A version management system that can check whether the TOE and TOE components are patched and functionally improved should be applied.

(e.g., In case of patch and function improvement, a system for changing the major version, minor version, release number, and build number for each case is established to track the reason for the change of TOE/TOE components with version information)

- In case of hardware appliances, users shall be able to view the unique identification information of the firmware in addition to TOE identification information through TOE interface.

o In case of providing the update function, the TOE shall verify the validity of the TOE update files before installing or applying the update files.

- If the TOE provides online update or manual update function, only the update files that have succeeded in verification of the validity shall be installed or applied.
- Integrity verification is mandatory when verify the validity of the update files, and shall be implemented using *digital signature verification, public hash value verification, etc.*
- When verifying the digital signature, verification of the validity of the certificate (within 1 year of validity) shall be performed.
- Cryptographic algorithm and cryptographic key security shall satisfy the requirements of FCS class and 'Protection when storing cryptographic key' of FPT_PST.1.
- Update file validation results (success・failure) shall be recorded in the audit.

o If the update function is provided, the TOE shall provide a function to automatically maintain the existing version when the update installation fails.

- An audit record shall be generated for the update installation result and the reason for failure.
- If it is not supported by the TOE, manual recovery by the administrator shall be supported.
- The developer shall describe the manual recovery procedure by the administrator in detail in the deliverables.

o In the case of an agent or client installed on the endpoint in Windows® environment, the agent or client shall perform the digital signature verification on the subject of file generation of the update target files received from the server or update server.

- It shall be applied to the agent or client existing on the endpoint where Windows® operating system is installed.
- All files that are irrelevant to TOE configuration without being included in installation files and policy files(e.g., patch files, general executable files, etc.) are not allowed to be

distributed to agents and clients.

- In case of verifying the digital signature, verification of the validity of the certificate(within 1 year of validity) shall be performed.
- The update file digital signature verification result(success, failure) shall be recorded in the audit record.
- The cryptographic-related part shall satisfy the requirements of FCS class and 'Protection when storing cryptographic key' of FPT_PST.1.
- Developers or administrators (who perform digital signatures on update files) shall perform digital signatures on the separate offline server that is disconnected from the Internet.

o In the case of an agent or client installed on the endpoint in Windows® environment, the agent or client shall provide an integrity verification function for the server/update server address.

o If there are two or more servers or update servers on the file transfer path, the receiving server shall perform integrity verification for the address of the sending server.

## 6.2.5. TOE access (FTA)

### 6.2.5.1. FTA_SSL.1 TSF-initiated session locking

| Component relationships | |
|---|---|
| Hierarchical to | No other components. |
| Dependencies | FIA_UAU.1 Timing of authentication |

| | |
|---|---|
| FTA_SSL.1.1 | The TSF shall lock an interactive session after [assignment: *time interval of user inactivity*] by:<br>a) clearing or overwriting display devices, making the current contents unreadable;<br>b) disabling any activity of the user's data access/display devices other than unlocking the session. |
| FTA_SSL.1.2 | The TSF shall require the following events to occur prior to unlocking the session: [ [selection: *unlocking session by the administrator, user re-authentication before unlocking session*] ]. |

Application notes

o The TOE shall provide a function to lock or terminate the session if it is not used for a certain period of time after the user session is connected.

- The time information used shall be applied based on the server time.
- A certain period of time refers to the amount of time accumulated after a connection that triggers session locking or termination.

- A certain period of time can be fixed by the administrator among 10 minutes or less or set in proportion to the number of authentication failures.

- After the lock time has elapsed, a locked session shall be unlocked by the administrator or through the user authentication function for each session.
- An audit record shall be generated when the session lock or termination function is activated.
- It shall be applied to all management and local access included in the TOE.

#### 6.2.5.2. FTA_SSL.3 TSF-initiated termination

| Component relationships | |
|---|---|
| Hierarchical to | No other components. |
| Dependencies | FMT_SMR.1 Security roles |
| FTA_SSL.3.1 | The TSF shall terminate an interactive session after a [assignment: *time interval of user inactivity*]. |

Application notes

o The TOE shall provide a function to lock or terminate the session if it is not used for a certain period of time after the user session is connected.
- The time information used shall be applied based on the server time.
- A certain period of time refers to the amount of time accumulated after a connection that triggers session locking or termination.
  - A certain period of time can be fixed by the administrator among 10 minutes or less or set in proportion to the number of authentication failures.
- After the lock time has elapsed, a locked session shall be unlocked by the administrator or through the user authentication function for each session.
- An audit record shall be generated when the session lock or termination function is activated.
- It shall be applied to all management and local access included in the TOE.

#### 6.2.5.3. FTA_TSE.1(2) TOE session establishment

| Component relationships | |
|---|---|
| Hierarchical to | No other components. |
| Dependencies | No dependencies. |
| FTA_TSE.1.1 | The TSF shall be able to deny session establishment based on [assignment: ***list of additional attributes of agent or client***.] |

Application notes

o In case of it is necessary to identify and authenticate a user existing in the agent or client

constituting the TOE, the identification value shall be a unique value that is not registered in duplicate.

- During user authentication, additional attributes of the registered agent or client shall also be authenticated.
- Additional attributes: IP address is mandatory, and at least one of *MAC address, serial number, and information that can uniquely identify the agent itself* shall be additionally used.

## 6.2.6. Trusted path/channels (FTP)

### 6.2.6.1. FTP_ITC.1 Inter-TSF trusted channel

| Component relationships | |
|---|---|
| Hierarchical to | No other components. |
| Dependencies | No dependencies. |

| | |
|---|---|
| FTP_ITC.1.1 | The TSF shall provide a communication channel between itself and another trusted IT product that is logically distinct from other communication channels and provides assured identification of its end points and protection of the channel data from modification or disclosure. |
| FTP_ITC.1.2 | The TSF shall permit [selection: *the TSF, another trusted IT product*] to initiate communication via the trusted channel. |
| FTP_ITC.1.3 | The TSF shall initiate communication via the trusted channel for [assignment: *list of functions for which a trusted channel is required*]. |

Application notes

ㅇ In case of interacting with external IT entities is supported, the TOE shall transmit data using a cryptographic communication channel to protect the transmitted data when interacting with external IT entities.

- For secure cryptographic communication, confidentiality and integrity shall be provided using standard protocols.
  - Secure cryptographic communication protocols include *HTTPS (implemented using TLS), TLS (TLS 1.2-RFC5246 or higher), SSH (SSH V2-RFC 4251, 4254), etc.*
- Use of its own protocol is not allowed.
- The cryptographic communication channel can be implemented directly in the TOE or to be provided by the TOE using the operating environment.
- This requirement shall be applied when the TOE provides a function that interacting with external IT entities to provide a security function.
- If transmission data is not protected using a cryptographic communication channel when interacting with external IT entities, the needlessness to protect the confidentiality and

integrity of transmitted data shall be proven.

- Communication services that do not support cryptographic communication channels shall be able to be disabled.
- The cryptographic algorithm used, cryptographic key security, and cryptographic key storage method shall satisfy the requirements of FCS class and 'Protection when storing cryptographic key' of FPT_PST.1.

o In case of audit records are stored in a log server outside the TOE, cryptographic communication shall be performed.

