CEN/TC 224

Date: 2012-01

prEN 14169-2:2012

CEN/TC 224

Secretariat: AFNOR

Protection profiles for secure signature creation device — Part 2: Device with key generation

Schutzprofile sichere Signaturerstellungseinheit — Teil 2: Gerät mit Schlüsselerzeugung

Profils de protection pour dispositif sécurisé de création de signature électronique — Partie 2: Dispositif avec génération de clé

ICS:

Descriptors:

Document type: European Standard
Document subtype:
Document stage: Working Document
Document language: E

WD1 EN_14169-2_(E)_v2.0.1_Keygen.doc

Contents

Page

Foreword

This document (prEN 14169-2:2012) has been prepared by Technical Committee CEN/TC 224 “Personal identification, electronic signature and cards and their related systems and operations”, the secretariat of which is held by AFNOR.

This document is a working document.

Introduction

This series of European standards specifies Common Criteria protection profiles for secure signature creation devices and is issued by the European Committee for Standardization, Information Society Standardization System (CEN/ISSS) as update of the Electronic Signatures (E-SIGN) CEN/ISSS workshop agreement (CWA) 14169:2002, Annex B and Annex C on the protection profile secure signature creation devices, "EAL 4+".

This series of European standards consists of the following parts:

- Protection profiles for secure signature creation device — Part 1: Overview;
- Protection profiles for secure signature creation device — Part 2: Device with key generation;
- Protection profiles for secure signature creation device — Part 3: Device with key import;
- Protection profiles for secure signature creation device — Part 4: Extension for device with key generation and trusted channel to certificate generation application;
- Protection profiles for secure signature creation device — Part 5: Extension for device with key generation and trusted channel to signature creation application;
- Protection profiles for secure signature creation device — Part 6: Extension for device with key import and trusted channel to signature creation application.

Preparation of this document as a protection profile (PP) follows the rules of the Common Criteria version 3.1 [2], [3] and [4].

Correspondence and comments to this protection profile about secure signature creation device with key generation (PP SSCD KG) should be referred to:

CONTACT ADDRESS

CEN/ISSS Secretariat
Rue de Stassart 36
1050 Brussels, Belgium

Tel +32 2 550 0813
Fax +32 2 550 0966

Email isss@cenorm.be

1 Scope

This European standard specifies a protection profile for a secure signature creation device that may generate signing keys internally: secure signature creation device with key generation (SSCD KG).

2 Normative references

For the application of this European standard the following documents are indispensible:

EN 14169-1, Protection profiles for secure signature creation device — Part 1: Overview[1]

Common Criteria for Information Technology Security Evaluation, Part 1: Introduction and General Model; Version 3.1, Revision 3, CCMB-2009-07-001, July 2009

Common Criteria for Information Technology Security Evaluation, Part 2: Security Functional Requirements; Version 3.1, Revision 3, CCMB-2009-07-002, July 2009

Common Criteria for Information Technology Security Evaluation, Part 3: Security Assurance Requirements; Version 3.1, Revision 3, CCMB-2009-07-003, July 2009

3 Conventions and terminology

3.1 Conventions

This document is drafted in accordance with the CEN/CENELEC directive and content and structure of this document follow the rules and conventions laid out in Common Criteria 3.1.

Normative aspects of content in this European standard are specified according to the Common Criteria rules and not specifically identified by the verbs “shall” or “must”.

3.2 Terms and definitions

For the purposes of this document, the acronyms, terms and definitions given in EN 14169-1 apply [6].

4 PP introduction

4.1 PP reference

Title:	Protection profiles for secure signature creation device — Part 2: Device with key generation
Version:	2.0.1.
Author:	CEN / CENELEC (TC224/WG17)
Publication date:	2012-01-23
Registration:	BSI-CC-PP-0059-2009-MA-01
CC version:	3.1 Revision 3

[1] To be published.

Editor:	Arnold Abromeit, TÜV Informationstechnik GmbH
General status:	final draft
Keywords:	secure signature creation device, electronic signature, digital signature

4.2 PP overview

This Protection Profile is established by CEN as a European standard for products to create electronic signatures. It fulfils requirements of directive[2] 1999/93/ec of the European parliament and of the council of 13 December 1999 on *a community framework for electronic signatures*.

In accordance with article 9 of this European directive this standard can be indicated by the European commission in the Official Journal of the European Communities as generally recognised standard for electronic signature products.

This protection profile defines security functional requirements and security assurance requirements that comply with those defined in Annex III of **the directive** for a secure signature creation device (SSCD). This secure signature creation device is the target of evaluation (TOE) for this protection profile.

European Union Member States may presume that there is compliance with the requirements laid down in Annex III of **the directive** when an electronic signature product is evaluated to a Security Target (ST) that is compliant with this Protection Profile (PP).

This Protection Profile describes core security requirements for a secure device that can generate a signing key[3] (signature creation data, SCD) and operates to create electronic signatures with the generated key. A device evaluated according to this protection profile and used in the specified environments can be trusted to create any type of digital signature. As such this PP can be used for any device that has been configured to create a digital signature. Specifically this PP allows the qualification of a product as a device for creating an advanced electronic signature as defined in **the directive**.

After an SSCD has generated a signing key, the corresponding public key (signature verification data, SVD) has to be provided as input to a certificate generation application (CGA). Security requirements for export of the SVD are described in a protection profile that extends this PP (EN 14169-4 "*Protection Profiles for secure signature creation device - Part 4: Extension for device with key generation and trusted channel to certificate generation application*") and not in this document.

When operated in a secure environment for signature creation a signer may use an SSCD that fulfils only these core security requirements to create an advanced electronic signature.[4] Security requirements for an SSCD used in environments, where the communication between SSCD and the signature creation application (SCA) is assumed to be protected by the SSCD and the SCA, are described in a separate protection profile that extend this PP (EN 14169-5 "*Protection profiles for secure signature creation device - Part 5: Extension for device with key generation and trusted channel to signature creation application"*) and not in this document.

These extended Protection Profiles claim conformance to this PP.

The assurance level for this PP is EAL4 augmented with AVA_VAN.5.

---

[2] This European directive is referred to in this PP as "the directive".

[3] An SSCD that can generate its own SCD/SVD was defined in the previous version of this PP (CWA 14169) as a Type 3 SSCD. The notion of types does not exist anymore in this series of ENs. In order to refer to the same functionality, a reference to EN 14169-2 (i.e. Part 2) should be used.

[4] An advanced electronic signature is defined as an electronic signature created by an SSCD using a public key with a public key certificate created as specified in the directive.

4.3 TOE overview

4.3.1 Operation of the TOE

This section presents a functional overview of the TOE in its distinct operational environments:

- The preparation environment, where it interacts with a certification service provider through a certificate generation application (CGA) to obtain a certificate for the signature validation data (SVD) corresponding with the SCD the TOE has generated. The initialization environment interacts further with the TOE to personalize it with the initial value of the reference authentication data (RAD).
- The signing environment where it interacts with a signer through a signature creation application (SCA) to sign data after authenticating the signer as its signatory. The signature creation application provides the data to be signed (DTBS), or a unique representation thereof (DTBS/R) as input to the TOE signature creation function and obtains the resulting digital signature[5].
- The management environments where it interacts with the user or an SSCD-provisioning service provider to perform management operations, e.g. for the signatory to reset a blocked RAD. A single device, e.g. a smart card terminal, may provide the required secure environment for management and signing.

The signing environment, the management environment and the preparation environment are secure and protect data exchanged with the TOE. Figure 2 in Part 1 [6] of this standard illustrates the operational environment.

The TOE stores signature creation data and reference authentication data. The TOE may store multiple instances of SCD. In this case the TOE provides a function to identify each SCD and the SCA can provide an interface to the signer to select an SCD for use in the signature creation function of the SSCD. The TOE protects the confidentiality and integrity of the SCD and restricts its use in signature creation to its signatory. The digital signature created by the TOE may be used to create an advanced electronic signature as defined in Article 5.1 of **the directive**. Determining the state of the certificate as qualified is beyond the scope of this standard.

The signature creation application is assumed to protect the integrity of the input it provides to the TOE signature creation function as being consistent with the user data authorized for signing by the signatory. Unless implicitly known to the TOE, the SCA indicates the kind of the signing input (as DTBS/R) it provides and computes any hash values required. The TOE may augment the DTBS/R with signature parameters it stores and then computes a hash value over the input as needed by the kind of input and the used cryptographic algorithm.

The TOE stores signatory reference authentication data to authenticate a user as its signatory. The RAD is a password e.g. PIN, a biometric template or a combination of these. The TOE protects the confidentiality and integrity of the RAD. The TOE may provide a user interface to directly receive verification authentication data (VAD) from the user, alternatively, the TOE receive the VAD from the signature creation application. If the signature creation application handles, is requesting or obtaining a VAD from the user, it is assumed to protect the confidentiality and integrity of this data.

A certification service provider and a SSCD-provisioning service provider interact with the TOE in the secure preparation environment to perform any preparation function of the TOE required before control of the TOE is given to the legitimate user. These functions may include:

- initialising the RAD,
- generating a key pair,
- storing personal information of the legitimate user.

[5] At a pure functional level the SSCD creates a digital signature; for an implementation of the SSCD, in that meeting the requirements of this PP and with the key certificate created as specified in the directive, Annex I, the result of the signing process can be used as to create a qualified electronic signature.

A typical example of an SSCD is a smart card. In this case a smart -card terminal may be deployed that provides the required secure environment to handle a request for signatory authorization. A signature can be obtained on a document prepared by a signature creation application component running on personal computer connected to the card terminal. The signature creation application, after presenting the document to the user and after obtaining the authorization PIN initiates the digital signature creation function of the smart card through the terminal.

4.3.2 Target of evaluation

The TOE is a combination of hardware and software configured to securely create, use and manage signature creation data (SCD). The SSCD protects the SCD during its whole lifecycle as to be used in a signature creation process solely by its signatory.

The TOE comprises all IT security functionality necessary to ensure the secrecy of the SCD and the security of the electronic signature.

The TOE provides the following functions:

(1) to generate signature creation data (SCD) and the correspondent signature-verification data (SVD),
(2) to export the SVD for certification,
(3) to, optionally, receive and store certificate info,
(4) to switch the TOE from a non-operational state to an operational state, and
(5) if in an operational state, to create digital signatures for data with the following steps:
    (a) select an SCD if multiple are present in the SSCD,
    (b) authenticate the signatory and determine its intent to sign,
    (c) receive data to be signed or a unique representation thereof (DTBS/R),
    (d) apply an appropriate cryptographic signature creation function using the selected SCD to the DTBS/R.

The TOE may implement its function for digital signature creation to conform to the specifications in ETSI TS 101 733 (CAdES) [7], ETSI TS 101 903 (XAdES) [8] and ETSI TS 101 903 (PAdES) [9].

The TOE is prepared for the signatory's use by

(1) generating at least one SCD/SVD pair, and
(2) personalising for the signatory by storing in the TOE:
    (a) the signatory's reference authentication data (RAD)
    (b) optionally, certificate info for at least one SCD in the TOE.

After preparation the SCD shall be in a non-operational state. Upon receiving a TOE the signatory shall verify its non-operational state and change the SCD state to operational.

After preparation the intended, legitimate user should be informed of the signatory's verification authentication data (VAD) required for use of the TOE in signing. If the VAD is a password or PIN, the means of providing this information is expected to protect the confidentiality and the integrity of the corresponding RAD.

If the use of an SCD is no longer required, then it shall be destroyed (e.g. by erasing it from memory) as well as the associated certificate info, if any exists.

