



Telia SITHS CA v1 CPS v1.3

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1 Introduction

A Certification Practice Statement (CPS) is a Certification Authority's (CA) description of the practices it follows when issuing certificates. The purpose of this CPS is to describe the procedures that the CA uses when issuing certificates, and that all Registration Authorities, Subscribers, Subjects, and Relying Parties shall follow in connection with these certificates. This document defines the Certification Practice Statement for the following CAs

- SITHS Root CA v1
- SITHS Type 1 CA v1
- SITHS Type 2 CA v1
Since 2015-12-08 SITHS Type 2 CA v1 is no longer issuing new certificates. All issued certificates will end at the latest 2016-12-31. In this version of the CPS all information regarding SITHS Type 2 CA is removed.
- SITHS Type 3 CA v1

This CPS describes the procedures and routines, which apply when completing a certificate for individuals, organizations, functions and devices and for revoking and revocation checking of such certificates. This CPS lay out how Telia AB conform to SITHS Certificate Policy (CP).

This document is divided into nine sections:

- Section 1 - provides an overview of the policy and set of provisions, as well as the types of entities and the appropriate applications for certificates.
- Section 2 - contains any applicable provisions regarding identification of the entity or entities that operate repositories; responsibility of a PKI participant to publish information regarding its practices, certificates, and the current status; frequency of publication; and access control on published information.
- Section 3 - covers the identification and authentication requirements for certificate related activity.
- Section 4 - deals with certificate life-cycle management and operational requirements including application for a certificate, revocation, suspension, audit, archival and compromise.
- Section 5 - covers facility, management and operational controls (physical and procedural security requirements).
- Section 6 - provides the technical controls with regard to cryptographic key requirements.
- Section 7 - defines requirements for certificate, Certificate Revocation List (CRL) and Online Certificate Status Protocol (OCSP) formats. This includes information on profiles, versions, and extensions used.
- Section 8 - addresses topics covered and methodology used for assessments/audits; frequency of compliance audits or assessments; identity and/or qualifications of the personnel performing the audit or assessment; actions taken as a result of deficiencies found during the assessment; and who is entitled to see results of an assessment.
- Section 9 - covers general business and legal matters: the business issues of fees, liabilities, obligations, legal requirements, governing laws, processes, and confidentiality.

This CPS generally conforms to the Internet Engineering Task Force (IETF):

- RFC 3647 for Certificate Policy and Certification Practices Framework
- RFC 2119 Key words for use in RFCs to Indicate Requirement Levels

This CPS and all certificates with O.I.D 1.2.752.74.8.3.2 issued by SITHS Type 3 CA v1 conforms to the current version of the Baseline Requirements for the Issuance and Management of Publicly-Trusted Certificates published at <http://www.cabforum.org>. In the event of any inconsistency between this document and those Requirements, those Requirements take precedence over this document.

1.1 Overview

This CPS lay out how Telia AB conform to procedures and routines defined in SITHS Certificate Policy (CP) when issuing certificates within SITHS for:

- Physical persons
- Functions/services

Within SITHS, certificates are issued according to different certificate profiles that govern certificate contents and possible subscribers, these profiles are labeled as HCC.

1.2 Document name and identification

This CPS is titled { Telia SITHS CA v1 CPS v1.3 } with OID: 1.2.752.74.8.1.2.1.1, 1.2.752.74.8.1.2.2.1, 1.2.752.74.8.1.2.3.1, 1.2.752.74.8.1.2.4.1.

1.3 PKI participants

1.3.1 Certification authorities

The term Certification Authority (CA) is an all-embracing term that refers to all entities authorized to issue public key certificates within SITHS. The CA term encompasses two subcategories of issuers:

- Root Certification Authorities. The SITHS Root CA acts as root for all subordinate CAs that are part of the SITHS CA hierarchy. A Root CA within SITHS only issues subordinate CA certificates.
- Subordinate issuing Certification Authorities. The set of SITHS Subordinate Issuing CAs issue end entity certificates based on the approved certificate profiles governed by the SITHS Policy Authority.

The Certification Authorities are responsible for managing the certificate life cycle of end entity certificates signed by the CAs. This will include:

1. Guarantee that all information within issued certificates is correct and verified in accordance with SITHS CP v1.
2. Generate keys for HCC Function in cases when the RA requests this.
3. Issue HCC certificates according to HCC Profiles approved by the SITHS Policy Authority.
4. Provide information for repositories in accordance with section 2.1.
5. Conduct audits in accordance with SITHS CP.
6. Conduct subject identification in accordance with chapter 2.
7. Provide subscribers and trusting parties, that use issued certificates, with appropriate information as dictated by SITHS CP and in accordance with applicable laws and regulations.
8. Revoke certificates and issue revocation lists in accordance with chapter 4.

This CPS is approved by the Telia Company CA Policy Management Team.

Telia AB will make sure to maintain sufficient resources in the form of monetary means and insurances to be able to fulfil its duties according to SITHS CP.

1.3.2 Registration authorities

A Registration Authority is an entity that performs identification and authentication of certificate applicants for end entity certificates, initiates or passes along revocation requests for certificates for end-entity certificates. Inera AB and SITHS member organizations may act as RAs for certificates they issue.

Each RA must operate in accordance with the SITHS RA Policy and have a RAPS published and approved by the SITHS Policy Authority. Each RA is accountable for that all obligations of the SITHS RA Policy are fulfilled.

In the case where Telia AB acts as an RA, Telia AB will rely on the electronic identification issued in accordance with each issuer.

1.3.3 Subscribers

Subscribers under SITHS include all end entities of certificates issued by a SITHS CA. A subscriber is the entity named as the end entity subscriber of a certificate. End entity subscribers may be individuals or, infrastructure components such as firewalls, routers, trusted servers or other devices.

In most cases certificates are issued directly to individuals or entities for their own use. However, there commonly exist other situations where the party requiring a certificate is different from the subject to whom the credential applies.