- If syslog is supported, cryptographic transmission shall be supported through *syslog over DTLS(RFC 5424), syslog over DTLS(RFC 6012), etc.*
- The cryptographic algorithm used, cryptographic key security, and cryptographic key storage method shall satisfy the requirements of FCS class and 'Protection when storing cryptographic key' of FPT_PST.1.

#### 6.2.6.2. FTP_TRP.1 Trusted path

Component relationships

| | |
|---|---|
| Hierarchical to | No other components. |
| Dependencies | No dependencies. |

| | |
|---|---|
| FTP_TRP.1.1 | The TSF shall provide a communication path between itself and [selection: *remote, local*] users that is logically distinct from other communication paths and provides assured identification of its end points and protection of the communicated data from *modification, disclosure, [assignment: other types of integrity or confidentiality violation]*. |
| FTP_TRP.1.2 | The TSF shall permit [selection: *the TSF, local users, remote users*] to initiate communication via the trusted path |
| FTP_TRP.1.3 | The TSF shall require the use of the trusted path for [ selection: ***the authentication of management access administrator***, [assignment: *other services for which trusted path is required*] ]. |

Application notes

o During management access, the TOE shall transmit data using a cryptographic communication channel to protect the transmitted data.

- For secure cryptographic communication, confidentiality and integrity shall be provided using standard protocols.
  - Secure cryptographic communication protocols include *HTTPS (implemented using TLS), TLS (TLS 1.2-RFC5246 or higher), SSH (SSH V2-RFC 4251, 4254), etc*.
- Use of its own protocol is not allowed.

- The cryptographic communication channel can be implemented directly in the TOE or to be provided by the TOE using the operational environment.
- The cryptographic algorithm used, cryptographic key security, and cryptographic key storage method shall satisfy the requirements of FCS class and 'Protection when storing cryptographic key' of FPT_PST.1.

## 6.3. Security functional requirements (Optional SFRs)

The 'optional SFRs' in this PP are as follows. The 'optional SFRs' are not required to be implemented mandatorily, but if the TOE provides relevant functions additionally, the ST author shall include the relevant SFRs in the ST.

| Functional class | Security functional components | |
|---|---|---|
| Cryptographic support (FCS) | FCS_CKM.2 | Cryptographic key distribution |
| Protection of the TSF (FPT) | FPT_STM.1 | Reliable time stamps |

[Table 11] Optional SFRs

### 6.3.1. Cryptographic support (FCS)

#### 6.3.1.1. FCS_CKM.2 Cryptographic key distribution

Component relationships

| | |
|---|---|
| Hierarchical to | No other components. |
| Dependencies | [FDP_ITC.1 Import of user data without security attributes, or<br>FDP_ITC.2 Import of user data with security attributes, or<br>FCS_CKM.1 Cryptographic key generation or<br>FCS_CKM.5 Cryptographic key derivation]<br>FCS_CKM.3 Cryptographic key access |
| FCS_CKM.2.1 | The TSF shall distribute cryptographic keys in accordance with a specified cryptographic key distribution method [assignment: *cryptographic key distribution method*] that meets the following: [assignment: *list of standards*]. |

Application notes

o FCS_CKM.2 cryptographic key distribution is an optionally implementable functional requirement('optional SFRs'), and if the TOE additionally provides the above function, the ST author shall include this requirement in the SFR.

### 6.3.2. Protection of the TSF (FPT)

#### 6.3.2.1. FPT_STM.1 Reliable time stamps

Component relationships

| | |
|---|---|
| Hierarchical to | No other components. |
| Dependencies | No dependencies. |

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

Application notes

o Each component of the TOE shall generate audit records using trusted time information.

- Trusted time information shall use the time information provided by the NTP server or operating system.

## 6.4. Security assurance requirements

Assurance requirements of this Protection Profile are comprised of assurance components in CC part 3, and the evaluation assurance level is EAL1+. The following table summarizes assurance components.

| Assurance class | Security assurance components | |
|---|---|---|
| Security Target evaluation | ASE_INT.1 | ST introduction |
| | ASE_CCL.1 | Conformance claims |
| | ASE_OBJ.1 | Security objectives for the operational environment |
| | ASE_ECD.1 | Extended components definition |
| | ASE_REQ.1 | Direct rationale security requirements |
| | 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 |
| Life-cycle support | ALC_CMC.1 | Labelling of the TOE |
| | ALC_CMS.1 | TOE CM coverage |
| Tests | ATE_FUN.1 | Functional testing |
| | ATE_IND.1 | Independent testing - conformance |
| Vulnerability assessment | AVA_VAN.1 | Vulnerability survey |

[Table 12] Security assurance requirements

### 6.4.1. Security Target evaluation

#### 6.4.1.1. ASE_INT.1 ST introduction

| | |
|---|---|
| Dependencies | No dependencies. |
| Developer action elements | |
| ASE_INT.1.1D | The developer shall provide an ST introduction. |
| Content and presentation elements | |
| ASE_INT.1.1C | The ST introduction shall contain an ST reference, a TOE reference, a TOE overview and a TOE description. |
| ASE_INT.1.2C | The ST reference shall uniquely identify the ST. |

| | |
|---|---|
| ASE_INT.1.3C | The TOE reference shall uniquely identify the TOE. |
| ASE_INT.1.4C | The TOE overview shall summarise the usage and major security features of the TOE. |
| ASE_INT.1.5C | The TOE overview shall identify the TOE type. |
| ASE_INT.1.6C | The TOE overview shall identify any non-TOE hardware/software/firmware required by the TOE. |
| ASE_INT.1.7C | For a multi-assurance ST, the TOE overview shall describe the TSF organization in terms of the sub-TSFs defined in the PP-Configuration the ST claims conformance to. |
| ASE_INT.1.8C | The TOE description shall describe the physical scope of the TOE. |
| ASE_INT.1.9C | The TOE description shall describe the logical scope of the TOE. |
| Evaluator action elements | |
| ASE_INT.1.1E | The evaluator shall confirm that the information provided meets all requirements for content and presentation of evidence. |
| ASE_INT.1.2E | The evaluator shall confirm that the TOE reference, the TOE overview, and the TOE description are consistent with each other. |

#### 6.4.1.2. ASE_CCL.1 Conformance claims

| | |
|---|---|
| Dependencies | ASE_INT.1 ST introduction<br>ASE_ECD.1 Extended components definition<br>ASE_REQ.1 Direct rationale security requirements |
| Developer action elements | |
| ASE_CCL.1.1D | The developer shall provide a conformance claim. |
| ASE_CCL.1.2D | The developer shall provide a conformance claim rationale. |
| Content and presentation elements | |
| ASE_CCL.1.1C | The conformance claim shall identify the edition of the CC to which the ST and the TOE claim conformance. |
| ASE_CCL.1.2C | The CC conformance claim shall describe the conformance of the ST to CC Part 2 as either CC Part 2 conformant or CC Part 2 extended. |
| ASE_CCL.1.3C | The CC conformance claim shall describe the conformance of the ST to CC Part 3 as either CC Part 3 conformant or CC Part 3 extended. |
| ASE_CCL.1.4C | The CC conformance claim shall be consistent with the extended components definition. |