4.3.3 TOE lifecycle

4.3.3.1 General

The TOE lifecycle distinguishes stages for development production, preparation and operational use. Note that other lifecycle definitions are possible; when this PP is claimed by other PPs (e.g. SCD/SVD generation in trusted environment after delivery to the signatory may be allowed when there is a trusted channel to the CGA).

The development phase comprises the development and production of the TOE. The development phase is subject of the evaluation according to the assurance lifecycle (ALC) class. The development phase ends with the delivery of the TOE to the SSCD-provisioning service.

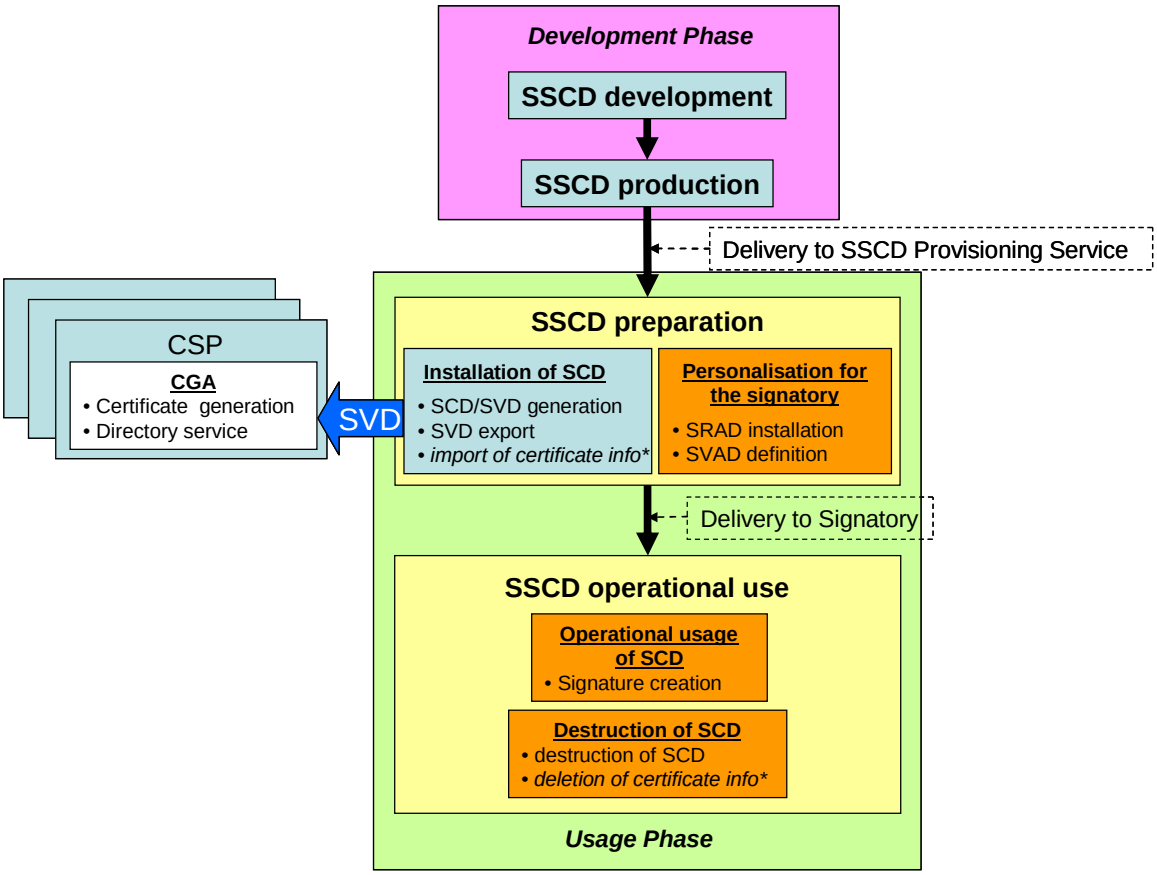


Figure 1: Example of TOE lifecycle[6]

The operational usage of the TOE comprises the preparation stage and the operational use stage. The TOE operational use stage begins when the signatory has obtained both the VAD and the TOE. Enabling the TOE for signing requires at least one set of SCD stored in its memory.

Figure 1 shows an example of the lifecycle where an SCD/SVD pair is generated on the TOE before delivery to the signatory. The lifecycle may allow generation of SCD or SCD/SVD key pairs after delivery to the signatory as well.

4.3.3.2 Preparation stage

An SSCD-provisioning service provider having accepted the TOE from a manufacturer prepares the TOE for use and delivers it to its legitimate user. The preparation phase ends when the legitimate user have received the TOE from the SSCD-provisioning service and any SCD it might already hold have been enabled for use in signing.

During preparation of the TOE, as specified above, an SSCD-provisioning service provider performs the following tasks:

---

[6]The asterisks * marks the optional import of the SVD and certificate info during TOE preparation and certificate info deletion when SCD is destroyed.

(1) Obtain information on the intended recipient of the device as required for the preparation process and for identification as a legitimate user of the TOE.
(2) Generate a PIN and/or obtain a biometric sample of the legitimate user, store this data as RAD in the TOE and prepare information about the VAD for delivery to the legitimate user.
(3) Generate a certificate for at least one SCD either by:
    (a) The TOE generating an SCD/SVD pair and obtaining a certificate for the SVD exported from the TOE, or
    (b) Initializing security functions in the TOE for protected export of the SVD and obtaining a certificate for the SVD after receiving a protected request from the TOE,
(4) Optionally, present certificate info to the SSCD.
(5) Deliver the TOE and the accompanying VAD info to the legitimate user.

The SVD certification task (third item listed above) of an SSCD-provisioning service provider as specified in this PP may support a centralised, pre-issuing key generation process, with at least one key generated and certified, before delivery to the legitimate user. Alternatively, or additionally, that task may support key generation by the signatory after delivery and outside the secure preparation environment. A TOE may support both key generation processes, for example with a first key generated centrally and additional keys generated by the signatory in the operational use stage.

Data required for inclusion in the SVD certificate at least includes (cf. [1], Annex II)
(a) the SVD which correspond to SCD under the control of the signatory;
(b) the name of the signatory or a pseudonym, which is to be identified as such;
(c) an indication of the beginning and end of the period of validity of the certificate.

The data included in the certificate may have been stored in the SSCD during personalization.

Before initiating the actual certificate signature the certificate generation application verifies the SVD received from the TOE by:

(1) establishing the sender as genuine SSCD
(2) establishing the integrity of the SVD to be certified as sent by the originating SSCD,
(3) establishing that the originating SSCD has been personalized for the legitimate user,
(4) establishing correspondence between SCD and SVD, and
(5) an assertion that the signing algorithm and key size for the SVD are approved and appropriate for the type of certificate.

The proof of correspondence between an SCD stored in the TOE and an SVD may be implicit in the security mechanisms applied by the CGA. Optionally, the TOE may support a function to provide an explicit proof of correspondence between an SCD it stores and an SVD realized by self-certification. Such a function may be performed implicitly in the SVD export function and may be invoked in the preparation environment without explicit consent of the signatory[7]. Security requirements to protect the SVD export function and the certification data if the SVD is generated by the signatory and then exported from the SSCD to the CGA are specified in a separate PP (see section 4.2).

Prior to generating the certificate the certification service provider asserts the identity of the signatory specified in the certification request as the legitimate user of the TOE.

4.3.3.3 Operational use stage

In this lifecycle stage the signatory can use the TOE to create advanced electronic signatures.

The TOE operational use stage begins when the signatory has obtained both the VAD and the TOE. Enabling the TOE for signing requires at least one set of SCD stored in its memory.

[7] Self-certification of the SVD is effectively computing an electronic signature with the corresponding SCD. A signing operation requires explicit sole signatory control, this specific case, if supported, provides an exception to this rule as, before being delivered to the signatory, such control is evidently impossible.

The signatory can also interact with the SSCD to perform management tasks, e.g. reset a RAD value or use counter if the password/PIN in the reference data has been lost or blocked. Such management tasks require a secure environment.

The signatory can render an SCD in the TOE permanently unusable. Rendering the last SCD in the TOE permanently unusable ends the life of the TOE as SSCD.

The TOE may support functions to generate additional signing keys. If the TOE supports these functions it will support further functions to securely obtain certificates for the new keys. For an additional key the signatory may be allowed to choose the kind of certificate (qualified, or not) to obtain for the SVD of the new key. The signatory may also be allowed to choose some of the data in the certificate request for instance to use a pseudonym instead of the legal name in the certificate[8]. If the conditions to obtain a qualified certificate are met the new key can also be used to create advanced electronic signatures. The optional TOE functions for additional key generation and certification may require additional security functions in the TOE and an interaction with the SSCD-provisioning service provider in an environment that is secure.

The TOE life cycle as SSCD ends when all set of SCD stored in the TOE are destructed. This may include deletion of the corresponding certificates.

5 Conformance claims

5.1 CC conformance claim

This PP uses the Common Criteria version 3.1 Revision 3 (see chapter 10).

This PP is conforming to Common Criteria Part 2 [3] extended.

This PP is conforming to Common Criteria Part 3 [4].

5.2 PP claim, Package claim

This PP does not claim conformance to any other PP.

This PP is conforming to assurance package EAL4 augmented with AVA_VAN.5 defined in CC part 3 [4].

5.3 Conformance rationale

This PP does not provide a conformance rationale because it does not claim conformance to any other PP.

5.4 Conformance statement

This PP requires **strict** conformance of the ST or PP claiming conformance to this PP.

[8] The certificate request in this case will contain the name of the signatory as the requester, as for instance it may be signed by the signatory's existing SCD.

6 Security problem definition

6.1 Assets, users and threat agents

The Common Criteria define assets as entities that the owner of the TOE presumably places value upon. The term “asset” is used to describe the threats in the operational environment of the TOE.

Assets and objects:

1. SCD: private key used to perform an electronic signature operation. The confidentiality, integrity and signatory’s sole control over the use of the SCD must be maintained.

2. SVD: public key linked to the SCD and used to perform electronic signature verification. The integrity of the SVD when it is exported must be maintained.

3. DTBS and DTBS/R: set of data, or its representation, which the signatory intends to sign. Their integrity and the unforgeability of the link to the signatory provided by the electronic signature must be maintained.

Users and subjects acting for users:

1. User: End user of the TOE who can be identified as administrator or signatory. The subject S.User may act as S.Admin in the role R.Admin or as S.Sigy in the role R.Sigy.

2. Administrator: User who is in charge to perform the TOE initialisation, TOE personalisation or other TOE administrative functions. The subject S.Admin is acting in the role R.Admin for this user after successful authentication as administrator.

3. Signatory: User who hold the TOE and use it on their own behalf or on behalf of the natural or legal person or entity they represent. The subject S.Sigy is acting in the role R.Sigy for this user after successful authentication as signatory.

Threat agents:

1. Attacker: Human or process acting on their behalf located outside the TOE. The main goal of the attacker is to access the SCD or to falsify the electronic signature. The attacker has got a high attack potential and knows no secret.

6.2 Threats

6.2.1 T.SCD_Divulg *Storing, copying and releasing of the signature creation data*

An attacker stores or copies the SCD outside the TOE. An attacker can obtain the SCD during generation, storage and use for signature creation in the TOE.

6.2.2 T.SCD_Derive *Derive the signature creation data*

An attacker derives the SCD from publicly known data, such as SVD corresponding to the SCD or signatures created by means of the SCD or any other data exported outside the TOE, which is a threat against the secrecy of the SCD.