For example, an organization may require certificates for a specific website. In such situations the entity subscribing for the issuance of certificates is different from the entity, which is the subject of the certificate (generally, the holder of the credential). Two different terms are used in this CPS to distinguish between these two roles: "subscriber", is the entity which contracts with a SITHS member organization for the issuance of credentials and "subject", is the entity to which the credential is bound. The subscriber bears ultimate responsibility for the use of the credential but the subject is the individual that is authenticated when the credential is presented.

When "subject" is used, it is to indicate a distinction from the subscriber. When "subscriber" is used it may mean just the subscriber as a distinct entity but may also use the term to embrace the two. The context of its use in this CPS will invoke the correct understanding.

CAs are technically also subscribers of certificates within SITHS, either as a Root CA issuing a self signed certificate to itself, or as a Subordinate Issuing CA issued a certificate by a superior CA. References to end entities and subscribers in this CPS, however, apply only to end entity subscribers.

1.3.4 Relying parties

A Relying Party is an individual or entity that acts in reliance of a certificate and/or a digital signature issued under SITHS. A relying party may, or may not also be a subscriber within SITHS.

1.3.5 Other participants

Telia AB act as a Processing Center within SITHS which means Telia AB has established secure facility housing, among other things, CA systems, including the cryptographic modules holding the private keys used for the issuance of Certificates and perform all certificate lifecycle services of issuing, managing, revoking, and renewing certificates.

1.4 Certificate usage

1.4.1 Appropriate certificate uses

Individual Certificates are normally used by individuals to sign and encrypt information, to authenticate to applications (client authentication) and to authenticate and encrypt communication (such as SSL/TLS). An individual certificate may however be used for other purposes, provided that a relying party is able to reasonably rely on that certificate and the usage is not otherwise prohibited by law, by SITHS CP, by this CPS under which the certificate has been issued and any agreements with subscribers.

1.4.2 Prohibited certificate uses

Certificates shall be used only to the extent the use is consistent with applicable law. SITHS certificates are not designed, intended, or authorized for use as control equipment in hazardous circumstances or for uses requiring fail-safe performance such as the operation of systems, where failure could lead directly to death, personal injury, or severe environmental damage. CA certificates shall not be used for any functions except CA functions. In addition, end entity subscriber certificates shall not be used as CA certificates.

1.4.3 Assurance levels and certificate categories

The CA-hierarchy is established according to Figure 1 below.

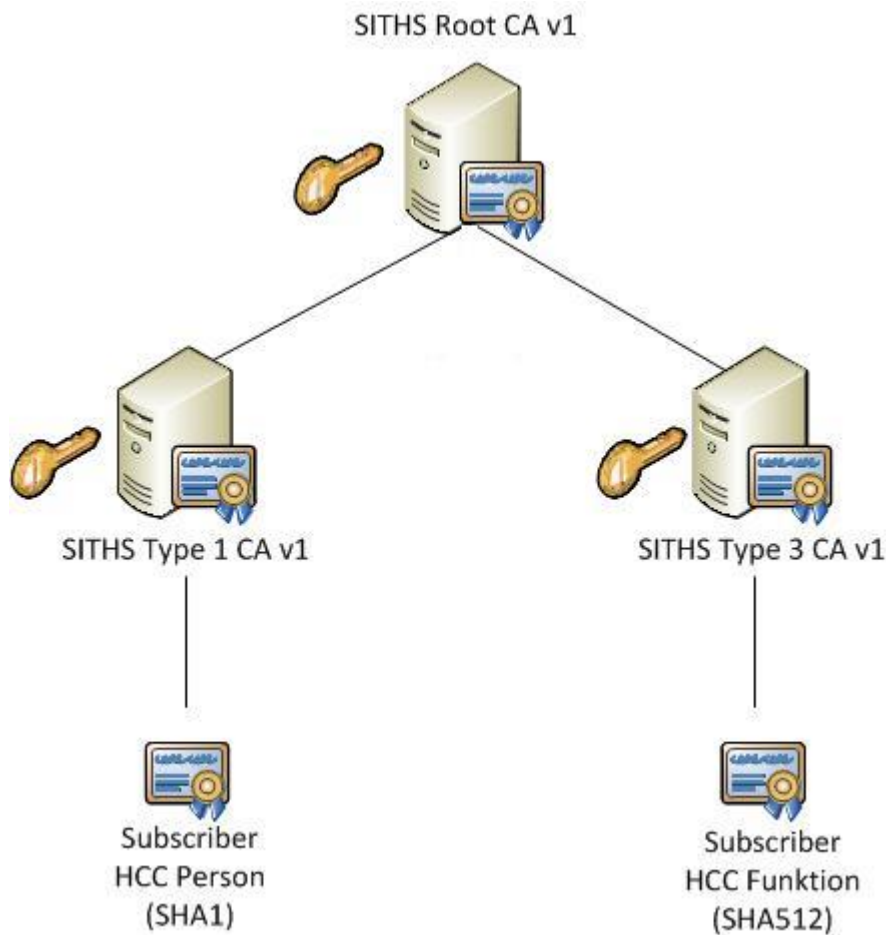


Figure 1

Based on the policy identifier within issued certificates it is possible to identify which policy that has been used in the issuance process along with which certificate category that the issued certificate belong to. The different certificate categories are described below, note that in cases where the certificate category requires a certain technical solution (e.g. cryptographic module type) the entire certificate chain must meet such requirements.