| | |
|---|---|
| ASE_CCL.1.5C | The conformance claim shall identify a PP-Configuration, or all PPs and security requirement packages to which the ST claims conformancepackages to which the ST claims conformance. |
| ASE_CCL.1.6C | The conformance claim shall describe any conformance of the ST to a package as either package-conformant or package-augmented. |
| ASE_CCL.1.7C | The conformance claim shall describe any conformance of the ST to a PP as PP-Conformant. |
| ASE_CCL.1.8C | The conformance claim rationale shall demonstrate that the TOE type is consistent with the TOE type in the PP-Configuration or PPs for which conformance is being claimed. |
| ASE_CCL.1.9C | The conformance claim rationale shall demonstrate that the statement of the security problem definition is consistent with the statement of the security problem definition in the PP-Configuration, PPs and any functional packages for which conformance is being claimed. |
| ASE_CCL.1.10C | The conformance claim rationale shall demonstrate that the statement of security objectives is consistent with the statement of security objectives in the PP-Configuration, PPs, and any functional package for which conformance is being claimed. |
| ASE_CCL.1.11C | The conformance claim rationale shall demonstrate that the statement of security requirements is consistent with the statement of security requirements in the PP-Configuration, PPs, and any functional packages for which conformance is being claimed. |
| ASE_CCL.1.12C | The conformance claim for PP(s) or a PP-Configuration shall be exact, strict, or demonstrable or a list of conformance types. |
| ASE_CCL.1.13C | If the conformance claim identifies a set of Evaluation methods and Evaluation activities derived from CEM work units that shall be used to evaluate the TOE then this set shall include all those that are included in any package, PP, or PP-Module in a PP-Configuration to which the ST claims conformance, and no others. |
| Evaluator action elements | |
| ASE_CCL.1.1E | The evaluator shall confirm that the information provided meets all requirements for content and presentation of evidence. |

#### 6.4.1.3. ASE_OBJ.1 Security objectives for the operational environment

| | |
|---|---|
| Dependencies | ASE_SPD.1 Security problem definition |
| Developer action elements | |
| ASE_OBJ.1.1D | The developer shall provide a statement of security objectives for the operational environment. |

| | |
|---|---|
| ASE_OBJ.1.2D | The developer shall provide a security objectives rationale for the operational environment |
| Content and presentation elements | |
| ASE_OBJ.1.1C | The statement of security objectives shall describe the security objectives for the operational environment. |
| ASE_OBJ.1.2C | The security objectives rationale shall trace each security objective for the operational environment back to threats countered by that security objective, OSPs enforced by that security objective, and assumptions upheld by that security objective. |
| ASE_OBJ.1.3C | The security objectives rationale shall demonstrate that the security objectives for the operational environment uphold all assumptions. |
| Evaluator action elements | |
| ASE_OBJ.1.1E | The evaluator shall confirm that the information provided meets all requirements for content and presentation of evidence. |

#### 6.4.1.4. ASE_ECD.1 Extended components definition

| | |
|---|---|
| Dependencies | No dependencies. |
| Developer action elements | |
| ASE_ECD.1.1D | The developer shall provide a statement of security requirements. |
| ASE_ECD.1.2D | The developer shall provide an extended components definition. |
| Content and presentation elements | |
| ASE_ECD.1.1C | The statement of security requirements shall identify all extended security requirements. |
| ASE_ECD.1.2C | The extended components definition shall define an extended component for each extended security requirement. |
| ASE_ECD.1.3C | The extended components definition shall describe how each extended component is related to the existing CC components, families, and classes. |
| ASE_ECD.1.4C | The extended components definition shall use the existing CC components, families, classes, and methodology as a model for presentation. |
| ASE_ECD.1.5C | The extended components shall consist of measurable and objective elements such that conformance or nonconformance to these elements may be demonstrated. |
| Evaluator action | |

| | |
|---|---|
| elements | |
| ASE_ECD.1.1E | The evaluator shall confirm that the information provided meets all requirements for content and presentation of evidence. |
| ASE_ECD.1.2E | The evaluator shall confirm that no extended component can be clearly expressed using existing components. |

#### 6.4.1.5. ASE_REQ.1 Direct rationale security requirements

| | |
|---|---|
| Dependencies | ASE_ECD.1 Extended components definition<br>ASE_SPD.1 Security problem definition<br>ASE_OBJ.1 Security objectives for the operational environment |
| Developer action elements | |
| ASE_REQ.1.1D | The developer shall provide a statement of security requirements. |
| ASE_REQ.1.2D | The developer shall provide a security requirements rationale. |
| Content and presentation elements | |
| ASE_REQ.1.1C | The statement of security requirements shall describe the SFRs and the SARs. |
| ASE_REQ.1.2C | For a single-assurance ST, the statement of security requirements shall define the global set of SARs that apply to the entire TOE. The sets of SARs shall be consistent with the PPs or PP-Configuration to which the ST claims conformance. |
| ASE_REQ.1.3C | For a multi-assurance ST, the statement of security requirements shall define the global set of SARs that apply to the entire TOE and the sets of SARs that apply to each sub-TSF. The sets of SARs shall be consistent with the multi-assurance PP-Configuration to which the ST claims conformance. |
| ASE_REQ.1.4C | All subjects, objects, operations, security attributes, external entities and other terms that are used in the SFRs and the SARs shall be defined. |
| ASE_REQ.1.5C | The statement of security requirements shall identify all operations on the security requirements. |
| ASE_REQ.1.6C | All operations shall be performed correctly. |
| ASE_REQ.1.7C | Each dependency of the security requirements shall either be satisfied, or the security requirements rationale shall justify the dependency not being satisfied. |
| ASE_REQ.1.8C | The security requirements rationale shall demonstrate that the SFRs (in conjunction with the security objectives for the environment) counter all threats for the TOE. |
| ASE_REQ.1.9C | The security requirements rationale shall demonstrate that the SFRs (in conjunction with the security objectives for the environment) enforce all |

| | |
|---|---|
| | OSPs. |
| ASE_REQ.1.10C | The security requirements rationale shall explain why the SARs were chosen. |
| ASE_REQ.1.11C | The statement of security requirements shall be internally consistent. |
| ASE_REQ.1.12C | If the ST defines sets of SARs that expand the sets of SARs of the PPs or PP-Configuration it claims conformance to, the security requirements rationale shall include an assurance rationale that justifies the consistency of the extension and provides a rationale for the disposition of any Evaluation methods and Evaluation activities identified in the conformance statement that are affected by the extension of the sets of SARs. |
| Evaluator action elements | |
| ASE_REQ.1.1E | The evaluator shall confirm that the information provided meets all requirements for content and presentation of evidence. |

#### 6.4.1.6. ASE_TSS.1 TOE summary specification

| | |
|---|---|
| Dependencies | ASE_INT.1 ST introduction<br>ASE_REQ.1 Direct rationale security requirements<br>ADV_FSP.1 Basic functional specification |
| Developer action elements | |
| ASE_TSS.1.1D | The developer shall provide a TOE summary specification |
| Content and presentation elements | |
| ASE_TSS.1.1C | The TOE summary specification shall describe how the TOE meets each SFR. |
| Evaluator action elements | |
| ASE_TSS.1.1E | The evaluator shall confirm that the information provided meets all requirements for content and presentation of evidence. |
| ASE_TSS.1.2E | The evaluator shall confirm that the TOE summary specification is consistent with the TOE overview and the TOE description. |