6.2.3 T.Hack_Phys *Physical attacks through the TOE interfaces*

An attacker interacts physically with the TOE to exploit vulnerabilities, resulting in arbitrary security compromises. This threat is directed against SCD, SVD and DTBS.

6.2.4 T.SVD_Forgery *Forgery of the signature verification data*

An attacker forges the SVD presented by the CSP to the CGA. This results in loss of SVD integrity in the certificate of the signatory.

6.2.*5* T.SigF_Misuse *Misuse of the signature creation function of the TOE*

An attacker misuses the signature creation function of the TOE to create SDO for data the signatory has not decided to sign. The TOE is subject to deliberate attacks by experts possessing a high attack potential with advanced knowledge of security principles and concepts employed by the TOE.

6.2.*6* T.DTBS_Forgery *Forgery of the DTBS/R*

An attacker modifies the DTBS/R sent by the SCA. Thus the DTBS/R used by the TOE for signing does not match the DTBS the signatory intended to sign.

6.2.7 T.Sig_Forgery *Forgery of the electronic signature*

An attacker forges a signed data object, maybe using an electronic signature which has been created by the TOE, and the violation of the integrity of the signed data object is not detectable by the signatory or by third parties. The signature created by the TOE is subject to deliberate attacks by experts possessing a high attack potential with advanced knowledge of security principles and concepts employed by the TOE.

6.3 Organisational security policies

6.3.1 P.CSP_QCert *Qualified certificate*

The CSP uses a trustworthy CGA to generate a qualified certificate or non-qualified certificate (cf. **the directive**, article 2, clause 9, and Annex I) for the SVD generated by the SSCD. The certificates contain at least the name of the signatory and the SVD matching the SCD implemented in the TOE under sole control of the signatory. The CSP ensures that the use of the TOE as SSCD is evident with signatures through the certificate or other publicly available information.

6.3.2 P.QSign *Qualified electronic signatures*

The signatory uses a signature creation system to sign data with an advanced electronic signature (cf. **the directive**, article 1, clause 2), which is a qualified electronic signature if it is based on a valid qualified certificate (according to **the directive** Annex I)[9]. The DTBS are presented to the signatory and sent by the SCA as DTBS/R to the SSCD. The SSCD creates the electronic signature created with a SCD implemented in the SSCD that the signatory maintain under their sole control and is linked to the DTBS/R in such a manner that any subsequent change of the data is detectable.

6.3.3 P.Sigy_SSCD *TOE as secure signature creation device*

The TOE meets the requirements for an SSCD laid down in Annex III of **the directive** [1]. This implies the SCD is used for digital signature creation under sole control of the signatory and the SCD can practically occur only once.

6.3.4 P.Sig_Non-Repud *Non-repudiation of signatures*

The lifecycle of the SSCD, the SCD and the SVD shall be implemented in a way that the signatory is not able to deny having signed data if the signature is successfully verified with the SVD contained in their unrevoked certificate.

---

9 It is a non-qualified advanced electronic signature if it is based on a non-qualified certificate for the SVD.

6.4 Assumptions

6.4.1 A.CGA *Trustworthy certificate generation application*

The CGA protects the authenticity of the signatory's name or pseudonym and the SVD in the (qualified) certificate by an advanced electronic signature of the CSP.

6.4.2 A.SCA *Trustworthy signature creation application*

The signatory uses only a trustworthy SCA. The SCA generates and sends the DTBS/R of the data the signatory wishes to sign in a form appropriate for signing by the TOE.

7 Security objectives

7.1 Security objectives for the TOE

7.1.1 Relation to PP SSCD KI

Security objectives for the TOE in this PP, which are identically stated in the PP SSCD KI, are OT.Lifecycle_Security, OT.SCD_Secrecy, OT.Sig_Secure, OT.Sigy_SigF, OT.DTBS_Integrity_TOE, OT.EMSEC_Design, OT.Tamper_ID and OT.Tamper_Resistance (these are independent from the fact whether SCD are generated by the TOE itself or imported from the operational environment).

The remaining security objectives for the TOE OT.SCD/SVD_Auth_gen, OT.SCD_Unique and OT.SCD_SVD_Corresp cover different aspects of the SCD/SVD generation by the TOE and are not present in PP SSCD KI. Instead, in PP SSCD KI the analogous security objectives for the operational environment OE.SCD/SVD_Auth_gen, OE.SCD_Unique and OE.SCD_SVD_Corresp are defined, as with key import the operational environment is responsible for the key generation.

7.1.2 OT.Lifecycle_Security *Lifecycle security*

The TOE shall detect flaws during the initialisation, personalisation and operational usage. The TOE shall securely destroy the SCD on demand of the signatory.

Application note 1: The TOE may contain more than one set of SCD. There is no need to destroy the SCD in case of repeated SCD generation. The signatory shall be able to destroy the SCD stored in the SSCD e.g. after the (qualified) certificate for the corresponding SVD has been expired.

7.1.3 OT.SCD/SVD_Auth_Gen *Authorized SCD/SVD generation*

The TOE shall provide security features to ensure that authorised users only may invoke the generation of the SCD and the SVD.

7.1.4 OT.SCD_Unique *Uniqueness of the signature creation data*

The TOE shall ensure the cryptographic quality of an SCD/SVD pair it creates as suitable for the advanced or qualified electronic signature. The SCD used for signature creation shall practically occur only once and shall not be reconstructable from the SVD. In that context 'practically occur once' means that the probability of equal SCDs is negligible.

7.1.5 OT.SCD_SVD_Corresp *Correspondence between SVD and SCD*

The TOE shall ensure the correspondence between the SVD and the SCD generated by the TOE. This includes unambiguous reference of a created SVD/SCD pair for export of the SVD and in creating an electronic signature creation with the SCD.

7.1.6 OT.SCD_Secrecy *Secrecy of the signature creation data*

The secrecy of the SCD (used for signature creation) shall be reasonably assured against attacks with a high attack potential.

Application note 2: The TOE shall keep the confidentiality of the SCD at all times, in particular during SCD/SVD generation, signature creation operation, storage and secure destruction.

7.1.7 OT.Sig_Secure *Cryptographic security of the electronic signature*

The TOE shall create digital signatures that cannot be forged without knowledge of the SCD through robust encryption techniques. The SCD shall not be reconstructable using the digital signatures or any other data exportable from the TOE. The digital signatures shall be resistant against these attacks, even when executed with a high attack potential.

7.1.8 OT.Sigy_SigF *Signature creation function for the legitimate signatory only*

The TOE shall provide the digital signature creation function for the legitimate signatory only and protects the SCD against the use of others. The TOE shall resist attacks with high attack potential.

7.1.9 OT.DTBS_Integrity_TOE *DTBS/R integrity inside the TOE*

The TOE must not alter the DTBS/R. As by definition of the DTBS/R this may consist of the DTBS themselves, this objective does not conflict with a signature creation process where the TOE hashes the provided DTBS (in part or entirely) for signature creation.

7.1.10 OT.EMSEC_Design *Provide physical emanations security*

The TOE shall be designed and built in such a way as to control the production of intelligible emanations within specified limits.

7.1.11 OT.Tamper_ID *Tamper detection*

The TOE shall provide system features that detect physical tampering of its components, and uses those features to limit security breaches.

7.1.12 OT.Tamper_Resistance *Tamper resistance*

The TOE shall prevent or resist physical tampering with specified system devices and components.

7.2 Security objectives for the operational environment

7.2.1 Relation to PP SSCD KI

Security objectives for the operational environment in this PP, which are identically stated in the PP SSCD KI, are OE.SVD_Auth, OE.CGA_QCert, OE.SSCD_Prov_Service, OE.HID_VAD, OE.DTBS_Intend, OE.DTBS_Protect and OE.Signatory (these are independent from the fact whether SCD are generated by the TOE itself or imported from the operational environment).

7.2.2 OE.SVD_Auth *Authenticity of the SVD*

The operational environment shall ensure the integrity of the SVD sent to the CGA of the CSP. The CGA verifies the correspondence between the SCD in the SSCD of the signatory and the SVD in the qualified certificate.

7.2.3 OE.CGA_QCert *Generation of qualified certificates*

The CGA shall generate a qualified certificate that includes (amongst others)

(a) the name of the signatory controlling the TOE,
(b) the SVD matching the SCD stored in the TOE and being under sole control of the signatory,
(c) the advanced signature of the CSP.

The CGA shall confirm with the generated qualified certificate that the SCD corresponding to the SVD is stored in a SSCD.

7.2.4 OE.SSCD_Prov_Service *Authentic SSCD provided by SSCD-provisioning service*

The SSCD-provisioning service shall initialise and personalise for the signatory an authentic copy of the TOE and deliver this copy as SSCD to the signatory.

7.2.5 OE.HID_VAD *Protection of the VAD*

If an external device provides the human interface for user authentication, this device shall ensure confidentiality and integrity of the VAD as needed by the authentication method employed from import through its human interface until import through the TOE interface. In particular, if the TOE requires a trusted channel for import of the VAD, the HID shall support usage of this trusted channel.

7.2.6 OE.DTBS_Intend *SCA sends data intended to be signed*

The signatory shall use a trustworthy SCA that

- generates the DTBS/R of the data that has been presented as DTBS and which the signatory intends to sign in a form which is appropriate for signing by the TOE,
- sends the DTBS/R to the TOE and enables verification of the integrity of the DTBS/R by the TOE,
- attaches the signature produced by the TOE to the data or provides it separately.

Application note 3: The SCA should be able to support advanced electronic signatures. Currently, there exist three formats defined by ETSI recognized as meeting the requirements needed by advanced electronic signatures: CAdES, XAdES and PAdES. These three formats mandate to include the hash of the signer's public key certificate in the data to be signed. In order to support for the mobility of the signer, it is recommended to store the certificate info on the SSCD for use by SCA and identification of the corresponding SCD if more than one SCD is stored on the SSCD.

7.2.7 OE.DTBS_Protect *SCA protects the data intended to be signed*

The operational environment shall ensure that the DTBS/R cannot be altered in transit between the SCA and the TOE. In particular, if the TOE requires a trusted channel for import of the DTBS/R, the SCA shall support usage of this trusted channel.

7.2.8 OE.Signatory *Security obligation of the signatory*

The signatory shall check that the SCD stored in the SSCD received from SSCD-provisioning service is in non-operational state. The signatory shall keep their VAD confidential.

7.3 Security objectives rationale

7.3.1 Security objectives backtracking

Table 1 Mapping of security problem definition to security objectives

	OT.Lifecycle_Security	OT.SCD/SVD_Auth_Gen	OT.SCD_Unique	OT.SCD_SVD_Corresp	OT.SCD_Secrecy	OT.Sig_Secure	OT.Sigy_SigF	OT.DTBS_Integrity_TOE	OT.EMSEC_Design	OT.Tamper_ID	OT.Tamper_Resistance	OE.CGA_QCert	OE.SVD_Auth	OE.SSCD_Prov_Service	OE.HID_VAD	OE.DTBS_Intend	OE.DTBS_Protect	OE.Signatory
T.SCD_Divulg					X													
T.SCD_Derive		X				X												
T.Hack_Phys					X				X	X	X							
T.SVD_Forgery				X									X					
T.SigF_Misuse	X						X	X							X	X	X	X
T.DTBS_Forgery								X								X	X	
T.Sig_Forgery			X			X						X						
P.CSP_QCert	X			X								X						
P.QSign						X	X					X				X		
P.Sigy_SSCD	X	X	X		X	X	X	X	X		X			X				
P.Sig_Non-Repud	X		X	X	X	X	X	X	X	X	X	X	X	X		X	X	X
A.CGA												X	X					
A.SCA																X		

7.3.2 Security objectives sufficiency

Countering of threats by security objectives:

T.SCD_Divulg (*Storing, copying and releasing of the signature creation data***)** addresses the threat against the legal validity of electronic signature due to storage and copying of SCD outside the TOE, as expressed in recital (18) of **the directive**. This threat is countered by OT.SCD_Secrecy, which assures the secrecy of the SCD used for signature creation.