1. HCC Function
 - a) Low Assurance 1.2.752.74.8.3.1
 - b) Medium Assurance 1.2.752.74.8.3.2
 - c) High Assurance 1.2.752.74.8.3.3
 - d) Very High Assurance 1.2.752.74.8.3.4
2. HCC Person
 - a) Low Assurance 1.2.752.74.8.3.1
 - b) Medium Assurance 1.2.752.74.8.3.2
 - c) High Assurance 1.2.752.74.8.3.3
 - d) Very High Assurance 1.2.752.74.8.3.4

1.4.3.1 Assurance levels HCC Function

Low Assurance: Low assurance certificates are certificates that should not be used for authentication purposes or to support Non-repudiation. The digital signature provides modest assurances that a message originated from a specific sender. The Certificate, however, provides no proof of the identity of the subscriber. Certificates issued at this assurance level must meet requirements stated within the NIST SP 800-63-1 Assurance level 1. Certificates issued in accordance with this level are marked with the following policy identifier:

- 1.2.752.74.8.3.1

Medium Assurance: This is an assurance level for use in scenarios where moderate risks for harmful or malicious actions are present and can have medium impact on subscribers and/or relying parties. Certificates issued at this assurance level must meet requirements stated within the NIST SP 800-63-1 Assurance level 2 and conforms to the current version of the Baseline Requirements for the Issuance and Management of Publicly-Trusted Certificates published at <http://www.cabforum.org>. Certificates issued in accordance with this level are marked with the following policy identifier:

- 1.2.752.74.8.3.2

High Assurance: This is an assurance level for use in scenarios where high risks for harmful or malicious actions are present and can have high impact on a subscribers and/or relying parties. Certificates issued at this assurance level must meet requirements stated within the NIST SP 800-63-1 Assurance level 3. Certificates issued in accordance with this level are marked with the following policy identifier:

- 1.2.752.74.8.3.3

Very High Assurance: This is an assurance level for use in scenarios where the highest level of assurance is required for protection of information and services that utilize certificates issued by SITHS. Typically high risks for harmful or malicious actions are present and can have high impact on a subscribers and/or relying parties. Certificates issued at this assurance level must meet requirements stated within the NIST SP 800-63-1 Assurance level 4. Certificates issued in accordance with this level are marked with the following policy identifier:

- 1.2.752.74.8.3.4

1.4.3.2 Assurance levels HCC Person

Low Assurance: Low assurance certificates are certificates that should not be used for authentication purposes or to support Non-repudiation. The digital signature provides modest assurances that a message originated from a specific sender. The Certificate, however, provides no proof of the identity of the subscriber. Certificates issued at this assurance level must meet requirements stated within the NIST SP 800-63-1 Assurance level 1. Certificates issued in accordance with this level are marked with the following policy identifier:

- 1.2.752.74.8.3.1

Medium Assurance: This is an assurance level for use in scenarios where moderate risks for harmful or malicious actions are present and can have medium impact on subscribers and/or relying parties. Certificates issued at this assurance level must meet requirements stated within the NIST SP 800-63-1 Assurance level 2. Certificates issued in accordance with this level are marked with the following policy identifier:

- 1.2.752.74.8.3.2

High Assurance: This is an assurance level for use in scenarios where high risks for harmful or malicious actions are present and can have high impact on a subscribers and/or relying parties. Certificates issued at this assurance level must meet requirements stated within the NIST SP 800-63-1 Assurance level 3. Certificates issued in accordance with this level are marked with the following policy identifier:

- 1.2.752.74.8.3.3

Very High Assurance: This is an assurance level for use in scenarios where the highest level of assurance is required for protection of information and services that utilize certificates issued by SITHS. Typically high risks for harmful or malicious actions are present and can have high impact on a subscribers and/or relying parties. Certificates issued at this assurance level must meet requirements stated within the NIST SP 800-63-1 Assurance level 4. Certificates issued in accordance with this level are marked with the following policy identifier:

- 1.2.752.74.8.3.4

1.5 Policy administration

1.5.1 Organization administering the document

Telia AB
SE-106 63 Stockholm
Phone: +46 (0)8 504 550 00

1.5.2 Contact person

Telia AB
Email: kundtjanst-eid@teliacompany.com
Phone: +46 (0)20 32 32 62
Internet: <http://www.telia.se>
Revocation Service: 020 32 32 62, +46 771 32 32 62, customerservices-eid@teliacompany.com

SITHS Policy Authority
Inera AB
Box 17703
118 93 Stockholm
Email: sithspolicyauthority@inera.se
Visiting: Tjärhovsgatan 21 B

1.5.3 Person determining CPS suitability for the policy

The SITHS Policy Authority determines the suitability and applicability of this CPS.

1.5.4 CPS approval procedures

Approval of this CPS and subsequent amendments shall be made by the SITHS Policy Authority. Amendments shall either be in the form of a document containing an amended form of the CPS or an update notice. Amended versions or updates shall be linked to the repository defined in section 2.1.1.

1.6 Definitions and acronyms

See Appendix A for a table of acronyms and definitions.

2 Publication and repository responsibilities

2.1 Repositories

2.1.1 CPS Repository

A full text version of this CPS is published at <https://repository.trust.telia.com>.

2.1.2 Revocation Information Repository

Certificate Revocation Lists (CRLs) are published to the HSA root directory.

The CRLs are published to the entries:

cn=SITHS Root CA v1,o=SITHS CA,c=SE

cn=SITHS Type 1 CA v1,o=SITHS CA,c=SE

cn=SITHS Type 3 CA v1,o=SITHS CA,c=SE

The attribute CertificateRevocationList is used for publication in the HSA-directory.

Access to external CRL repositories as stated in the SITHS CP (<http://crl1.siths.se/> and <http://crl2.siths.sjunet.org/>) is not the responsibility of Telia. Inera AB maintains external CRL repositories.

Revocation information is also accessible via OCSP. The OCSP responder will respond to signed and unsigned requests at the addresses stated in the Authority Information Access extension in the Certificate.

2.1.3 Certificate Repository

All issued certificates are stored in the local database of the CA-system. Certificates may also be published to other repositories if it is a part of the Telia Service or agreed with the customer.

2.2 Publication of certification information

Telia AB will make the following information available:

- a) This CPS.
- b) Certificate Revocation Lists of revoked certificates and information of revoked certificates via OCSP.
- c) Issued CA-certificates, self signed CA-certificates and cross-certified certificates for cross-certified CAs are distributed to SITHS Policy Authority who is responsible for making them publicly available.