### 6.4.2. Development

#### 6.4.2.1. ADV_FSP.1 Basic functional specification

| | |
|---|---|
| Dependencies | No dependencies. |
| Developer action elements | |

| | |
|---|---|
| ADV_FSP.1.1D | The developer shall provide a functional specification. |
| ADV_FSP.1.2D | The developer shall provide a tracing from the functional specification to the SFRs. |
| Content and presentation elements | |
| ADV_FSP.1.1C | The functional specification shall describe the purpose and method of use for each SFR-enforcing and SFR-supporting TSFI. |
| ADV_FSP.1.2C | The functional specification shall identify all parameters associated with each SFR-enforcing and SFR-supporting TSFI. |
| ADV_FSP.1.3C | The functional specification shall provide rationale for the implicit categorization of interfaces as SFR-non-interfering. |
| ADV_FSP.1.4C | The tracing shall demonstrate that the SFRs trace to TSFIs in the functional specification. |
| Evaluator action elements | |
| ADV_FSP.1.1E | The evaluator shall confirm that the information provided meets all requirements for content and presentation of evidence. |
| ADV_FSP.1.2E | The evaluator shall determine that the functional specification is an accurate and complete instantiation of the SFRs. |

## 6.4.3. Guidance documents

### 6.4.3.1. AGD_OPE.1 Operational user guidance

| | |
|---|---|
| Dependencies | ADV_FSP.1 Basic functional specification |
| Developer action elements | |
| AGD_OPE.1.1D | The developer shall provide operational user guidance. |
| Content and presentation elements | |
| AGD_OPE.1.1C | The operational user guidance shall describe, for each user role, the user-accessible functions and privileges that shall be controlled in a secure processing environment, including appropriate warnings. |
| AGD_OPE.1.2C | The operational user guidance shall describe, for each user role, how to use the available interfaces provided by the TOE in a secure manner. |
| AGD_OPE.1.3C | The operational user guidance shall describe, for each user role, the available functions and interfaces, in particular all security parameters under the control of the user, indicating secure values as appropriate. |
| AGD_OPE.1.4C | The operational user guidance shall, for each user role, clearly present each |

| | |
|---|---|
| | type of security-relevant event relative to the user-accessible functions that need to be performed, including changing the security characteristics of entities under the control of the TSF. |
| AGD_OPE.1.5C | The operational user guidance shall identify all possible modes of operation of the TOE (including operation following failure or operational error), their consequences and implications for maintaining secure operation. |
| AGD_OPE.1.6C | The operational user guidance shall, for each user role, describe the security controls to be followed in order to fulfil the security objectives for the operational environment as described in the ST. |
| AGD_OPE.1.7C | The operational user guidance shall be clear and reasonable. |
| Evaluator action elements | |
| AGD_OPE.1.1E | The evaluator shall confirm that the information provided meets all requirements for content and presentation of evidence. |

#### 6.4.3.2. AGD_PRE.1 Preparative procedures

| | |
|---|---|
| Dependencies | No dependencies. |
| Developer action elements | |
| AGD_PRE.1.1D | The developer shall provide the TOE including its preparative procedures. |
| Content and presentation elements | |
| AGD_PRE1.1C | The preparative procedures shall describe all the steps necessary for secure acceptance of the delivered TOE in accordance with the developer's delivery procedures. |
| AGD_PRE1.2C | The preparative procedures shall describe all the steps necessary for secure installation of the TOE and for the secure preparation of the operational environment in accordance with the security objectives for the operational environment as described in the ST. |
| Evaluator action elements | |
| AGD_PRE.1.1E | The evaluator shall confirm that the information provided meets all requirements for content and presentation of evidence. |
| AGD_PRE.1.2E | The evaluator shall apply the preparative procedures to confirm that the TOE can be prepared securely for operation. |

### 6.4.4. Life-cycle support

#### 6.4.4.1. ALC_CMC.1 Labelling of the TOE

| | |
|---|---|
| Dependencies | ALC_CMS.1 TOE CM coverage |
| Developer action elements | |
| ALC_CMC.1.1D | The developer shall provide the TOE and a unique reference for the TOE. |
| Content and presentation elements | |
| ALC_CMC.1.1C | The TOE shall be labelled with its unique reference. |
| Evaluator action elements | |
| ALC_CMC.1.1E | The evaluator shall confirm that the information provided meet requirements for content and presentation of evidence. |

#### 6.4.4.2. ALC_CMS.1 TOE CM coverage

| | |
|---|---|
| Dependencies | No dependencies. |
| Developer action elements | |
| ALC_CMS.1.1D | The developer shall provide a configuration list for the TOE. |
| Content and presentation elements | |
| ALC_CMS.1.1C | The configuration list shall include the following: the TOE itself; and the evaluation evidence required by the SARs. |
| ALC_CMS.1.2C | The configuration list shall uniquely identify the configuration items. |
| Evaluator action elements | |
| ALC_CMS.1.1E | The evaluator shall confirm that the information provided meets all requirements for content and presentation of evidence. |

### 6.4.5. Tests

#### 6.4.5.1. ATE_FUN.1 Functional testing

| | |
|---|---|
| Dependencies | ATE_COV.1 Evidence of coverage |
| Developer action elements | |
| ATE_FUN.1.1D | The developer shall test the TSF and document the results. |

| | |
|---|---|
| ATE_FUN.1.2D | The developer shall provide test documentation. |
| Content and presentation elements | |
| ATE_FUN.1.1C | The test documentation shall consist of test plans, expected test results and actual test results. |
| ATE_FUN.1.2C | The test plans shall identify the tests to be performed and describe the scenarios for performing each test. These scenarios shall include any ordering dependencies on the results of other tests. |
| ATE_FUN.1.3C | The expected test results shall show the anticipated outputs from a successful execution of the tests. |
| ATE_FUN.1.4C | The actual test results shall be consistent with the expected test results. |
| Evaluator action elements | |
| ATE_FUN.1.1E | The evaluator shall confirm that the information provided meets all requirements for content and presentation of evidence. |

#### 6.4.5.2. ATE_IND.1 Independent testing - conformance

| | |
|---|---|
| Dependencies | ADV_FSP.1 Basic functional specification<br>AGD_OPE.1 Operational user guidance<br>AGD_PRE.1 Preparative procedures |
| Developer action elements | |
| ATE_IND.1.1D | The developer shall provide the TOE for testing. |
| Content and presentation elements | |
| ATE_IND.1.1C | The TOE shall be suitable for testing. |
| Evaluator action elements | |
| ATE_IND.1.1E | The evaluator shall confirm that the information provided meets all requirements for content and presentation of evidence. |
| ATE_IND.1.2E | The evaluator shall test a subset of the TSF to confirm that the TSF operates as specified. |

### 6.4.6. Vulnerability assessment

### 6.4.6.1. AVA_VAN.1 Vulnerability survey

| | |
|---|---|
| Dependencies | ADV_FSP.1 Basic functional specification<br>AGD_OPE.1 Operational user guidance<br>AGD_PRE.1 Preparative procedures |
| Developer action elements | |
| AVA_VAN.1.1D | The developer shall provide the TOE for testing |
| Content and presentation elements | |
| AVA_VAN.1.1C | The TOE shall be suitable for testing. |
| Evaluator action elements | |
| AVA_VAN.1.1E | The evaluator shall confirm that the information provided meets all requirements for content and presentation of evidence. |
| AVA_VAN.1.2E | The evaluator shall perform a search of public domain sources to identify potential vulnerabilities in the TOE. |
| AVA_VAN.1.3E | The evaluator shall conduct penetration testing, based on the identified potential vulnerabilities, to determine that the TOE is resistant to attacks performed by an attacker possessing Basic attack potential. |

## 6.5. Security requirements rationale

### 6.5.1. Security functional requirements rationale

The rationale for the security functional requirements demonstrates the following:

▷ Each threat and organizational security policy is addressed by at least one security functional requirement.