T.SCD_Derive (*Derive the signature creation data***)** deals with attacks on the SCD via public known data produced by the TOE, which are the SVD and the signatures created with the SCD. OT.SCD/SVD_Auth_Gen counters this threat by implementing cryptographically secure generation of the SCD/SVD pair. OT.Sig_Secure ensures cryptographically secure electronic signatures.

T.Hack_Phys (*Exploitation of physical vulnerabilities***)** deals with physical attacks exploiting physical vulnerabilities of the TOE. OT.SCD_Secrecy preserves the secrecy of the SCD. OT.EMSEC_Design counters

physical attacks through the TOE interfaces and observation of TOE emanations. OT.Tamper_ID and OT.Tamper_Resistance counter the threat T.Hack_Phys by detecting and by resisting tampering attacks.

T.SVD_Forgery (*Forgery of the signature verification data***)** deals with the forgery of the SVD exported by the TOE to the CGA for certificate generation. T.SVD_Forgery is addressed by OT.SCD_SVD_Corresp, which ensures correspondence between SVD and SCD and unambiguous reference of the SVD/SCD pair for the SVD export and signature creation with the SCD, and OE.SVD_Auth that ensures the integrity of the SVD exported by the TOE to the CGA.

T.SigF_Misuse (*Misuse of the signature creation function of the TOE*) addresses the threat of misuse of the TOE signature creation function to create SDO by others than the signatory to create an electronic signature on data for which the signatory has not expressed the intent to sign, as required by paragraph 1(c) of Annex III. OT.Lifecycle_Security (*Lifecycle security*) requires the TOE to detect flaws during the initialisation, personalisation and operational usage including secure destruction of the SCD, which may be initiated by the signatory. OT.Sigy_SigF (*Signature creation function for the legitimate signatory only*) ensures that the TOE provides the signature creation function for the legitimate signatory only. OE.DTBS_Intend (*Data intended to be signed*) ensures that the SCA sends the DTBS/R only for data the signatory intends to sign and OE.DTBS_Protect counters manipulation of the DTBS during transmission over the channel between the SCA and the TOE. OT.DTBS_Integrity_TOE (*DTBS/R integrity inside the TOE*) prevents the DTBS/R from alteration inside the TOE. If the SCA provides a human interface for user authentication, OE.HID_VAD (*Protection of the VAD*) provides confidentiality and integrity of the VAD as needed by the authentication method employed. OE.Signatory ensures that the signatory checks that an SCD stored in the SSCD when received from an SSCD-provisioning service provider is in non-operational state, i.e. the SCD cannot be used before the signatory becomes control over the SSCD. OE.Signatory ensures also that the signatory keeps their VAD confidential.

T.DTBS_Forgery (*Forgery of the DTBS/R***)** addresses the threat arising from modifications of the data sent as input to the TOE's signature creation function that does not represent the DTBS as presented to the signatory and for which the signature has expressed its intent to sign. The TOE IT environment addresses T.DTBS_Forgery by the means of OE.DTBS_Intend, which ensures that the trustworthy SCA generates the DTBS/R of the data that has been presented as DTBS and which the signatory intends to sign in a form appropriate for signing by the TOE, and by means of OE.DTBS_Protect, which ensures that the DTBS/R cannot be altered in transit between the SCA and the TOE. The TOE counters this threat by the means of OT.DTBS_Integrity_TOE by ensuring the integrity of the DTBS/R inside the TOE.

T.Sig_Forgery (*Forgery of the electronic signature***)** deals with non-detectable forgery of the electronic signature. OT.Sig_Secure, OT.SCD_Unique and OE.CGA_QCert address this threat in general. OT.Sig_Secure (*Cryptographic security of the electronic signature*) ensures by means of robust cryptographic techniques that the signed data and the electronic signature are securely linked together. OT.SCD_Unique and ensures that the same SCD cannot be generated more than once and the corresponding SVD cannot be included in another certificate by chance. OE.CGA_QCert prevents forgery of the certificate for the corresponding SVD, which would result in false verification decision concerning a forged signature.

Enforcement of OSPs by security objectives:

P.CSP_QCert (*CSP generates qualified certificates*) establishes the CSP generating qualified certificate or non-qualified certificate linking the signatory and the SVD implemented in the SSCD under sole control of this signatory. P.CSP_QCert is addressed by

- OT.Lifecycle_Security, which requires the TOE to detect flaws during the initialisation, personalisation and operational usage,
- OT.SCD_SVD_Corresp, which requires to ensure the correspondence between the SVD and the SCD during their generation,
- OE.CGA_QCert for generation of qualified certificates or non-qualified certificates, which requires the CGA to certify the SVD matching the SCD implemented in the TOE under sole control of the signatory.

P.QSign (*Qualified electronic signatures*) provides that the TOE and the SCA may be employed to sign data with an advanced electronic signature, which is a qualified electronic signature if based on a valid qualified

certificate. OT.Sigy_SigF ensures signatory's sole control of the SCD by requiring the TOE to provide the signature creation function for the legitimate signatory only and to protect the SCD against the use of others. OT.Sig_Secure ensures that the TOE creates electronic signatures, which cannot be forged without knowledge of the SCD through robust encryption techniques. OE.CGA_QCert addresses the requirement of qualified or non-qualified electronic certificates building a base for the electronic signature. OE.DTBS_Intend ensures that the SCA provides only those DTBS to the TOE, which the signatory intends to sign.

P.Sigy_SSCD (*TOE as secure signature creation device*) requires the TOE to meet Annex III. This is ensured as follows:

- OT.SCD_Unique meets the paragraph 1(a) of Annex III, by the requirements that the SCD used for signature creation can practically occur only once;
- OT.SCD_Unique, OT.SCD_Secrecy and OT.Sig_Secure meet the requirement in paragraph 1(a) of Annex III by the requirements to ensure secrecy of the SCD. OT.EMSEC_Design and OT.Tamper_Resistance address specific objectives to ensure secrecy of the SCD against specific attacks;
- OT.SCD_Secrecy and OT.Sig_Secure meet the requirement in paragraph 1(b) of Annex III by the requirements to ensure that the SCD cannot be derived from SVD, the electronic signatures or any other data exported outside the TOE;
- OT.Sigy_SigF meets the requirement in paragraph 1(c) of Annex III by the requirements to ensure that the TOE provides the signature creation function for the legitimate signatory only and protects the SCD against the use of others;
- OT.DTBS_Integrity_TOE meets the requirements in paragraph 2 of Annex III as the TOE must not alter the DTBS/R.

Paragraph 2 of Annex III, requires that an SSCD does not prevent the data to be signed from being presented to the signatory prior to the signature process is obviously fulfilled by the method of TOE usage: the SCA will present the DTBS to the signatory and send it to the SSCD for signing.

The usage of SCD under sole control of the signatory is ensured by

- OT.Lifecycle_Security requiring the TOE to detect flaws during the initialisation, personalisation and operational usage,
- OT.SCD/SVD_Auth_Gen, which limits invocation of the generation of the SCD and the SVD to authorised users only, and
- OT.Sigy_SigF, which requires the TOE to provide the signature creation function for the legitimate signatory only and to protect the SCD against the use of others.

OE.SSCD_Prov_Service ensures that the signatory obtains an authentic copy of the TOE, initialised and personalised SSCD from an SSCD-provisioning service.

P.Sig_Non-Repud (*Non-repudiation of signatures***)** deals with the repudiation of signed data by the signatory, although the electronic signature is successfully verified with the SVD contained in their certificate valid at the time of signature creation. This policy is implemented by the combination of the security objectives for the TOE and its operational environment, which ensures the aspects of signatory's sole control over and responsibility for the electronic signatures created with the TOE.

OE.SSCD_Prov_Service ensures that the signatory obtains an authentic copy of the TOE, initialised and personalised as SSCD from the SSCD-provisioning service.

OE.CGA_QCert ensures that the certificate allows to identify the signatory and thus to link the SVD to the signatory. OE.SVD_Auth and OE.CGA_QCert require the environment to ensure authenticity of the SVD as being exported by the TOE and used under sole control of the signatory. OT.SCD_SVD_Corresp ensures that the SVD exported by the TOE corresponds to the SCD that is implemented in the TOE. OT.SCD_Unique provides that the signatory's SCD can practically occur just once.

OE.Signatory ensures that the signatory checks that the SCD, stored in the SSCD received from an SSCD-provisioning service is in non-operational state (i.e. the SCD cannot be used before the signatory becomes

into sole control over the SSCD). OT.Sigy_SigF provides that only the signatory may use the TOE for signature creation. As prerequisite OE.Signatory ensures that the signatory keeps their VAD confidential. OE.DTBS_Intend, OE.DTBS_Protect and OT.DTBS_Integrity_TOE ensure that the TOE creates electronic signatures only for those DTBS/R, which the signatory has decided to sign as DTBS. The robust cryptographic techniques required by OT.Sig_Secure ensure that only this SCD may create a valid electronic signature that can be successfully verified with the corresponding SVD used for signature verification. The security objective for the TOE OT.Lifecycle_Security (*Lifecycle security*), OT.SCD_Secrecy (*Secrecy of the signature creation data*), OT.EMSEC_Design (*Provide physical emanations security*), OT.Tamper_ID (*Tamper detection*) and OT.Tamper_Resistance (*Tamper resistance*) protect the SCD against any compromise.

Upkeep of assumptions by security objectives:

A.SCA *(Trustworthy signature creation application)* establishes the trustworthiness of the SCA with respect to generation of DTBS/R. This is addressed by OE.DTBS_Intend *(Data intended to be signed*) which ensures that the SCA generates the DTBS/R of the data that have been presented to the signatory as DTBS and which the signatory intends to sign in a form which is appropriate for being signed by the TOE.

A.CGA *(Trustworthy certificate generation application)* establishes the protection of the authenticity of the signatory's name and the SVD in the qualified certificate by the advanced signature of the CSP by means of the CGA. This is addressed by OE.CGA_QCert (Generation of qualified certificates), which ensures the generation of qualified certificates, and by OE.SVD_Auth (Authenticity of the SVD), which ensures the protection of the integrity of the received SVD and the verification of the correspondence between the SVD and the SCD that is implemented by the SSCD of the signatory.

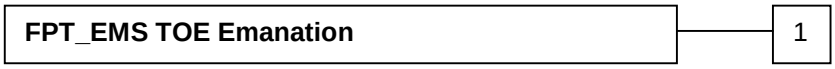
8 Extended components definition

The additional family FPT_EMS (TOE Emanation) of the Class FPT (Protection of the TSF) is defined here to describe the IT security functional requirements of the TOE. The TOE shall prevent attacks against the SCD and other secret data where the attack is based on external observable physical phenomena of the TOE. Examples of such attacks are evaluation of TOE's electromagnetic radiation, simple power analysis (SPA), differential power analysis (DPA), timing attacks, radio emanation etc. This family describes the functional requirements for the limitation of intelligible emanations. The family FPT_EMS belongs to the Class FPT because it is the class for TSF protection. Other families within the Class FPT do not cover the TOE emanation. The definition of the family FPT_EMS is taken from the *Protection Profile Secure Signature Creation Device* [5].