The CRLs will contain information of all revoked certificates for each CA at the time of publication. Each CRL will only hold information of which the CRL is intended to give notification.

Telia will provide CA-certificates as long as they can be used for verification purposes.

2.3 Time or frequency of publication

Updates to this CPS are published in accordance with the provisions specified in section 9.12.

Revocation information publication provisions are specified in section 4.9.

All issued certificates are stored in the local database of the CA-system promptly on issuing.

2.4 Access controls on repositories

This CPS and CA-certificates are publicly available.

CRLs are available at the HSA root directory.

Revocation information via OCSP is available for signed and unsigned requests.

Only authorized CA-personnel have access to end entity certificates stored in the local database of the CA-system.

3 Identification and authentication

3.1 Naming

3.1.1 Types of names

The xRA registers the applicant with identity, name and contact information. The RA is appointed by the applicant's organization

3.1.1.1 HCC Person

The keyholder's Swedish personal identity number and certificate is registered when authenticating to the administration and certificate management system. Only certificate issuers approved by Telia and Inera are valid for authentication. The keyholder's permissions are verified against the actual rights and permissions of the system.

The information about the keyholder published in the issued certificates is a subset of the attributes that can be included in a HCC according to current version of the SITHS HCC Profile.

3.1.1.2 HCC Function

The naming of HCC Function relies on information in HSA. If HCC Function contains a domain name (FQDN) the HCC Function is verified against a domain register. The domain register is maintained by the SITHS CA-person.

3.1.2 Need for names to be meaningful

If the attribute "Country" appears, it specifies the country in which the meaning of other attributes is defined and ought to be interpreted. This means that all appearing attributes must be defined and interpretable in the same country.

Email addresses can only be expressed as SMTP-addresses (IETF RFC 2822 or IETF RFC 5322).

Unique identifier is a common identifier that shall be of other kind than Swedish personal identity number. Its primary purpose is to provide a working unique identity for information that cannot apply identities compounded by several attributes. It shall also assure that two subscribers are not certified with the same identity.

Organization name is the Organization's officially registered name within the specified country. Organizations registered in Sweden have to be registered at the Swedish Companies Registration Office.

Locality, is for HCC Function, defined as the municipality where the Board of Directors of the organization that owns the domain-name has its seat. The locality will be determined by the SITHS Policy Authority.

Organization Unit is an arbitrary name to a unit or branch in the Organization. The name of the Organization Unit is arbitrarily specified by the liable Organization. The Organization is also responsible for making sure the name is unique within the organization for the specified country.

The subscriber's identity can be specified by an arbitrary combination of the attributes in 3.1.1 as long as the combination contains mandatory attributes and provides a unique identity. A unique identifier is here defined as a set of attributes uniquely identifying one specific person. The unique connection between the identifier and the subscriber can be dependent on the context in which the identity concepts are handled. Some of the contexts may require help from current register owner (e.g. mail).

Telia is not responsible for the accuracy of the content in above attributes. Telia assure the attribute information above is pulled from alleged site through the HSA-catalogue's top node on the basis of the information provided by the RA organization.

3.1.3 Anonymity or pseudonymity of subscribers

SITHS subscribers are not permitted to use pseudonyms (names other than a subscriber's true name).

3.1.4 Rules for interpreting various name forms

No stipulation.

3.1.5 Uniqueness of names

The names of subscribers within SITHS shall be unique by means of the mandatory HSA-id unique identifier. This applies to all certificate profiles. Telia AB verifies that the subscriber information is accurate by relying on an official business register maintained by an applicable government agency such as HSA.

3.1.6 Recognition, authentication, and role of trademarks

The priority to entity names are given to registered trademark holders. The use of a Domain Name is restricted to the authenticated legal owner of that Domain Name. The use of an email address is restricted to the authenticated legal owner of that email address.

Telia AB does not check the right of the Customer Organization to use the names it gives in its certificate applications except for the Organization Name as stated in section 3.2.2, nor does the CA participate in any name claim dispute resolution procedure concerning brand names, domain names, trademarks, or service names. In the event of a name claim dispute, Telia AB reserves the right not to reject a certificate order, or to revoke an already issued certificate.

3.2 Initial identity validation

3.2.1 Method to prove possession of private key

The keyholder's possession of private key is verified through the following methods:

1. The Keyholder proves possession through correctly using the key at a purpose suitable for the inspection procedure (at the issuance of Person HCC or Funktion HCC where the key is created at the organization).
2. By generating the private key at the CA, and safely securing and distributing it to the responsible keyholder (at the issuance of HCC Person or HCC Funktion).
3. If the keyholder already has a certificate corresponding to the actual private key, the possession of the correct private key can be proven by presenting the corresponding certificate, provided that the certificate indicates a security level equally corresponding to this CPS, and usage restrictions are valid for the new certificate (at the issuance of HCC Person). The CA issuer must also be approved by Telia and Inera in order for the certificates to be approved for the above purpose.

3.2.2 Authentication of organization identity

Telia AB verifies the organization name, legal name, business identity code and other relevant organization information of a new Customer Organization from an official business register maintained by an applicable government agency such as HSA.

The Customer Organization makes an agreement with Inera and Telia AB to act as a Registration Officer within the Customer Organization and to register Telia AB certificates for the individuals or client devices related to the organization. The Customer Registration Officer is restricted to register certificates only within their own Organizations (O). Before enabling the service, the CA verifies the organization identity as described in the section 3.2.2.

3.2.3 Authentication of individual identity

SITHS Type1 CA v1

The Customer Registration Officer is responsible for authenticating the Subject data according to Organization's internal policies. Subject authentication is typically based on previously recorded personal information in HSA.

Identity control is performed according to any of below procedures

- a) The subscriber shows an approved and valid ID
- b) The subscriber is identified and signs the order with a valid digital identity

Identity check according to a) is normally performed by a connected RA of the Inera organization where the RA undertakes to practice the identification check in accordance with SITHS RA-Policy.