▷ Each security functional requirement is traced to at least one threat or organizational security policy.

| SFRs | T. SESSION_HIJACK | T. RETRY_AUTH_ATTEMPT | T. IMPERSONATION | T. REPLAY | T. WEAK_PASSWORD | T. STORED_DATA_LEAKAGE | T. TRANSMISSION_DATA_DAMAGE | T. WEAK_CRYPTO_PROTOCOLS | T. TSF_COMPROMISE | P. AUDIT | P. SECURE_OPERATION | P. CRYPTO_STRENGTH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FAU_ARP.1 | | | | | | | | | O | | | |
| FAU_GEN.1 | | | | | | | | | | O | | |
| FAU_SAA.1 | | | | | | | | | O | | | |
| FAU_SAR.1 | | | | | | | | | | O | | |
| FAU_SAR.3 | | | | | | | | | | O | | |
| FAU_STG.1 | | | | | | | | | | O | | |
| FAU_STG.2 | | | | | | | | | | O | | |
| FAU_STG.4 | | | | | | | | | | O | | |
| FAU_STG.5 | | | | | | | | | | O | | |
| FCS_CKM.1 | | | | | | O | O | O | | | | O |
| FCS_CKM.2 | | | | | | O | O | O | | | | O |
| FCS_CKM.5 | | | | | | O | O | O | | | | O |
| FCS_CKM.6 | | | | | | O | O | O | | | | O |
| FCS_COP.1 | | | | | | O | O | O | | | | O |
| FCS_RBG.1 | | | | | | O | O | O | | | | O |
| FCS_RBG.2 | | | | | | O | O | O | | | | O |
| FCS_RBG.3 | | | | | | O | O | O | | | | O |
| FCS_RBG.4 | | | | | | O | O | O | | | | O |
| FCS_RBG.5 | | | | | | O | O | O | | | | O |
| FIA_AFL.1 | | O | O | | | | | | O | | | |
| FIA_IMA.1 | | | O | | | | | | | | | |
| FIA_SOS.1 | | | | | O | | | | | | | |

| SFRs | T. SESSION_HIJACK | T. RETRY_AUTH_ATTEMPT | T. IMPERSONATION | T. REPLAY | T. WEAK_PASSWORD | T. STORED_DATA_LEAKAGE | T. TRANSMISSION_DATA_DAMAGE | T. WEAK_CRYPTO_PROTOCOLS | T. TSF_COMPROMISE | P. AUDIT | P. SECURE_OPERATION | P. CRYPTO_STRENGTH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FIA_SOS.2 | | | O | O | | | | | | | | |
| FIA_SOS.3 | O | | O | | | | | | | | | |
| FIA_UAU.1 | | | O | | | | | | O | | | |
| FIA_UAU.4 | | | O | O | | | | | O | | | |
| FIA_UAU.5 | | | O | | | | | | O | | | |
| FIA_UAU.7 | | | O | | O | | | | O | | | |
| FIA_UID.1 | | | O | | | | | | O | | | |
| FMT_MOF.1 | | | | | | | | | O | | O | |
| FMT_MTD.1 | | | | | | | | | O | | O | |
| FMT_PWD.1 | | | | | O | | | | O | | O | |
| FMT_SMF.1 | | | | | | | | | O | | O | |
| FMT_SMR.1 | | | | | | | | | O | | O | |
| FPT_FLS.1 | | | | | | O | O | O | | | | O |
| FPT_ITT.1 | | | | | | | O | | | | | |
| FPT_LEE.1 | | | O | | | | | | O | | | |
| FPT_PST.1 | | | | | | O | | | | | | |
| FPT_RCV.1 | | | | | | | | | O | | | |
| FPT_RCV.2 | | | | | | | | | O | | | |
| FPT_STM.1 | | | | | | | | | | O | | |
| FPT_TST.1 | | | | | | O | O | O | O | | | O |
| FPT_TUD.1 | | | | | | | | | O | | | |
| FTA_MCS.2 | O | | | | | | | | | | | |
| FTA_SSL.1 | O | | | | | | | | | | | |
| FTA_SSL.3 | O | | | | | | | | | | | |
| FTA_TSE.1(1) | O | | | | | | | | | | | |
| FTA_TSE.1(2) | O | | | | | | | | | | | |
| FTP_ITC.1 | | | | | | | O | | | | | |
| FTP_TRP.1 | | | | | | | O | | | | | |

[Table 13] correspondence with the 'security problem definition' and the 'security functional requirements'

| | |
|---|---|
| T.SESSION_HIJACK | FIA_SOS.3,<br>FTA_MCS.2, FTA_SSL.1, FTA_SSL.3, FTA_TSE.1(1), FTA_TSE.1(2) |

FIA_SOS.3 responds to T.SESSION_HIJACK by ensuring safe destruction of the authentication token when the TOE session ends.

FTA_MCS.2 responds to T.SESSION_HIJACK by restricting concurrent access to the TOE with the same user account or same privileges.

FTA_SSL.1 and FTA_SSL.3 repond to T.SESSION_HIJACK by ensuring session locking or session termination for interactive sessions after a period of inactivity by authorized users.

FTA_TSE.1(1), FTA_TSE.1(2) respond to T.SESSION_HIJACK by ensuring that it determines whether to establish an authorized user access session based on IP, etc.

| | |
|---|---|
| T.RETRY_AUTH_ATTEMPT | FIA_AFL.1 |

FIA_AFL.1 responds to T.RETRY_AUTH_ATTEMPT by defining the number of failed authentication attempts by authorized users and ensuring the ability to take responsive action when the defined number is reached.

| | |
|---|---|
| T.IMPERSONATION | FIA_AFL.1, FIA_IMA.1, FIA_UAU.1, FIA_UAU.4, FIA_UAU.5, FIA_UAU.7, FIA_UID.1, FPT_LEE.1 |

FIA_AFL.1 responds to T.IMPERSONATION by defining the number of failed authentication attempts by authorized users and ensuring the ability to take responsive action when the defined number is reached.

FIA_IMA.1 responds to T.IMPERSONATION by ensuring that mutual authentication is conducted between TOE components.

FIA_SOS.2, FIA_SOS.3, FIA_UAU.1, FIA_UAU.4, FIA_UAU.5, and FPT_LEE.1 respond to T.IMPERSONATION by ensuring that users attempting to access the TOE are successfully authenticated.

FIA_UAU.7 responds to T.IMPERSONATION by ensuring that only masked values will be output or no display to users during authentication and not providing feedback on the reason for failure in case of authentication failure.

FIA_UID.1 responds to T.IMPERSONATION by ensuring that users attempting to access the TOE are successfully identified.

| | |
|---|---|
| T.REPLAY | FIA_SOS.2, FIA_UAU.4 |

FIA_SOS.2 responds to T.REPLAY by ensuring that authentication tokens are not reused when generating authentication tokens.