FPT_EMS TOE Emanation

Family behaviour:
This family defines requirements to mitigate intelligible emanations.

Component levelling:



FPT_EMS.1 TOE Emanation has two constituents:

- FPT_EMS.1.1 Limit of Emissions requires to not emit intelligible emissions enabling access to TSF data or user data.
- FPT_EMS.1.2 Interface Emanation requires to not emit interface emanation enabling access to TSF data or user data.

Management: FPT_EMS.1

There are no management activities foreseen.

Audit: FPT_EMS.1

There are no actions identified that shall be auditable if **FAU_GEN** (*Security audit data generation*) is included in a PP or ST using FPT_EMS.1.

FPT_EMS.1 *TOE Emanation*

Hierarchical to: No other components.
Dependencies: No dependencies.

FPT_EMS.1.1 The TOE shall not emit [*assignment: types of emissions*] in excess of [*assignment: specified limits*] enabling access to [assignment*: list of types of TSF data*] and [assignment*: list of types of user data*].

FPT_EMS.1.2 The TSF shall ensure [assignment*: type of users*] are unable to use the following interface [assignment*: type of connection*] to gain access to [assignment*: list of types of TSF data*] and [assignment*: list of types of user data*].

9 Security requirements

9.1 Security functional requirements

9.1.1 Use of requirement specifications

Common Criteria allow several operations to be performed on functional requirements; *refinement*, *selection*, *assignment*, and *iteration.*. Each of these operations is used in this PP. Operations not performed in this PP are identified in order to enable instantiation of the PP into a Security Target (ST).

A **refinement** operation is used to add detail to a requirement, and thus further restricts a requirement. Refinement of security requirements is (i) denoted by the word “refinement” in **bold** text and the added or changed words are in bold text, or (ii) included in text as **bold** text and marked by a footnote. In cases where words from a CC requirement were deleted, a separate attachment indicates the words that were removed.

A **selection** operation is used to select one or more options provided by the CC in stating a requirement. A selection that has been made in this European standard is indicated as underlined text and the original text of the component is given by a footnote. Selections left to be filled in by the ST author appear in square brackets with an indication that a selection is to be made, [selection:], and are *italicized*.

An **assignment** operation is used to assign a specific value to an unspecified parameter, such as the length of a password. An assignment that that has been made in this European standard is indicated as underlined text and the original text of the component is given by a footnote. Assignments left to be filled in by the ST author appear in square brackets with an indication that an assignment is to be made [assignment:], and are *italicized*.

An **iteration** operation is used when a component is repeated with varying operations. Iteration is denoted by showing a slash “/”, and the iteration indicator after the component identifier.

9.1.2 Cryptographic support (FCS)

Application note 4: Member states of the European Union have specified entities as responsible for accreditation and supervision of the evaluation process for products conforming to this standard and for determining admissible algorithms and algorithm parameters (**the directive**: 1.1b and 3.4). The ST writer shall consult with these entities to learn of admissible algorithms and cryptographic key sizes and other parameters or applicable standards.

9.1.2.1 ***FCS_CKM.1*** *Cryptographic key generation*

Hierarchical to: No other components.

Dependencies: [FCS_CKM.2 Cryptographic key distribution, or
FCS_COP.1 Cryptographic operation]
FCS_CKM.4 Cryptographic key destruction

FCS_CKM.1.1 The TSF shall generate an **SCD/SVD pair** 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 note 5: The ST writer shall perform the missing operations in the element FCS_CKM.1.1. The refinement in the element FCS_CKM.1.1 substitutes “cryptographic keys” by “SCD/SVD pairs” because it clearly addresses the SCD/SVD key generation.

9.1.2.2 ***FCS_CKM.4*** *Cryptographic key destruction*

Hierarchical to: No other components.

Dependencies: [FDP_ITC.1 Import of user data without security attributes, or
FDP_ITC.2 Import of user data with security attributes, or
FCS_CKM.1 Cryptographic key generation]

FCS_CKM.4.1 The TSF shall destroy cryptographic keys in accordance with a specified cryptographic key destruction method [assignment*: cryptographic key destruction method*] that meets the following: [assignment*: list of standards*].

Application note 6: The ST writer shall perform the missing operations in the element FCS_CKM.4.1. The specified cryptographic key destruction methods include but are not limited to overwriting the cryptographic key with any fixed or random data e.g. by generation of a new key.

9.1.2.3 ***FCS_COP.1*** *Cryptographic operation*

Hierarchical to: No other components.

Dependencies: [FDP_ITC.1 Import of user data without security attributes, or
FDP_ITC.2 Import of user data with security attributes, or
FCS_CKM.1 Cryptographic key generation]
FCS_CKM.4 Cryptographic key destruction

FCS_COP.1.1 The TSF shall perform digital signature creation[10] 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 note 7: The ST writer shall perform the missing operations in the element FCS_COP.1.1. The operations in the element FCS_COP.1.1 shall be appropriate for the SCD/SVD pairs generated according to

[10] [assignment: *list of cryptographic operations*]

FCS_CKM.1. Note that for some cryptographic algorithm like RSA padding is important part of the signature creation algorithm.

9.1.3 User data protection (FDP)

The security attributes and related status for the subjects and objects are:

Table 2 Subjects and security attributes for access control

Subject or object the security attribute is associated with	Security attribute type	Value of the security attribute
S.User	Role	R.Admin, R.Sigy
S.User	SCD/SVD Management	authorised, not authorised
SCD	SCD Operational	no, yes
SCD	SCD identifier	arbitrary value
SVD	(This PP does not define security attributes for SVD)	(This PP does not define security attributes for SVD)

Application note 8: The writer of PP or ST may define additional objects and security attributes.

9.1.3.1 FDP_ACC.1/SCD/SVD_Generation *Subset access control*

Hierarchical to: No other components.

Dependencies: FDP_ACF.1 Security attribute based access control

FDP_ACC.1.1/ SCD/SVD_Generation: The TSF shall enforce the SCD/SVD Generation SFP[11] on
(1) subjects: S.User,
(2) objects: SCD, SVD,
(3) operations: generation of SCD/SVD pair[12].

9.1.3.2 FDP_ACF.1/SCD/SVD_Generation *Security attribute based access control*

Hierarchical to: No other components.

Dependencies: FDP_ACC.1 Subset access control
FMT_MSA.3 Static attribute initialisation

FDP_ACF.1.1/ SCD/SVD_Generation: The TSF shall enforce the SCD/SVD Generation SFP[13] to objects based on the following: the user S.User is associated with the security attribute "SCD/SVD Management"[14].

---

[11] [assignment: *access control SFP*]

[12] [assignment: *list of subjects, objects, and operations among subjects and objects covered by the SFP*]

[13] [assignment: *access control SFP*]

FDP_ACF.1.2/ SCD/SVD_Generation	The TSF shall enforce the following rules to determine if an operation among controlled subjects and controlled objects is allowed: S.User with the security attribute "SCD/SVD Management" set to "authorised" is allowed to generate SCD/SVD pair[15].
FDP_ACF.1.3/ SCD/SVD_Generation	The TSF shall explicitly authorise access of subjects to objects based on the following additional rules: none[16].
FDP_ACF.1.4/ SCD/SVD_Generation	The TSF shall explicitly deny access of subjects to objects based on the following additional rules: S.User with the security attribute "SCD/SVD management" set to "not authorised" is not allowed to generate SCD/SVD pair[17].

9.1.3.3 FDP_ACC.1/SVD_Transfer *Subset access control*

Hierarchical to: No other components.

Dependencies: FDP_ACF.1 Security attribute based access control

FDP_ACC.1.1/ SVD_Transfer	The TSF shall enforce the SVD Transfer SFP[18] on (1) subjects: S.User, (2) objects: SVD (3) operations: export[19].

9.1.3.4 FDP_ACF.1/SVD_Transfer *Security attribute based access control*

Hierarchical to: No other components.

Dependencies: FDP_ACC.1 Subset access control
FMT_MSA.3 Static attribute initialisation

FDP_ACF.1.1/ SVD_Transfer	The TSF shall enforce the SVD Transfer SFP[20] to objects based on the following: (1) the S.User is associated with the security attribute Role, (2) the SVD [21].

---

[14] [assignment: *list of subjects and objects controlled under the indicated SFP, and for each, the SFP-relevant security attributes, or named groups of SFP-relevant security attributes*]

[15] [assignment: *rules governing access among controlled subjects and controlled objects using controlled operations on controlled objects*]

[16] [assignment: *rules, based on security attributes, that explicitly authorise access of subjects to objects*]

[17] [assignment: *rules, based on security attributes, that explicitly deny access of subjects to objects*]

[18] [assignment: *access control SFP*]

[19] [assignment: *list of subjects, objects, and operations among subjects and objects covered by the SFP*]

[20] [assignment: *access control SFP*]

FDP_ACF.1.2/ SVD_Transfer	The TSF shall enforce the following rules to determine if an operation among controlled subjects and controlled objects is allowed: [selection: *R.Admin, R.Sigy*] is allowed to export SVD[22].
FDP_ACF.1.3/ SVD_Transfer	The TSF shall explicitly authorise access of subjects to objects based on the following additional rules: none[23].
FDP_ACF.1.4/ SVD_Transfer	The TSF shall explicitly deny access of subjects to objects based on the following additional rules: none[24].

Application note 9: The ST writer shall perform the operation in the element FDP_ACF.1.1/SVD_Transfer according to the access control rules provided by the TOE for SVD export. The access control rules may depend on TOE lifecycle as shown in the following examples:

- The Administrator is authorized to generate the SCD/SVD key pair according to FDP_ACF.1/SCD/SVD_Generation and to export the SVD before the signatory role (RAD) is created. This allows identification of a particular instance of the TOE by means of the SVD;
- The Administrator is authorized to generate the SCD/SVD key pair according to FDP_ACF.1/SCD/SVD_Generation and only the signatory is allowed to export the SVD to the CGA. This allows determination whether the signatory has control over the TOE instantiation and the certificate may be generated;
- The signatory is authorized to generate the SCD/SVD key pair according to FDP_ACF.1/SCD/SVD_Generation and to export the SVD to the CGA to apply for the certificate.

This PP does not require the TOE to protect the integrity and authenticity of the exported SVD public key but requires such protection by the operational environment. If the operational environment does not provide sufficient security measures for the CGA to ensure the authenticity of the public key the TOE shall implement additional security functions to support the export of public keys with integrity and data origin authentication. See EN 14169-4 "*Protection Profiles for secure signature creation device - Part 4: Extension for device with key generation and trusted channel to certificate generation application*" for additional requirements for use of an SSCD in an environment that cannot provide such protection.

9.1.3.5 FDP_ACC.1/Signature_Creation *Subset access control*

Hierarchical to: No other components.

Dependencies: FDP_ACF.1 Security attribute based access control

FDP_ACC.1.1/ Signature_Creation	The TSF shall enforce the Signature Creation SFP[25] on (1) subjects: S.User, (2) objects: DTBS/R, SCD, (3) operations: signature creation[26].

---

[21] [assignment: *list of subjects and objects controlled under the indicated SFP, and for each, the SFP-relevant security attributes, or named groups of SFP-relevant security attributes*]

[22] [assignment: *rules governing access among controlled subjects and controlled objects using controlled operations on controlled objects*]].

[23] [assignment: *rules, based on security attributes, that explicitly authorise access of subjects to objects*]

[24] [assignment: *rules, based on security attributes, that explicitly deny access of subjects to objects*]

[25] [assignment: *access control SFP*]

[26] [assignment: *list of subjects, objects, and operations among subjects and objects covered by the SFP*]

9.1.3.6 FDP_ACF.1/Signature creation *Security attribute based access control*

Hierarchical to: No other components.