In the case the identity check also involves issuance of the hardware protected Telia e-legitimation, the requirements in the CPS for Telia Hardware based e-legitimation and SBC151 (regulations for issuing of SIS-approved ID-cards) shall be pursued.

SITHS Type3 CA v1

The Registration Officer is responsible for authenticating the Subject data according to the Organization's internal policies.

The Registration Officer is responsible for authenticating the Subject. Registration Officers are obliged to follow the policies and instructions of the CA.

The Registration Officer should use the organization's previously recorded directories, databases or other similar information of organization employees, partners, or devices to verify the Subject information, including the email address. The Registration Officer should verify the information by checking the Subject's identity card.

SITHS Root CA v1

Not applicable.

3.2.4 Non-verified subscriber information

Telia AB does not verify domain name ownership of domains in email addresses. Telia AB verifies only the following Subject information:

SITHS Type1 CA v1

Telia AB verifies Organization Name, email address ownership and public domain name information as described in sections 3.2.2 and 3.2.3. The Customer Registration Officer is responsible for verifying the other subject information according to Customer's internal policy.

Telia AB does not verify other information within the certificate request.

SITHS Type3 CA v1

Telia AB verifies Organization Name (O) information as described in section 3.2.2.

The customer or the Telia AB Registration Officer is required to verify the following Subject information as described in section 3.2.3:

- commonName (CN)

If the e-mail address (EA), Surname (S) and givenName (G) attributes or Subject Alternative Name extensions are used, then the Registration Officer should verify them also.

Telia AB and/or Customer Organization do not verify other information.

3.2.5 Validation of authority

SITHS Type1 CA v1 and SITHS Type3 CA v1

The Administrative Contact Person, who grants the necessary authorizations in the RA Organization, has been identified in the service agreement or order.

Customer Registration Officers may also be identified in the service agreement or the Administrative Contact Person may authorize Registration Officers by delivering to Telia AB an authorization in writing and signed by him/her. The certificate application information of the Registration Officer is delivered at the same time.

A Registration Officer in an RA Organization has the right to define new Registration Officers in the organization and initiate the application for their Registration Officer certificates.

When registering Subjects, the identity and authority of the Registration Officer is verified by means of his certificate issued by Inera, or from his signature on the certificate order form, or using other comparable methods approved by the CA.

SITHS Root CA v1

Not applicable.

3.2.6 Criteria for interoperation

Not applicable.

3.3 Identification and authentication for re-key requests

3.3.1 Identification and authentication for routine re-key

In accordance with 3.1

3.3.2 Identification and authentication for re-key after revocation

In accordance with 3.3.1.

3.4 Identification and authentication for revocation request

SITHS Type1 CA v1 or SITHS Type3 CA v1

A revocation request for an end entity certificate shall be submitted in any of below three ways:

- a) The subscriber's registration authority performs a revocation in the GUI. The request is signed with a digital signature (HCC Person or equivalent)
- b) The Subject performs a revocation in the self-administration GUI. The request is signed with a digital signature (HCC Person or equivalent)
- c) The Subject, Subscriber, or Registration Officer in a Customer Organization shall submit a request for certificate revocation to the Revocation Service by telephone. Revocation by Customer Organization shall only be executed when a) and b) cannot be used as revocation methods.

The Subject or the Subscriber can activate customer's self-service revocation. The Subject can submit the revocation request to Telia AB directly or via the Revocation Officer of the Customer Organization. In the latter case the Revocation Officer is responsible for the verification of the authenticity of the request.

If there is a risk of abuse of the private key associated with a certificate, the certificate is revoked in accordance with the request even if above identity validation requirements cannot be met. Information about the order of the revocation shall be logged. The method for identification and authentication for

every revocation request shall be logged by the CA, along with eventual reasons for simplified identification and authentication.

SITHS Root CA v1

Revocation is performed on request/benefit of SITHS Policy Authority

4 Certificate life cycle operational requirements

4.1 Certificate Application

4.1.1 Who can submit a certificate application

Certificate application can be performed by:

- a) Individual who is the subject of the certificate and who is an employee of, or by a formal agreement is connected to, a SITHS member organization.
- b) Authorized representatives of an organization
- c) Authorized representatives of a CA
- d) RAs or authorized representatives of an RA

4.1.2 Enrollment process and responsibilities

4.1.2.1 End entity certificate subscribers

A certificate enrollment must undertake this process:

- a) The RA or a representative of an RA will complete a digital application. The digital application is signed with a digital signature. When signing the application the terms and conditions stated in section 9.6.2 are accepted by the RA or a representative of the RA. In the process the subscriber will state all relevant personal information according to section 3.1.1.
- b) The keyholder/subscriber is identified according to section 3.2.
- c) The digital application form is archived according to section 5.5.

4.1.2.2 CA and RA certificates

The representative of the CA/SITHS Policy Authority enrolls RA certificates. The enrollment undertakes the same process as in section 4.1.2.1.

CA-certificates are enrolled by filling in a CA naming application form. The form shall be digitally signed by a representative of SITHS Policy Authority. The form shall be sent to the sales representative of Telia.

4.2 Certificate application processing

4.2.1 Performing identification and authentication functions

Identification and authentication of Subject and Subscriber information is performed according to section 3.2.

4.2.2 Approval or rejection of certificate applications

Telia will approve certificate application if it meets the requirements of validation and identification and if the application is digitally signed by an RA or by a representative of an RA. All other certificate applications will be rejected.

4.2.3 Time to process certificate applications

Telia will process a digitally signed application immediately.

4.3 Certificate issuance

4.3.1 CA actions during certificate issuance

Issuing a certificate is Telia's acceptance of a certificate application from an RA or a representative of an RA.

The issuance of a certificate means that Telia accept the subscriber application and the subscriber information that the subscriber has declared.

The digital registration by RAs is conducted in a system and in an environment that is secured from integrity flaws and follows routines that prevent faulty mixtures of keys and subscriber information.

Certificates are generated when an authorized representative for a CA or RA or other authorized representative for RA has ascertained that all application and control routines have been fulfilled.