FIA_UAU.4 responds to T.REPLAY by ensuring the ability to prevent reuse of authentication data.

| | |
|---|---|
| T.WEAK_PASSWORD | FIA_UAU.7, FIA_SOS.1, FMT_PWD.1 |

FIA_UAU.7 responds to T.WEAK_PASSWORD by ensuring that only masked values will be output or

no display to users during authentication.

FIA_SOS.1 responds to T.WEAK_PASSWORD by verifying that password complexity rules are satisfied.

FMT_PWD.1 responds to T.WEAK_PASSWORD by ensuring the ability to force a change of the default password when the authorized administrator first connects

| | |
|---|---|
| T.STORED_DATA_LEAKAGE | FCS_CKM.1, FCS_CKM.2, FCS_CKM.5, FCS_CKM.6, FCS_COP.1, FCS_RBG.1, FCS_RBG.2, FCS_RBG.3, FCS_RBG.4, FCS_RBG.5, FPT_FLS.1, FPT_PST.1, FPT_TST.1 |

FCS_CKM.1, FCS_CKM.2, FCS_CKM.5, FCS_RBG.1, FCS_RBG.2, FCS_RBG.3, FCS_RBG.4, FCS_RBG.5, FPT_FLS.1, and FPT_TST.1 respond to T.STORED_DATA_LEAKAGE by ensuring that a cryptographic key is created and distributed according to a secure cryptographic algorithm and key length when encrypting stored data.

FCS_CKM.6 responds to T.STORED_DATA_LEAKAGE by ensuring that the cryptographic keys and their related information are destroyed according to the specified cryptographic key destruction method upon completion of storage data encryption.

FCS_COP.1 responds to T.STORED_DATA_LEAKAGE by ensuring that cryptographic operations are performed according to the specified secure algorithm and specified cryptographic key length when encrypting stored data.

FPT_PST.1 responds to T.STORED_DATA_LEAKAGE by ensuring that the stored TSF data is protected from being leaked by means of encryption, access control, etc.

| | |
|---|---|
| T.TRANSMISSION_DATA_DAMAGE | FCS_CKM.1, FCS_CKM.1, FCS_CKM.2, FCS_CKM.5, FCS_CKM.6, FCS_COP.1, FCS_RBG.1, FCS_RBG.2, FCS_RBG.3, FCS_RBG.4, FCS_RBG.5, FPT_FLS.1 ,FPT_ITT.1, FPT_TST.1, FTP_ITC.1, FTP_TRP.1 |

FCS_CKM.1, FCS_CKM.2, FCS_CKM.5, FCS_RBG.1, FCS_RBG.2, FCS_RBG.3, FCS_RBG.4, FCS_RBG.5, FPT_FLS.1, and FPT_TST.1 respond to T.TRANSMISSION_DATA_DAMAGE by ensuring that a cryptographic key is created and distributed according to a secure cryptographic algorithm and key length during cryptographic communication.

FCS_CKM.6 responds to T.TRANSMISSION_DATA_DAMAGE by ensuring that cryptographic keys and their related information are destroyed according to the specified cryptographic key destruction method at the end of cryptographic communication.

FCS_COP.1 responds to T.TRANSMISSION_DATA_DAMAGE by ensuring that cryptographic operations are performed according to the specified secure algorithm and specified cryptographic key length during cryptographic communication.

FPT_ITT.1 responds to T.TRANSMISSION_DATA_DAMAGE by ensuring the confidentiality and integrity of transmission data between TOE components.

FTP_ITC.1 responds to T.TRANSMISSION_DATA_DAMAGE by ensuring the confidentiality and integrity of transmission data between the TOE and external IT entities.

FTP_TRP.1 responds to T.TRANSMISSION_DATA_DAMAGE by ensuring the confidentiality and integrity of transmission data between external IT entities and the TOE during the management access process.

| | |
|---|---|
| T.WEAK_CRYPTO_PROTOCOLS | FCS_CKM.1, FCS_CKM.1, FCS_CKM.2, FCS_CKM.2, FCS_CKM.5, FCS_CKM.6, FCS_COP.1, FCS_RBG.1, FCS_RBG.2, FCS_RBG.3, FCS_RBG.4, FCS_RBG.5 FPT_FLS.1, FPT_TST.1 |

FCS_CKM.1, FCS_CKM.1, FCS_CKM.2, FCS_CKM.5, FCS_RBG.1, FCS_RBG.2, FCS_RBG.3, FCS_RBG.4, FCS_RBG.5, FPT_FLS.1, and FPT_TST.1 respond to T.WEAK_CRYPTO_PROTOCOLS by ensuring that the cryptographic key is created and distributed according to the standard cryptographic algorithm and key length with a security strength of 112 bits or more when encrypting transmission data.

FCS_CKM.6 responds to T.WEAK_CRYPTO_PROTOCOLS by ensuring that the cryptographic keys and their related information are destroyed according to the specified destruction method.

FCS_COP.1 responds to T.WEAK_CRYPTO_PROTOCOLS by ensuring that cryptographic operations are performed according to the standard cryptographic algorithm and cryptographic key length with a security strength of 112 bits or more when encrypting transmission data.

| | |
|---|---|
| T.TSF_COMPROMISE | FAU_ARP.1, FAU_SAA.1, FIA_AFL.1, FIA_UAU.1, FIA_UAU.4, FIA_UAU.5, FIA_UAU.7, FIA_UID.1 FMT_MOF.1, FMT_MTD.1, FMT_PWD.1, FMT_SMF.1, FMT_SMR.1, FPT_LEE.1, FPT_RCV.1, FPT_RCV.2, FPT_TST.1, FPT_TUD.1 |

FAU_ARP.1 responds to T.TSF_COMPROMISE by ensuring the ability to take response actions when detecting security violations such as TOE integrity compromise, etc.

FAU_SAA.1 responds to T.TSF_COMPROMISE by ensuring the ability to review audited events to point out security violations, such as TOE integrity compromise.

FIA_AFL.1, FIA_UAU.1, FIA_UAU.4, FIA_UAU.5, FIA_UAU.7, FIA_UID.1, and FPT_LEE.1 respond to T.TSF_COMPROMISE by allowing access to the TOE only after successful user identification and authentication, ensuring the blocking of bypass access by threat agents.

FMT_MOF.1, FMT_MTD.1, FMT_PWD.1, FMT_SMF.1, and FMT_SMR.1 respond to T.TSF_COMPROMISE by dividing authorized user roles into administrator and end user when accessing and configuring management functions, and by providing security policies and functions based on those roles to ensure blocking of unauthorized access by threat agents.

FPT_RCV.1 responds to T.TSF_COMPROMISE by ensuring that the TOE clients can recover modified information.

FPT_RCV.2 responds to T.TSF_COMPROMISE by ensuring that the existing version is automatically maintained in the event of a failure of the TOE update installation.

FPT_TST.1 responds to T.TSF_COMPROMISE by ensuring the TSF self-testing for accurate operation of the TOE and ensuring that authorized administrators can verify the integrity of TSF data and the TSF itself.

FPT_TUD.1 responds to T.TSF_COMPROMISE by ensuring that only validated TOE update files are

installed and applied.

| | |
|---|---|
| P.AUDIT | FAU_GEN.1, FAU_SAR.1, FAU_SAR.3, FAU_STG.1, FAU_STG.2, FAU_STG.4, FAU_STG.5, FPT_STM.1 |

FAU_GEN.1 satisfies P.AUDIT by ensuring that audit records are generated for auditable events such as the startup/termination of the audit function and the success/failure of the identification and authentication of the administrator.