Dependencies: FDP_ACC.1 Subset access control
FMT_MSA.3 Static attribute initialisation

FDP_ACF.1.1/ Signature_Creation: The TSF shall enforce the Signature Creation SFP[27] to objects based on the following:
(1) the user S.User is associated with the security attribute "Role" and
(2) the SCD with the security attribute "SCD Operational"[28].

FDP_ACF.1.2/ Signature_Creation: The TSF shall enforce the following rules to determine if an operation among controlled subjects and controlled objects is allowed:

R.Sigy is allowed to create electronic signatures for DTBS/R with SCD which security attribute "SCD operational" is set to "yes"[29].

FDP_ACF.1.3/ Signature_Creation: The TSF shall explicitly authorise access of subjects to objects based on the following additional rules: none[30].

FDP_ACF.1.4/ Signature_Creation: The TSF shall explicitly deny access of subjects to objects based on the following additional rules:

S.User is not allowed to create electronic signatures for DTBS/R with SCD which security attribute "SCD operational" is set to "no"[31].

9.1.3.7 FDP_RIP.1 *Subset residual information protection*

Hierarchical to: No other components.

Dependencies: No dependencies.

FDP_RIP.1.1: The TSF shall ensure that any previous information content of a resource is made unavailable upon the de-allocation of the resource from[32] the following objects: SCD[33].

The following data persistently stored by the TOE shall have the user data attribute "integrity checked persistent stored data":
1. SCD

---

[27] [assignment: *access control SFP*]

[28] [assignment: *list of subjects and objects controlled under the indicated SFP, and for each, the SFP-relevant security attributes, or named groups of SFP-relevant security attributes*]

[29] [assignment: *rules governing access among controlled subjects and controlled objects using controlled operations on controlled objects*]

[30] [assignment: *rules, based on security attributes, that explicitly authorise access of subjects to objects*]

[31] [assignment: *rules, based on security attributes, that explicitly deny access of subjects to objects*]

[32] [selection: *allocation of the resource to, deallocation of the resource from*]

[33] [assignment: *list of objects*]

2. SVD (if persistently stored by the TOE).

The DTBS/R temporarily stored by the TOE has the user data attribute "integrity checked stored data":

9.1.3.8 FDP_SDI.2/Persistent *Stored data integrity monitoring and action*

Hierarchical to: FDP_SDI.1 Stored data integrity monitoring.

Dependencies: No dependencies.

FDP_SDI.2.1/ Persistent The TSF shall monitor user data stored in containers controlled by the TSF for integrity error[34] on all objects, based on the following attributes: integrity checked stored data[35].

FDP_SDI.2.2/ Persistent Upon detection of a data integrity error, the TSF shall
(1) prohibit the use of the altered data
(2) inform the S.Sigy about integrity error[36].

9.1.3.9 FDP_SDI.2/DTBS *Stored data integrity monitoring and action*

Hierarchical to: FDP_SDI.1 Stored data integrity monitoring.

Dependencies: No dependencies.

FDP_SDI.2.1/DTBS The TSF shall monitor user data stored in containers controlled by the TSF for integrity error[37] on all objects, based on the following attributes: integrity checked stored DTBS[38].

FDP_SDI.2.2/DTBS Upon detection of a data integrity error, the TSF shall
(1) prohibit the use of the altered data
(2) inform the S.Sigy about integrity error[39].

Application note 10: The integrity of TSF data like RAD shall be protected to ensure the effectiveness of the user authentication. This protection is a specific aspect of the security architecture (cf. ADV_ARC.1).

9.1.4 Identification and authentication (FIA)

9.1.4.1 FIA_UID.1 *Timing of identification*

Hierarchical to: No other components.

Dependencies: No dependencies.

FIA_UID.1.1 The TSF shall allow
(1) Self-test according to FPT_TST.1,
(2) [assignment: *list of additional TSF-mediated actions*][40]

---

[34] [assignment: *integrity errors*]

[35] [assignment: *user data attributes*]

[36] [assignment: *action to be taken*]

[37] [assignment: *integrity errors*]

[38] [assignment: *user data attributes*]

[39] [assignment: *action to be taken*]

[40] [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 note 11: The ST writer shall perform the missing operation in the element FIA_UID.1.1. The list of additional TSF-mediated actions may be empty (i.e. assignment "none") or include TSF-mediated actions like establishing a trusted path between the user using the HI of an external device. The TOE may identify the user by default or by selection of the role and RAD against the authentication will be performed. Identification by default is normally linked to the TOE lifecycle, e.g. the TOE may identify by default the Administrator before the signatory's RAD is created and the signatory if signatory's RAD exists. In case of multi-application smart cards (i.e. the smart card provides more than the signature creation application) the user identifies themselves as signatory by selection of the signature application directory file and therefore the PIN authentication will be performed against the signatory PIN. The user may identify themselves as Administrator by selection of an authentication key as Administrator and therefore authentication will be performed by external authenticate or mutual device authentication.

9.1.4.2 FIA_UAU.1 *Timing of authentication*

Hierarchical to: No other components.

Dependencies: FIA_UID.1 Timing of identification.

FIA_UAU.1.1 The TSF shall allow
(1) Self-test according to FPT_TST.1,
(2) Identification of the user by means of TSF required by FIA_UID.1.
(3) [assignment: *list of additional TSF-mediated actions*][41]
on behalf of the user to be performed before the user is authenticated.

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

Application note 12: The ST writer shall perform the missing operation in the element FIA_UAU.1.1. The list of additional TSF-mediated actions may be empty (i.e. assignment "none") or include TSF-mediated actions like establishing a trusted path between the user using the HI of an external device.

9.1.4.3 FIA_AFL.1 *Authentication failure handling*

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 consecutive failed authentication attempts[42].

FIA_AFL.1.2 When the defined number of unsuccessful authentication attempts has been met[43], the TSF shall block RAD[44].

---

[41] [assignment: *list of TSF mediated actions*]

[42] [assignment: *list of authentication events*]

[43] [selection: *met* ,*surpassed*]

[44] [assignment: *list of actions*]

Application note 13: The ST writer shall perform the missing operation in the element FIA_AFL.1.1. The assignment shall be consistent with the implemented authentication mechanism and the resistant against attacks with high attack potential.

9.1.5 Security management (FMT)

9.1.5.1 FMT_SMR.1 *Security roles*

Hierarchical to: No other components.

Dependencies: FIA_UID.1 Timing of identification.

FMT_SMR.1.1 The TSF shall maintain the roles R.Admin and R.Sigy[45].

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

9.1.5.2 FMT_SMF.1 *Security management functions*

Hierarchical to: No other components.

Dependencies: No dependencies.

FMT_SMF.1.1 The TSF shall be capable of performing the following management functions:
(1) Creation and modification of RAD,
(2) Enabling the signature creation function,
(3) Modification of the security attribute SCD/SVD management, SCD operational,
(4) Change the default value of the security attribute SCD Identifier,
(5) [assignment: *list of other security management functions to be provided by the TSF*][46].

Application note 14: The ST writer shall perform the missing operation in the element FMT_SMF.1.1. The list of other security management functions to be provided by the TSF may be empty (i.e. assignment “none”).

9.1.5.3 FMT_MOF.1 *Management of security functions behaviour*

Hierarchical to: No other components.

Dependencies: FMT_SMR.1 Security roles
FMT_SMF.1 Specification of Management Functions.

FMT_MOF.1.1 The TSF shall restrict the ability to enable[47] the functions signature creation function[48] to R.Sigy[49].

---

[45] [assignment: *the authorised identified roles*]

[46] [assignment: *list of security management functions to be provided by the TSF*]

[47] [selection: *determine the behaviour of, disable, enable, modify the behaviour of*]

[48] [assignment: *list of functions*]

[49] [assignment: *the authorised identified roles*]

9.1.5.4 FMT_MSA.1/Admin *Management of security attributes*

Hierarchical to: No other components.

Dependencies: [FDP_ACC.1 Subset access control, or
FDP_IFC.1 Subset information flow control]
FMT_SMR.1 Security roles
FMT_SMF.1 Specification of Management Functions

FMT_MSA.1.1/ Admin: The TSF shall enforce the SCD/SVD Generation SFP[50] to restrict the ability to modify [assignment: *other operations*][51] the security attributes SCD/SVD management[52] to R.Admin[53].

9.1.5.5 FMT_MSA.1/Signatory *Management of security attributes*

Hierarchical to: No other components.

Dependencies: [FDP_ACC.1 Subset access control, or
FDP_IFC.1 Subset information flow control]
FMT_SMR.1 Security roles
FMT_SMF.1 Specification of Management Functions

FMT_MSA.1.1/Signatory: The TSF shall enforce the Signature Creation SFP[54] to restrict the ability to modify[55] the security attributes SCD operational[56] to R.Sigy[57].

9.1.5.6 FMT_MSA.2 *Secure security attributes*

Hierarchical to: No other components.

Dependencies: [FDP_ACC.1 Subset access control, or
FDP_IFC.1 Subset information flow control]
FMT_MSA.1 Management of security attributes
FMT_SMR.1 Security roles

FMT_MSA.2.1: The TSF shall ensure that only secure values are accepted for SCD/SVD Management and SCD operational[58].

---

[50] [assignment: *access control SFP(s), information flow control SFP(s)*]

[51] [selection: *change_default, query, modify, delete, [assignment: other operations]*]

[52] [assignment: *list of security attributes*]

[53] [assignment: *the authorised identified roles*]

[54] [assignment: *access control SFP(s), information flow control SFP(s)*]

[55] [selection: *change_default, query, modify, delete, [assignment: other operations]*]

[56] [assignment: *list of security attributes*]

[57] [assignment: *the authorised identified roles*]

[58] [selection: *list of security attributes*]

Application note 15: The ST writer shall define which values of the security attribute SCD/SVD Management are secure for the TOE and the intended TOE lifecycle. E.g. if the TOE supports generation of SCD/SVD pairs by the signatory and a trusted channel for export of the SVD to the CGA then the subject S.Sigy may or may not be assigned the security attribute SCD/SVD Management to "yes". If the TOE supports the generation of the SCD/SVD pair in the preparation phase in secure environment only the TSF should enforce the assignment of the security attribute SCD/SVD Management of S.Admin to "yes" and of S.Sigy to "no".

9.1.5.7 FMT_MSA.3 *Static attribute initialisation*

Hierarchical to: No other components.

Dependencies: FMT_MSA.1 Management of security attributes

FMT_SMR.1 Security roles

FMT_MSA.3.1 The TSF shall enforce the SCD/SVD Generation SFP, SVD Transfer SFP and Signature Creation SFP[59] to provide restrictive[60] default values for security attributes that are used to enforce the SFP.

FMT_MSA.3.2 The TSF shall allow the R.Admin[61] to specify alternative initial values to override the default values when an object or information is created.

9.1.5.8 FMT_MSA.4 *Security attribute value inheritance*

Hierarchical to: No other components.

Dependencies: [FDP_ACC.1 Subset access control, or

FDP_IFC.1 Subset information flow control]

FMT_MSA.4.1 The TSF shall use the following rules to set the value of security attributes:

(1) If S.Admin successfully generates an SCD/SVD pair without S.Sigy being authenticated the security attribute "SCD operational of the SCD" shall be set to "no" as a single operation.