Every certificate application from an authorized representative for a CA or RA or other authorized representative for RA can be traced back to the individual that signed the certificate application.

4.3.2 Notification to subscriber by the CA of issuance of certificate

Issued certificates are downloaded to the subscribers token (Smart Card), published to the HSA-directory and also accessible to the subscriber via a web application.

In some cases certificates are also sent via e-mail to the subscriber.

4.4 Certificate acceptance

4.4.1 Conduct constituting certificate acceptance

The following conduct constitutes certificate acceptance:

- Downloading a certificate or installing a certificate from a message attaching it constitutes the subscribers acceptance of the certificate.
- Failure of the subscriber to object to the certificate or its content constitutes certificate acceptance.

Procedures for certificate acceptance should also be part of the RA-policy and the RAPS practiced by the organization to which the subscriber belongs.

4.4.2 Publication of the certificate by the CA

Certificates are published to the HSA directory. Certificates are published to the relevant attribute (i.e. CertificateRevocationList) of the object representing the certificate subject in the directory.

4.4.3 Notification of certificate issuance by the CA to other entities

Other entities are not informed.

4.5 Key pair and certificate usage

4.5.1 Subscriber private key and certificate usage

Use of the private key corresponding to the public key in the certificate shall only be permitted once the subscriber has agreed to the subscriber agreement and accepted the certificate. The certificate shall only be used in accordance with:

- The SITHS subscriber agreement
- The relevant CP
- The terms of this CPS

Certificate use must be consistent with the KeyUsage field extensions included in the certificate.

Subscribers shall protect their private keys from unauthorized use and shall discontinue use of the private key following expiration or revocation of the certificate.

4.5.2 Relying party public key and certificate usage

Prior to accepting a SITHS certificate, a relying party is responsible to:

- a) Verify that the certificate is appropriate for the intended use;
- b) Check the validity of the certificate, i.e. verify the validity dates and the validity of the certificate and issuance signatures; and
- c) Verify from a valid Certificate Revocation List (CRL) or other certificate status service provided by the CA that the certificate has not been revoked or suspended. If certificate status cannot be verified due to system failure or similar, the certificates shall not be accepted.

4.6 Certificate renewal

Certificate renewals are conducted in the same manner as new certificate applications.

4.7 Certificate re-key

Telia do not allow re-key requests for existing issued end entity certificates.

Certificate re-key requests are conducted in the same manner as new certificate applications.

CA-certificates may be re-keyed under special circumstances. This will be described in section 6 of this CPS and/or in the agreement with Inera AB.

4.8 Certificate modification

Certificate modifications are conducted in the same manner as new certificate applications.

4.9 Certificate revocation and suspension

4.9.1 Circumstances for revocation

Function for suspension of a certificate is not available.

A certificate must be revoked under the following conditions:

- a) Upon suspected or known compromise of the private key.
- b) Upon suspected or known compromise of the media holding the private key.
- c) Subject or subscriber information is known to be invalid or re-verification fails.
- d) When there is an essential error in the certificate

A certificate may be revoked under the following conditions:

- a) When any information in the certificate changes.
- b) Upon termination of a Subject.
- c) When a Subject no longer needs access to secured organizational resources.
- d) When the certificate is redundant (for example, a duplicate certificate has been issued).
- e) Customer's certificate contract with Telia has ended.
- f) Any other reason that makes the certificate obsolete or threats related keys.

Telia in its discretion may revoke a certificate under any circumstances, for example when an entity fails to comply with obligations set out in this CPS, any applicable agreement or applicable law. Telia will revoke a certificate at any time if Telia suspects that conditions may lead to a compromise of a Subscriber's keys or certificates.

4.9.2 Who can request revocation

In general, the revocation of a certificate can be requested by:

- a) A Subject whose name the certificate is issued under;
- b) A Subscriber or Registration Officer in the RA Organization that has made an application for a certificate on behalf of an organization, device or application; or
- c) Authorized personnel at Telia and authorized personnel for SITHS member organization.

4.9.3 Procedure for revocation request

A revocation request may be received by Telia in one of the following ways:

- a) The Registration Officer in the RA Organization makes the revocation request using the administration interface.
- b) The Subject makes the revocation request using the self-administration tool.
- c) If the revocation request cannot be carried out in accordance with a) or b), the Registration Officer in the Customer Organization or the Subject may contact Telia Revocation Service by telephone or email and make a revocation request. Authorized Telia revocation staff then authenticates the identity of the originator of a revocation request according to section 3.4 and makes the revocation request using Telia's CA system.

When making a revocation request as above, Telia's system checks that the person making revocation request is authorized to do so and after that the certificate in question is revoked

4.9.4 Revocation request grace period

The CA is available for revocation requests 24 hours per day, 7 days per week.

When a reason for the revocation of a certificate appears, the Subject or Subscriber shall immediately inform the Revocation Service directly or the Customer Organization through its Registration Officer. Also the Registration Officer shall revoke the certificate using the administration interface or inform Telia's Revocation Service immediately, when a reason for the revocation of a certificate comes to his/her notice.

The CA shall not be responsible for the damage caused by illicit use of the Subject's private key. The CA shall be responsible for the publication of the revocation information on the Certificate Revocation List according to the principles given in this CPS.

4.9.5 Time within which CA must process the revocation request

Revoked certificates are published in the latest revocation list within one hour after a certificate is marked for revocation. The decision to revoke a certificate is normally done in relation to receiving the revocation request. In doubtful situations the decision can however be postponed until sufficient confirmation is given, there is no maximum time for such confirmations.