FAU_SAR.1 satisfies P.AUDIT by providing the authorized administrator with the ability to retrieve audit records and ensuring that the audit records are presented in a manner suitable for the administrator to interpret the information.

FAU_SAR.3 satisfies P.AUDIT by providing a selective audit review function based on logical relationship criteria for audit data.

FAU_STG.1 satisfies P.AUDIT by providing the ability to store audit data in local storage or transmit it to an external IT entity for storage in real time using a trusted channel for the TOE server.

FAU_STG.2 satisfies P.AUDIT by providing the ability to protect against unauthorized modifications and deletions of stored audit data.

FAU_STG.4 satisfies P.AUDIT by ensuring that appropriate response actions are taken if the audit trail on the TOE server exceeds the storage limit.

FAU_STG.5 satisfies P.AUDIT by ensuring the ability to take appropriate response actions when the audit trail of the TOE server is full.

FPT_STM.1 satisfies P.AUDIT by ensuring that each component of the TOE generates audit records using trusted time information.

| | |
|---|---|
| P.SECURE_OPERATION | FMT_MOF.1, FMT_MTD.1, FMT_PWD.1, FMT_SMF.1, FMT_SMR.1 |

FMT_MOF.1 satisfies P.SECURE_OPERATION by ensuring that only authorized users have the ability to manage security functions.

FMT_MTD.1 satisfies P.SECURE_OPERATION by ensuring that only authorized users have the ability to manage the TSF data.

FMT_PWD.1 satisfies P.SECURE_OPERATION by ensuring that only authorized administrators have the ability to manage the combination rules and length of IDs and passwords, and by providing functions such as changing passwords when authorized administrators first access.

FMT_SMF.1 satisfies P.SECURE_OPERATION by requiring management functions such as security functions to be performed by the TSF, the TSF data, etc. to be specified.

FMT_SMR.1 satisfies P.SECURE_OPERATION by ensuring that authorized roles related to security management are specified.

| | |
|---|---|
| P.CRYPTO_STRENGTH | FCS_CKM.1, FCS_CKM.2, FCS_CKM.5, FCS_CKM.6, FCS_COP.1, |

| | |
|---|---|
| | FCS_RBG.1, FCS_RBG.2, FCS_RBG.3, FCS_RBG.4, FCS_RBG.5, FPT_FLS.1, FPT_TST.1 |

FCS_CKM.1, FCS_CKM.2, FCS_CKM.5, FCS_RBG.1, FCS_RBG.2, FCS_RBG.3, FCS_RBG.4, FCS_RBG.5, FPT_FLS.1, and FPT_TST.1 satisfy P.CRYPTO_STRENGTH by ensuring that the cryptographic keys required for standard cryptographic algorithms with a security strength of 112 bits or more are securely generated and distributed during data encryption.

FCS_COP.1 satisfies P.CRYPTO_STRENGTH by ensuring that cryptographic operations are performed according to standard cryptographic algorithms with a security strength of 112 bits or more and the cryptographic key length during data encryption.

### 6.5.2. Security assurance requirements rationale

The evaluation assurance level of this PP was selected as EAL1+(ATE_FUN.1).

EAL1 can be applied in cases where a certain degree of trust in correct operation is required, but the threat to security is not serious. If EAL1 is developed according to the development methodology commonly applied by the developer, no additional effort is required from the developer to prepare the evaluation submissions. In other words, there is no need to invest more money or time to prepare for the evaluation.

EAL1 provides a basic level of assurance by analyzing the security functional requirements included in the limited security target using function and interface specifications and documentation to understand security behavior.

This analysis is supported by independent testing of the TSF and searching for potential vulnerabilities in the public domain(functional testing and penetration testing).

EAL1 does not require evidence of testing conducted by the developer based on functional specifications, but ATE_FUN.1 was added in this PP to allow the developer to independently test whether the TSF has been implemented correctly and whether defects have occurred, etc. and document the results.

### 6.5.3. Dependency of the security functional requirements

The following table shows dependency of security functional requirements.

| No. | Security functional requirements | Dependency | Reference No. | SFR type |
|---|---|---|---|---|
| 1 | FAU_ARP.1 | FAU_SAA.1 | 3 | Mandatory |
| 2 | FAU_GEN.1 | FPT_STM.1 | Rationale(1) | Mandatory |
| 3 | FAU_SAA.1 | FAU_GEN.1 | 2 | Mandatory |
| 4 | FAU_SAR.1 | FAU_GEN.1 | 2 | Mandatory |
| 5 | FAU_SAR.3 | FAU_SAR.1 | 4 | Mandatory |
| 6 | FAU_STG.1 | FAU_GEN.1 | 2 | Mandatory |
| | | FTP_ITC.1 | Rationale(2) | |
| 7 | FAU_STG.2 | FAU_GEN.1 | 2 | Conditionally mandatory |
| 8 | FAU_STG.4 | FAU_STG.2 | Rationale(3) | Conditionally mandatory |
| 9 | FAU_STG.5 | FAU_STG.2 | Rationale(3) | Conditionally mandatory |
| 10 | FCS_CKM.1 | [FCS_CKM.2 or FCS_CKM.5 or FCS_COP.1] | 11, 12, 14 | Mandatory |
| | | FCS_CKM.3 | Rationale(4) | |
| | | [FCS_RBG.1 or FCS_RNG.1] | 15 | |
| | | FCS_CKM.6 | 13 | |
| 11 | FCS_CKM.2 | [FDP_ITC.1 or FDP_ITC.2 or FCS_CKM.1 or FCS_CKM.5] | 10, 12 | Optional |
| | | FCS_CKM.3 | Rationale(4) | |
| 12 | FCS_CKM.5 | [FCS_CKM.2 or FCS_COP.1] | 11, 14 | Conditionally mandatory |
| | | FCS_CKM.6 | 13 | |
| 13 | FCS_CKM.6 | [FDP_ITC.1 or FDP_ITC.2 or FCS_CKM.1 or FCS_CKM.5] | 10, 12 | Mandatory |
| 14 | FCS_COP.1 | [FDP_ITC.1 or FDP_ITC.2 or FCS_CKM.1 or FCS_CKM.5] | 10, 12 | Mandatory |
| | | FCS_CKM.6 | 13 | |
| 15 | FCS_RBG.1 | [FCS_RBG.2 or FCS_RBG.3] | 16, 17 | Mandatory |
| | | FPT_FLS.1 | 35 | |
| | | FPT_TST.1 | 42 | |
| 16 | FCS_RBG.2 | FCS_RBG.1 | 15 | Conditionally mandatory |
| 17 | FCS_RBG.3 | FCS_RBG.1 | 15 | Conditionally mandatory |
| 18 | FCS_RBG.4 | FCS_RBG.1 | 15 | Conditionally mandatory |
| | | FCS_RBG.5 | 19 | |