(2) If S.Sigy successfully generates an SCD/SVD pair the security attribute "SCD operational of the SCD" shall be set to "yes" as a single operation. [62]

Application note 16: The TOE may not support generating an SVD/SCD pair by the signatory alone, in which case rule (2) is not relevant.

---

[59] [assignment: *access control SFP, information flow control SFP*]

[60] [selection, choose one of: *restrictive, permissive, [assignment: other property]*]

[61] [assignment: *the authorised identified roles*]

[62] [assignment: *rules for setting the values of security attributes*]

9.1.5.9 FMT_MTD.1/Admin *Management of TSF data*

Hierarchical to: No other components.

Dependencies: FMT_SMR.1 Security roles

FMT_SMF.1 Specification of Management Functions

FMT_MTD.1.1/Admin The TSF shall restrict the ability to create[63] the RAD[64] to R.Admin[65].

9.1.5.10 FMT_MTD.1/Signatory *Management of TSF data*

Hierarchical to: No other components.

Dependencies: FMT_SMR.1 Security roles

FMT_SMF.1 Specification of Management Functions

FMT_MTD.1.1/Signatory The TSF shall restrict the ability to modify [assignment*: other operations*] [66] the RAD[67] to R.Sigy[68].

Application note 17: The ST writer shall perform the missing operation in the element FMT_MTD.1.1. The missing assignment may be “unblock” or “none”.

9.1.6 Protection of the TSF (FPT)

9.1.6.1 FPT_EMS.1 *TOE Emanation*

Hierarchical to: No other components.

Dependencies: No dependencies.

FPT_EMS.1.1 The TOE shall not emit [assignment*: types of emissions*] in excess of [assignment*: specified limits*] enabling access to RAD[69] and SCD[70].

FPT_EMS.1.2 The TSF shall ensure [assignment*: type of users*] are unable to use the following interface [assignment*: type of connection*] to gain access to RAD[71] and SCD[72].

---

[63] [selection: *change_default, query, modify, delete, clear, [assignment: other operations]*]

[64] [assignment: *list of TSF data*]

[65] [assignment: *the authorised identified roles*]

[66] [selection: *change_default, query, modify, delete, clear, [assignment: other operations]*]

[67] [assignment: *list of TSF data*]

[68] [assignment: *the authorised identified roles*]

[69] [assignment*: list of types of TSF data*]

[70] [assignment*: list of types of user data*]

[71] [assignment*: list of types of TSF data*]

[72] [assignment*: list of types of user data*]

Application note 18: The TOE shall prevent attacks against the SCD and other secret data where the attack is based on external observable physical phenomena of the TOE. Such attacks may be observable at the interfaces of the TOE or may origin from internal operation of the TOE or may origin by an attacker that varies the physical environment under which the TOE operates. The set of measurable physical phenomena is influenced by the technology employed to implement the TOE. Examples of measurable phenomena are variations in the power consumption, the timing of transitions of internal states, electromagnetic radiation due to internal operation, radio emission.
Due to the heterogeneous nature of the technologies that may cause such emanations, evaluation against state-of-the-art attacks applicable to the technologies employed by the TOE is assumed. Examples of such attacks are, but are not limited to, evaluation of TOE's electromagnetic radiation**,** simple power analysis (SPA), differential power analysis (DPA), timing attacks, etc.

9.1.6.2 FPT_FLS.1 *Failure with preservation of secure state*

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:
(1) self-test according to FPT_TST fails,
(2) [assignment*: list of other types of failures in the TSF*][73].

Application note 19: The ST writer shall perform the missing assignment in the element FPT_FLS.1.1. The assignment (1) addresses failures detected by a failed self-test and requiring appropriate action to prevent security violation. When the TOE is in a secure state the TSF shall not perform any cryptographic operations and all data output interfaces shall be inhibited by the TSF.

9.1.6.3 FPT_PHP.1 *Passive detection of physical attack*

Hierarchical to: No other components.

Dependencies: No dependencies.

FPT_PHP.1.1 The TSF shall provide unambiguous detection of physical tampering that might compromise the TSF.

FPT_PHP.1.2 The TSF shall provide the capability to determine whether physical tampering with the TSF's devices or TSF's elements has occurred.

9.1.6.4 FPT_PHP.3 *Resistance to physical attack*

Hierarchical to: No other components.

Dependencies: No dependencies.

FPT_PHP.3.1 The TSF shall resist [assignment: *physical tampering scenarios*] to the [assignment: *list of TSF devices/elements*] by responding automatically such that the SFRs are always enforced.

Application note 20: The TOE will implement appropriate measures to continuously counter physical tampering which may compromise the SCD. The "automatic response" in the element FPT_PHP.3.1 means (i) assuming that there might be an attack at any time and (ii) countermeasures are provided at any time. Due to

[73] [assignment*: list of types of failures in the TSF*]

the nature of these attacks the TOE can by no means detect attacks on all of its elements (e.g. the TOE is destroyed). But physical tampering must not reveal information of the SCD. E.g. the TOE may be physically tampered in power-off state of the TOE (e.g. a smart card), which does not allow TSF for overwriting the SCD but leads to physical destruction of the memory and all information therein about the SCD. In case of physical tampering the TFS may not provide the intended functions for SCD/SVD pair generation or signature creation but ensures the confidentiality of the SCD by blocking these functions. The SFR FPT_PHP.1 requires the TSF to react on physical tampering in a way that the signatory is able to determine whether the TOE was physical tampered or not. E.g. the TSF may provide an appropriate message during start-up or the guidance documentation may describe a failure of TOE start-up as indication of physical tampering.

9.1.6.5 FPT_TST.1 *TSF testing*

Hierarchical to: No other components.

Dependencies: No dependencies.

FPT_TST.1.1 The TSF shall run a suite of self tests [selection: *during initial start-up, periodically during normal operation, at the request of the authorised user, at the conditions [assignment: conditions under which self-test should occur]*] to demonstrate the correct operation of the TSF[74].

FPT_TST.1.2 The TSF shall provide authorised users with the capability to verify the integrity of TSF data[75].

FPT_TST.1.3 The TSF shall provide authorised users with the capability to verify the integrity of TSF[76].

Application note 21: The ST writer shall perform the operations in the element FPT_TST.1.1. The component FPT_TST.1 addresses only the self-test of the TSF. If the TSF relays on security feature of the hardware platform of part of the TOE the ST should consider inclusion FPT_TEE.1 to require the TSF to test these features for correct work of the dependent TSF.

9.2 Security assurance requirements

Table 3 Security assurance requirements: EAL4 augmented with AVA_VAN.5

Assurance class	Assurance components
ADV: Development	ADV_ARC.1 Architectural Design with domain separation and non-bypassability
	ADV_FSP.4 Complete functional specification
	ADV_IMP.1 Implementation representation of the TSF
	ADV_TDS.3 Basic modular design
AGD: Guidance documents	AGD_OPE.1 Operational user guidance
	AGD_PRE.1 Preparative procedures
ALC: Life-cycle support	ALC_CMC.4 Production support, acceptance procedures and automation
	ALC_CMS.4 Problem tracking CM coverage

[74] [selection: *[assignment: parts of TSF], the TSF*]

[75] [selection: *[assignment: parts of TSF data], TSF data*]

[76] [selection: *[assignment: parts of TSF], TSF*]

Assurance class	Assurance components
	ALC_DEL.1 Delivery procedures
	ALC_DVS.1 Identification of security measures
	ALC_LCD.1 Developer defined life-cycle model
	ALC_TAT.1 Well-defined development tools
ASE: Security Target evaluation	ASE_CCL.1 Conformance claims
	ASE_ECD.1 Extended components definition
	ASE_INT.1 ST introduction
	ASE_OBJ.2 Security objectives
	ASE_REQ.2 Derived security requirements
	ASE_SPD.1 Security problem definition
	ASE_TSS.1 TOE summary specification
ATE: Tests	ATE_COV.2 Analysis of coverage
	ATE_DPT.1 Testing: basic design
	ATE_FUN.1 Functional testing
	ATE_IND.2 Independent testing – sample
AVA: Vulnerability assessment	AVA_VAN.5 Advanced methodical vulnerability analysis

9.3 Security requirements rationale

9.3.1 Security requirement coverage

Table 4 Mapping of functional requirements to security objectives for the TOE

TOE security objectives / **Functional requirements**	OT.Lifecycle_Security	OT.SCD/SVD_Auth_Gen	OT.SCD_Unique	OT.SCD_SVD_Corresp	OT.SCD_Secrecy	OT.Sig_Secure	OT.Sigy_SigF	OT.DTBS_Integrity_TOE	OT.EMSEC_Design	OT.Tamper_ID	OT.Tamper_Resistance
FCS_CKM.1	X		X	X	X						
FCS_CKM.4	X				X						
FCS_COP.1	X					X					
FDP_ACC.1/SCD/SVD_Generation	X	X									
FDP_ACC.1/SVD_Transfer	X										
FDP_ACC.1/Signature_Creation	X						X				
FDP_AFC.1/SCD/SVD_Generation	X	X									
FDP_AFC.1/SVD_Transfer	X										

TOE security objectives / Functional requirements	OT.Lifecycle_Security	OT.SCD/SVD_Auth_Gen	OT.SCD_Unique	OT.SCD_SVD_Corresp	OT.SCD_Secrecy	OT.Sig_Secure	OT.Sigy_SigF	OT.DTBS_Integrity_TOE	OT.EMSEC_Design	OT.Tamper_ID	OT.Tamper_Resistance
FDP_AFC.1/Signature_Creation	X						X				
FDP_RIP.1					X		X				
FDP_SDI.2/Persistent				X	X	X					
FDP_SDI.2/DTBS							X	X			
FIA_AFL.1							X				
FIA_UAU.1		X					X				
FIA_UID.1		X					X				
FMT_MOF.1	X						X				
FMT_MSA.1/Admin	X	X									
FMT_MSA.1/Signatory	X						X				
FMT_MSA.2	X	X					X				
FMT_MSA.3	X	X					X				
FMT_MSA.4	X	X		X			X				
FMT_MTD.1/Admin	X						X				
FMT_MTD.1/Signatory	X						X				
FMT_SMR.1	X						X				
FMT_SMF.1	X			X			X				
FPT_EMS.1					X				X		
FPT_FLS.1					X						
FPT_PHP.1										X	
FPT_PHP.3					X						X
FPT_TST.1	X				X	X					

9.3.2 TOE Security Requirements Sufficiency

OT.Lifecycle_Security (*Lifecycle security*) is provided by the SFR for SCD/SVD generation FCS_CKM.1, SCD usage FCS_COP.1 and SCD destruction FCS_CKM.4 which ensure cryptographically secure lifecycle of the SCD. The SCD/SVD generation is controlled by TSF according to FDP_ACC.1/SCD/SVD_Generation and

FDP_ACF.1/SCD/SVD_Generation. The SVD transfer for certificate generation is controlled by TSF according to FDP_ACC.1/SVD_Transfer and FDP_ACF.1/SVD_Transfer. The SCD usage is ensured by access control FDP_ACC.1/Signature_Creation, FDP_AFC.1/Signature_Creation which is based on the security attribute secure TSF management according to FMT_MOF.1, FMT_MSA.1/Admin, FMT_MSA.1/Signatory, FMT_MSA.2, FMT_MSA.3, FMT_MSA.4, FMT_MTD.1/Admin, FMT_MTD.1/Signatory, FMT_SMF.1 and FMT_SMR.1. The test functions FPT_TST.1 provides failure detection throughout the lifecycle.