4.9.6 Revocation checking requirement for relying parties

Prior to using a certificate, it is the Relying Party's responsibility to check the status of all certificates in the certificate validation chain against the current CRL's or on-line certificate status server (OCSP). A certificate cannot be reasonably relied on if the Relying Party does not diligently follow the certificate status checking procedures denoted below:

- A Relying Party shall ensure him-/herself of the authenticity and integrity of the CRLs or on-line certificate status responses by checking the digital signature and the certification path related to it.
- The Relying Party shall also check the validity period of the CRL and OCSP response in order to make sure that the information in the CRL or OCSP response is up-to-date.
- Certificates may be stored locally in the Relying Party's system, but the prevailing revocation status of each of those certificates shall be checked before use.
- If valid certificate status information cannot be obtained because of a system or service failure, not a single certificate must be trusted. The acceptance of a certificate in violation of this condition befalls at the Relying Party's own risk.

The Relying Party may acquire the checking of the CRLs as a service that shall follow the certificate status checking procedures denoted above.

4.9.7 CRL issuance frequency

The Revocation Status Service is implemented by publishing Certificate Revocation Lists (CRLs), digitally signed by the CA, in the HSA-directory. For CA's issuing end entity certificates the following is applicable:

- A new CRL is published in the directory at intervals of not more than one (1) hour.
- The validity time of every CRL is forty-eight (48) hours.

For Root CA's issuing issuing CA-certificates the following is applicable:

- A new CRL is published in the directory at intervals of not more than one (1) year.
- The validity time of every CRL is one (1) year.
- If an issuing CA-certificate is revoked a new CRL will be published within reasonable time.

There may be several valid CRLs available at the same time. The one of those, which has been published as the latest, contains the most real time information.

4.9.8 Maximum latency for CRL's

CRL's are published to the HSA LDAP directory and updated automatically. Normally latency will be a matter of seconds.

4.9.9 On-line revocation/status checking availability

Telia provide on-line revocation status checking via the OCSP protocol.

In general the OCSP service is a 24/7 service. Availability of the service is provided in the agreement with Inera AB.

OCSP services will, at least, every 15 minutes update its revocation information by checking the current CRL for each CA it is connected to.

4.9.10 On-line revocation checking requirements

OCSP requests may be unsigned or signed.

All responses will be signed by a private key corresponding to a public key certified by the CA on which the OCSP request is made.

The OCSP service is normally updated through the use of CRLs and/or deltaCRLs that are published on regular basis. The actual time intervals for the updates of the CRLs and/or deltaCRLs are described in the section 4.9.7.

4.9.11 Other forms of revocation advertisements available

No other forms of advertisement will be available.

4.9.12 Special requirements regarding key compromise

Telia will use commercially reasonable efforts to notify potential relying parties if Telia discover, or have reason to believe, that there has been a compromise of the private key of one of the issuing CAs.

4.9.13 Circumstances for suspension

Telia will not suspend any certificates.

4.9.14 Who can request suspension

No stipulation.

4.9.15 Procedure for suspension request

No stipulation.

4.9.16 Limits on suspension period

No stipulation.

4.10 Certificate status services

4.10.1 Operational characteristics

The CRLs are published in the HSA directory as disclosed in section 2.1.2.

The OCSP-service will answer to signed and unsigned requests.

URLs to CRLs and the OCSP-responders are specified within each certificate.

4.10.2 Service availability

The certificate status services are available 24 hours per day, 7 days per week excluding scheduled maintenance or other planned breaks.

SLA is stated in the agreement with Inera AB.

4.10.3 Optional features

CRLs are also published in an LDAP-directory provided by Telia.

4.11 End of subscription

The end of a subscription as a result of no longer requiring the service, compromise, or termination of employment (voluntary or imposed) will result in the immediate revocation of the certificate and the publishing of a CRL or other certificate status verification system.

A subscriber may end a subscription for a SITHS certificate by:

- Allowing his/her/its certificate to expire
- Revoking of his/her/its certificate before certificate expiration without replacing the certificate

4.12 Key escrow and recovery

CA, RA or subscriber private keys are not escrowed.

5 Physical, Procedural, and Personnel Security Controls

5.1 Physical controls

5.1.1 Site location and construction

All Telia AB CA and RA operations are conducted within a physically protected environment designed to deter, prevent, and detect covert or overt penetration.

5.1.1.1 CA Site location and construction

The premises where central CA functions take place are physically located in a highly secure server rooms dedicated for CA operations, The physical protection of which corresponds at least with the requirements for "priority 1 premises" defined in the regulation on priority rating, redundancy, power supply and physical protection of communications networks and services (54/2008 M) issued by Ficora (Finnish Communications Regulatory Authority). Within these server rooms, key components are locked in separate, freestanding security cabinets.

The server rooms, which are locked and alarmed, are in secure buildings, which are also locked and alarmed. These are protected jointly by using active monitoring.

5.1.1.2 RA Site location and construction

The premises where central RA functions take place are physically located in highly secure server rooms.

Within these server rooms, key components are locked in separate, freestanding security cabinets.

The server rooms, which are locked and alarmed, are in secure buildings, which are also locked and alarmed. These are protected jointly by using active monitoring.

Certain RA functions comprising roles in accordance with section 5.2.1 may be carried out outside the physical environment of the protected premises detailed above. These are:

- a. Identification on application of key holders who are present in person.
- b. Issuing keys and codes.
- c. Identifying key holders and ownership of the correct private key on electronic application.
- d. Electronic registration of key holders.
- e. Revocation service for revoking certificates.

Functions in accordance with a) do not involve any access to the central RA system. This environment therefore has no specific security provisions in terms of physical security.

Functions in accordance with b) to e) are carried out in well-controlled office environments where access is restricted to authorized personnel. No keys or codes are left unmonitored.

In the case where the CA is a Customer's CA, the stipulations above for physical protection of the locality for RA functions may not be followed.

5.1.2 Physical access

For security reasons, detailed information on security procedures for physical access to the premises is not publicly available but is described in the Telia AB Operational Documentation. The security procedures are described in separate documentations belonging to the Telia AB CA Services.

The premises' external protection such as locks and alarm systems are monitored each day on a 24-hour basis by security staff on duty.

Unescorted access to the CA and RA sites and servers is limited to personnel identified on access lists. Personnel that are not included on the access lists will be escorted by authorized personnel and supervised during their work.