| No. | Security functional requirements | Dependency | Reference No. | SFR type |
|---|---|---|---|---|
| 19 | FCS_RBG.5 | FCS_RBG.1<br>[FCS_RBG.2 or FCS_RBG.3 or FCS_RBG.4] | 15<br>16, 17, 18 | Conditionally mandatory |
| 20 | FIA_AFL.1 | FIA_UAU.1 | 25 | Mandatory |
| 21 | FIA_IMA.1 | - | - | Mandatory |
| 22 | FIA_SOS.1 | - | - | Mandatory |
| 23 | FIA_SOS.2 | - | - | Mandatory |
| 24 | FIA_SOS.3 | FIA_SOS.2 | 23 | Mandatory |
| 25 | FIA_UAU.1 | FIA_UID.1 | 29 | Mandatory |
| 26 | FIA_UAU.4 | - | - | Mandatory |
| 27 | FIA_UAU.5 | - | - | Conditionally Mandatory |
| 28 | FIA_UAU.7 | FIA_UAU.1 | 25 | Mandatory |
| 29 | FIA_UID.1 | - | - | Mandatory |
| 30 | FMT_MOF.1 | FMT_SMF.1<br>FMT_SMR.1 | 33<br>34 | Mandatory |
| 31 | FMT_MTD.1 | FMT_SMF.1<br>FMT_SMR.1 | 33<br>34 | Mandatory |
| 32 | FMT_PWD.1 | FMT_SMF.1<br>FMT_SMR.1 | 33<br>34 | Mandatory |
| 33 | FMT_SMF.1 | - | - | Mandatory |
| 34 | FMT_SMR.1 | FIA_UID.1 | 29 | Mandatory |
| 35 | FPT_FLS.1 | - | - | Mandatory |
| 36 | FPT_ITT.1 | - | - | Mandatory |
| 37 | FPT_LEE.1 | - | - | Conditionally Mandatory |
| 38 | FPT_PST.1 | - | - | Mandatory |
| 39 | FPT_RCV.1 | AGD_OPE.1 | - | Conditionally Mandatory |
| 40 | FPT_RCV.2 | AGD_OPE.1 | - | Conditionally Mandatory |
| 41 | FPT_STM.1 | - | - | Optional |
| 42 | FPT_TST.1 | - | - | Mandatory |
| 43 | FPT_TUD.1 | - | - | Conditionally Mandatory |

| No. | Security functional requirements | Dependency | Reference No. | SFR type |
|---|---|---|---|---|
| 44 | FTA_MCS.2 | FIA_UID.1 | 29 | Mandatory |
| 45 | FTA_SSL.1 | FIA_UAU.1 | 25 | Conditionally Mandatory |
| 46 | FTA_SSL.3 | FMT_SMR.1 | 34 | Conditionally Mandatory |
| 47 | FTA_TSE.1(1) | - | - | Mandatory |
| 48 | FTA_TSE.1(2) | - | - | Conditionally Mandatory |
| 49 | FTP_ITC.1 | - | - | Conditionally Mandatory |
| 50 | FTP_TRP.1 | - | - | Conditionally Mandatory |

[Table 14] Rationale for the dependency of the security functional requirements

The ST author refers to the table above and prepares a dependency relationship rationale table for the SFRs included in the ST.

Rationale(1) : FAU_GEN.1 has the dependency on FAU_STG.1. However, since the TOE of this PP has been prepared to reflect for the TOE implemented in various types, if the pertinent function is implemented by the TOE, the ST author needs to identify the optional SFR (FPT_STM.1) as the SFR of the ST and describe the pertinent reference number. In addition, if FPT_STM.1 is supported by the operational environment, the author shall add the security objectives for the operational environment and a justification must be provided to state that there is no need to satisfy the dependencies.

Rationale(2): FAU_STG.1 has the dependency on FTP_ITC.1. However, since the TOE of this PP has been prepared to reflect for the TOE implemented in various types, if the function of transmitting audit data generated to an external IT entity is implemented by the TOE, the ST author needs to identify the conditionally mandatory SFR (FTP_ITC.1) as the SFR of the ST and describe the pertinent reference number. In addition, if audit data is stored in the TOE itself and FTP_ITC.1 has not been added to the ST, a justification must be provided to state that there is no need to satisfy the dependencies.

Rationale(3) : FAU_STG.4 and FAU_STG.5 have the dependency on FAU_STG.2. However, since the TOE of this PP has been prepared to reflect for the TOE implemented in various types, if the pertinent function is implemented by the TOE, the ST author needs to identify the conditionally mandatory SFR (FAU_STG.2) as the SFR of the ST and describe the pertinent reference number. In addition, if FAU_STG.2 is supported by the operational environment (e.g., DBMS), the author shall add the security objectives for the operational environment and a justification must be provided to state that there is no need to satisfy the dependencies.

Rationale(4): FCS_CKM.3 Cryptographic key access component is intended to allow the requirements for using keys outside of the TOE (e.g. . backup, archival, escrow, recovery) be specified and to require the

method used to access the cryptographic key be specified. Since this function is not required in the Security Requirements for Government, it has not been added in this PP.

### 6.5.4. Dependency of the security assurance requirements

The dependency of EAL1 assurance package provided in the CC is already satisfied, the rationale is omitted.

The augmented ATE_FUN.1 has dependency on ATE_COV.1. but, ATE_FUN.1 is augmented to require developer testing in order to check if the developer correctly performed and documented the tests in the test documentation, ATE_COV.1 is not included in this PP since it is not necessarily required to show the correspondence between the tests and the TSFIs.

This protection profile complies with the EAL1 assurance package, but ASE_OBJ.1 includes ASE_SPD.1, which is absent in the EAL1 assurance package due to a dependency.

However, this direct rationale protection profile includes a security problem definition, and ASE_OBJ.1 provides indirect assurance on the security problem definition, such as requesting an investigation to see if the security objectives for the TOE operating environment are traced to the security problem definition. Therefore, ASE_SPD.1, which is related to the request for a description of the security problem definition, was judged not to be absolutely necessary and was not added to this protection profile.

ASE_REQ.1 also includes ASE_SPD.1, which is absent in the EAL1 assurance package due to dependency. However, this direct rationale protection profile includes a security problem definition, and ASE_REQ.1 provides indirect assurance on the security problem definition, such as requesting an investigation to see if the SFR is traced to the security problem definition. Therefore, ASE_SPD.1, which is related to the request for description of security problem definition, was judged not to be absolutely necessary and was not added to this protection profile.

# References


| Title | Author | Remark |
|---|---|---|
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# Abbreviated terms

| | |
|---|---|
| CBC | Cipher Block Chaining |
| CC | Common Criteria |
| CCMB | Common Criteria Maintenance Board |
| CFB | Cipher Feedback |
| CTR | Counter Mode |
| ECB | Electronic Codebook |
| DEK | Data Encryption Key |
| EAL | Evaluation Assurance Level |
| HMAC | Hash-based Message Authentication Code |
| HTTPS | Hypertext Transfer Protocol over Secure Socket Layer |
| IP | Internet Protocol |
| IT | Information Technology |
| IV | Initial Vector |
| KEK | Key Encryption Key |
| NTP | Network Time Protocol |
| OFB | Output Feedback |
| OTP | One Time Password |
| SFP | Security Function Policy |
| SFR | Security Functional Requirement |
| SHA | Secure Hash Algorithm |
| SMS | Short Message Service |
| SSH | Secure Shell |
| SSL | Secure Socket Layer |
| ST | Security Target |
| TLS | Transport Layer Security |
| TOE | Target of Evaluation |
| TSF | TOE Security Functionality |