OT.SCD/SVD_Auth_Gen (*Authorized SCD/SVD generation*) addresses that generation of a SCD/SVD pair requires proper user authentication. The TSF specified by FIA_UID.1 and FIA_UAU.1 provide user identification and user authentication prior to enabling access to authorised functions. The SFR FDP_ACC.1/SCD/SVD_Generation and FDP_ACF.1/SCD/SVD_Generation provide access control for the SCD/SVD generation. The security attributes of the authenticated user are provided by FMT_MSA.1/Admin, FMT_MSA.2, and FMT_MSA.3 for static attribute initialisation. The SFR FMT_MSA.4 defines rules for inheritance of the security attribute “SCD operational” of the SCD.

OT.SCD_Unique (*Uniqueness of the signature creation data*) implements the requirement of practically unique SCD as laid down in **Annex** III, paragraph 1(a), which is provided by the cryptographic algorithms specified by FCS_CKM.1.

OT.SCD_SVD_Corresp (*Correspondence between SVD and SCD*) addresses that the SVD corresponds to the SCD implemented by the TOE. This is provided by the algorithms specified by FCS_CKM.1 to generate corresponding SVD/SCD pairs. The security functions specified by FDP_SDI.2/Persistent ensure that the keys are not modified, so to retain the correspondence. Moreover, the SCD Identifier allows the environment to identify the SCD and to link it with the appropriate SVD. The management functions identified by FMT_SMF.1 and by FMT_MSA.4 allow R.Admin to modify the default value of the security attribute SCD Identifier.

OT.SCD_Secrecy (*Secrecy of signature creation data*) is provided by the security functions specified by the following SFR. FCS_CKM.1 ensures the use of secure cryptographic algorithms for SCD/SVD generation. Cryptographic quality of SCD/SVD pair shall prevent disclosure of SCD by cryptographic attacks using the publicly known SVD. The security functions specified by FDP_RIP.1 and FCS_CKM.4 ensure that residual information on SCD is destroyed after the SCD has been use for signature creation and that destruction of SCD leaves no residual information.

The security functions specified by FDP_SDI.2/Persistent ensure that no critical data is modified which could alter the efficiency of the security functions or leak information of the SCD. FPT_TST.1 tests the working conditions of the TOE and FPT_FLS.1 guarantees a secure state when integrity is violated and thus assures that the specified security functions are operational. An example where compromising error conditions are countered by FPT_FLS.1 is fault injection for differential fault analysis (DFA).

SFR FPT_EMS.1 and FPT_PHP.3 require additional security features of the TOE to ensure the confidentiality of the SCD.

OT.Sig_Secure (*Cryptographic security of the electronic signature*) is provided by the cryptographic algorithms specified by FCS_COP.1, which ensures the cryptographic robustness of the signature algorithms. FDP_SDI.2/Persistent corresponds to the integrity of the SCD implemented by the TOE and FPT_TST.1 ensures self-tests ensuring correct signature creation.

OT.Sigy_SigF (*Signature creation function for the legitimate signatory only*) is provided by an SFR for identification authentication and access control.

FIA_UAU.1 and FIA_UID.1 ensure that no signature creation function can be invoked before the signatory is identified and authenticated. The security functions specified by FMT_MTD.1/Admin and FMT_MTD.1/Signatory manage the authentication function. SFR FIA_AFL.1 provides protection against a number of attacks, such as cryptographic extraction of residual information, or brute force attacks against authentication. The security function specified by FDP_SDI.2/DTBS ensures the integrity of stored DTBS and FDP_RIP.1 prevents misuse of any resources containing the SCD after de-allocation (e.g. after the signature creation process).

The security functions specified by FDP_ACC.1/Signature_Creation and FDP_ACF.1/Signature_Creation provide access control based on the security attributes managed according to the SFR FMT_MTD.1/Signatory, FMT_MSA.2, FMT_MSA.3 and FMT_MSA.4. The SFR FMT_SMF.1 and FMT_SMR.1 list these management functions and the roles. These ensure that the signature process is restricted to the signatory. FMT_MOF.1 restricts the ability to enable the signature creation function to the signatory. FMT_MSA.1/Signatory restricts the ability to modify the security attributes SCD operational to the signatory.

OT.DTBS_Integrity_TOE (*DTBS/R integrity inside the TOE*) ensures that the DTBS/R is not altered by the TOE. The integrity functions specified by FDP_SDI.2/DTBS require that the DTBS/R has not been altered by the TOE.

OT.EMSEC_Design (*Provide physical emanations security*) covers that no intelligible information is emanated. This is provided by FPT_EMS.1.1.

OT.Tamper_ID (*Tamper detection*) is provided by FPT_PHP.1 by the means of passive detection of physical attacks.

OT.Tamper_Resistance (*Tamper resistance*) is provided by FPT_PHP.3 to resist physical attacks.

9.3.3 Satisfaction of dependencies of security requirements

Table 5 Satisfaction of dependencies of security functional requirements

Functional requirement	Dependencies	Satisfied by
FCS_CKM.1	[FCS_CKM.2 or FCS_COP.1], FCS_CKM.4	FCS_COP.1, FCS_CKM.4
FCS_CKM.4	[FDP_ITC.1 or FDP_ITC.2 or FCS_CKM.1]	FCS_CKM.1
FCS_COP.1	[FDP_ITC.1 or FDP_ITC.2 or FCS_CKM.1], FCS_CKM.4	FCS_CKM.1, FCS_CKM.4
FDP_ACC.1/SCD/SVD_Generation	FDP_ACF.1	FDP_ACF.1/SCD/SVD_Generation
FDP_ACC.1/Signature_Creation	FDP_ACF.1	FDP_ACF.1/Signature_Creation
FDP_ACC.1/SVD_Transfer	FDP_ACF.1	FDP_ACF.1/SVD_Transfer
FDP_ACF.1/SCD/SVD_Generation	FDP_ACC.1, FMT_MSA.3	FDP_ACC.1/SCD/SVD_Generation, FMT_MSA.3
FDP_ACF.1/Signature_Creation	FDP_ACC.1, FMT_MSA.3	FDP_ACC.1/Signature_Creation, FMT_MSA.3
FDP_ACF.1/SVD_Transfer	FDP_ACC.1, FMT_MSA.3	FDP_ACC.1/SVD_Transfer, FMT_MSA.3
FDR_RIP.1	No dependencies	n/a
FDP_SDI.2/Persistent	No dependencies	n/a
FDP_SDI.2/DTBS	No dependencies	n/a
FIA_AFL.1	FIA_UAU.1	FIA_UAU.1
FIA_UID.1	No dependencies	n/a
FIA_UAU.1	FIA_UID.1	FIA_UID.1
FMT_MOF.1	FMT_SMR.1, FMT_SMF.1	FMT_SMR.1, FMT_SMF.1

Functional requirement	Dependencies	Satisfied by
FMT_MSA.1/Admin	[FDP_ACC.1 or FDP_IFC.1], FMT_SMR.1, FMT_SMF.1	FDP_ACC.1/SCD/SVD_Generation, FMT_SMR.1, FMT_SMF.1
FMT_MSA.1/Signatory	[FDP_ACC.1 or FDP_IFC.1], FMT_SMR.1, FMT_SMF.1	FDP_ACC.1/Signature_Creation, FMT_SMR.1, FMT_SMF.1
FMT_MSA.2	[FDP_ACC.1 or FDP_IFC.1], FMT_MSA.1, FMT_SMR.1	FDP_ACC.1/SCD/SVD_Generation, FDP_ACC.1/Signature_Creation, FMT_SMR.1, FMT_MSA.1/Admin, FMT_MSA.1/Signatory
FMT_MSA.3	FMT_MSA.1, FMT_SMR.1	FMT_MSA.1/Admin, FMT_MSA.1/Signatory, FMT_SMR.1
FMT_MSA.4	[FDP_ACC.1 or FDP_IFC.1]	FDP_ACC.1/SCD/SVD_Generation, FDP_ACC.1/Signature_Creation
FMT_MTD.1/Admin	FMT_SMR.1, FMT_SMF.1	FMT_SMR.1, FMT_SMF.1
FMT_MTD.1/Signatory	FMT_SMR.1, FMT_SMF.1	FMT_SMR.1, FMT_SMF.1
FMT_SMF.1	No dependencies	n/a
FMT_SMR.1	FIA_UID.1	FIA_UID.1
FPT_FLS.1	No dependencies	n/a
FPT_PHP.1	No dependencies	n/a
FPT_PHP.3	No dependencies	n/a
FPT_TST.1	No dependencies	n/a

Table 6 Satisfaction of dependencies of security assurance requirements

Assurance requirement(s)	Dependencies	Satisfied by
EAL4 package	(dependencies of EAL4 package are not reproduced here)	By construction, all dependencies are satisfied in a CC EAL package
AVA_VAN.5	ADV_ARC.1, ADV_FSP.4, ADV_TDS.3, ADV_IMP.1, AGD_OPE.1, AGD_PRE.1, ATE_DPT.1	ADV_ARC.1, ADV_FSP.4, ADV_TDS.3, ADV_IMP.1, AGD_OPE.1, AGD_PRE.1, ATE_DPT.1 (all are included in EAL4 package)

9.3.4 Rationale for chosen security assurance requirements

The assurance level for this protection profile is EAL4 augmented. EAL4 allows a developer to attain a reasonably high assurance level without the need for highly specialized processes and practices. It is considered to be the highest level that could be applied to an existing product line without undue expense and complexity. As such, EAL4 is appropriate for commercial products that can be applied to moderate to high security functions. The TOE described in this protection profile is just such a product. Augmentation results from the selection of:

AVA_VAN.5 Advanced methodical vulnerability analysis

The TOE is intended to function in a variety of signature creation systems for qualified electronic signatures. Due to the nature of its intended application, i.e., the TOE may be issued to users and may not be directly under the control of trained and dedicated administrators. As a result, it is imperative that misleading, unreasonable and conflicting guidance is absent from the guidance documentation, and that secure procedures for all modes of operation have been addressed. Insecure states should be easy to detect. The TOE shall be shown to be highly resistant to penetration attacks to meet the security objectives OT.SCD_Secrecy, OT.Sigy_SigF and OT.Sig_Secure.

10 References

[1] DIRECTIVE 1999/93/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 13 December 1999 on a Community framework for electronic signatures

[2] Common Criteria for Information Technology Security Evaluation, Part 1: Introduction and General Model; Version 3.1, Revision 3, CCMB-2009-07-001, July 2009

[3] Common Criteria for Information Technology Security Evaluation, Part 2: Security Functional Requirements; Version 3.1, Revision 3, CCMB-2009-07-002, July 2009

[4] Common Criteria for Information Technology Security Evaluation, Part 3: Security Assurance Requirements; Version 3.1, Revision 3, CCMB-2009-07-003, July 2009

[5] Protection Profile Secure Signature Creation Device Type 3, registered and certified by Bundesamt für Sicherheit in der Informationstechnik (BSI) under the reference BSI-PP-0006-2002, also short SSCD-PP or CWA14169

[6] CEN prEN 14169-1:2010, Protection profiles for secure signature creation device — Part 1: Overview, date 2012-01

[7] ETSI Technical Specification 101 733, CMS Advanced Electronic Signatures (CAdES), the latest version may be downloaded from the ETSI download page http://pda.etsi.org/pda/queryform.asp

[8] ETSI Technical Specification 101 903, XML Advanced Electronic Signatures (XAdES), the latest version may be downloaded from the ETSI download page http://pda.etsi.org/pda/queryform.asp

[9] ETSI Technical Specification 102 778: PDF Advanced Electronic Signatures (PAdES), the latest version may be downloaded from the ETSI download page http://pda.etsi.org/pda/queryform.asp