Site access is monitored in real time or access logs are inspected periodically at least quarterly by qualified personnel. The inspection documentation is retained for at least a one-year period to support audit requirements.

All access control and monitoring systems are tied to UPS's. The UPS systems are inspected and tested at least annually and the inspection documentation is retained for at least a one-year period.

5.1.2.1 CA Site Physical access

Telia AB CA facilities are protected by four tiers of physical security where the CA systems and other important CA devices have been placed in a security vault. The security vault has been placed in a rock shelter that provide good structural security and fire protection for the CA equipment.

Progressively restrictive physical access privileges control access to each tier.

The characteristics and requirements of each tier are described in the table below.

<i>Tier</i>	<i>Description</i>	<i>Access Control Mechanisms</i>
Physical Security Tier 1 "Entrance to rock shelter"	Physical security tier one refers to the outermost physical security barrier for the facility.	Access to this tier requires the use of a proximity card employee badge and related PIN code. Physical access to tier one is automatically logged.
Physical Security Tier 2 "Rock shelter Tunnel"	Tier two includes common areas including restrooms and common hallways.	Tier two enforces individual access control for all persons entering the common areas of the CA facility through the use of a proximity card employee badge. Physical access to tier two is automatically logged.
Physical Security Tier 3 "CA Security area"	CA Security Area is the room that separates the Security Vault from the rock shelter tunnel.	Access to CA Security Area requires the usage of an individual access card combined with a PIN code. In addition a separate burglar alarm system has to be inactivated by individual access codes. Physical access is automatically logged, video recorded and a special notification is generated to the CA Security Board members about each access to CA Security Area.
Physical Security Tiers 4 "CA Vault"	The CA Security Vault is where the CA systems and other critical devices are placed and where sensitive CA operations occur. Tier four is the only tier where local maintenance access to servers is possible.	The tier four data center enforces individual access control with a PIN code and it enforces dual control if incoming persons have access also to Tiers 5. Dual control is enforced through special individual partial access control to doors and burglar alarm systems. To such person or to outsider the authorization for unescorted access to the tier four rooms is not given. Physical access to tier four is automatically logged and video monitored and a special notification is generated to the CA Security Board members. CA Security Board member will always check, grant and document each access to Tiers 4.

<i>Tier</i>	<i>Description</i>	<i>Access Control Mechanisms</i>
Physical Security Tiers 5 “Key Management”	Key Management tiers five serve to protect CA HSMs keying material and other most critical components.	Online HSMs and other most critical components are protected through the use of locked cabinets that always require dual control to be accessed. Offline keying material like CA system key backups and secret shares are protected through the use of locked safes, cabinets and containers. Access to HSMs and keying material is restricted in accordance with Telia’s segregation of duties requirements. The opening and closing of cabinets or containers in this tier is logged for audit purposes. All access is video monitored.

5.1.2.2 RA Site Physical access

The Telia AB RA systems are protected by four tiers of physical security, with access to the lower tier required before gaining access to the higher tier. In addition, the physical security system includes additional tiers for key management security. Progressively restrictive physical access privileges control access to each tier. The characteristics and requirements of each tier are described in the table below.

<i>Tier</i>	<i>Description</i>	<i>Access Control Mechanisms</i>
Physical Security Tier 1	Physical security tier one refers to the outermost physical security barrier for the facility.	Access to this tier requires the use of a proximity card employee badge. Physical access to tier one is automatically logged.
Physical Security Tier 2	Tier two includes common areas including restrooms and common hallways.	Tier two enforces individual access control for all persons entering the common areas of the RA facility through the use of a proximity card employee badge. Physical access to tier two is automatically logged.
Physical Security Tier 3	Tier three is the first tier at which sensitive central RA systems are located and where operational activity takes place.	Tier three enforces individual access control through the use of two-factor authentication including biometrics or proximity card employee badge and PIN code. Unescorted personnel are not allowed into a tier-three secured area. Physical access to tier three is automatically logged.
Physical Security Tiers 4	Tier four is used only in Telia AB Sweden. Tier four is the tier at which especially sensitive RA operations occur. There are two distinct tier four areas: the online tier four data center and the offline tier four key storage room.	The tier four data center enforces individual access control and the key storage room enforces dual control, each through the use of two-factor authentication including biometrics. Authorizations for unescorted access to both the tier four rooms are not given to any individual. Physical access to tier four is automatically logged and video monitored.

<i>Tier</i>	<i>Description</i>	<i>Access Control Mechanisms</i>
Key Management Tiers 5	<p>Tier five is used only in Telia AB Sweden.</p> <p>Key Management tiers five serve to protect both online and offline storage of RA HSMs and keying material. RA HSMs are used to store OCSP signing keys and encryption keys protecting archived Subscriber private keys.</p>	<p>Online HSMs are protected through the use of locked cabinets that at least require dual control to be accessed. Offline keying material like RA system key backups and secret shares are protected through the use of locked safes, cabinets and containers. Access to HSMs and keying material is restricted in accordance with Telia's segregation of duties requirements. The opening and closing of cabinets or containers in this tier is logged for audit purposes. All access is video monitored.</p>

5.1.3 Power and air conditioning

Telia AB secure premises are equipped with primary and backup:

- power systems to ensure continuous, uninterrupted access to electric power and
- heating/ventilation/air conditioning systems to control temperature and relative humidity.

5.1.4 Water exposures

Telia AB has taken reasonable precautions to minimize the impact of water exposure to Telia AB systems. Exposure to water damages is prevented with structural solutions.

5.1.5 Fire prevention and protection

Telia AB has taken reasonable precautions to prevent and extinguish fires or other damaging exposure to flame or smoke. Telia's fire prevention and protection measures have been designed to comply with local fire safety regulations and Inergen gas are used as extinguishing method in certain data centers.

5.1.6 Media storage

All media containing production software and data, audit, archive, or backup information is stored within the Telia AB facilities or in a secure off-site storage premises with appropriate physical and logical access controls designed to limit access to authorized personnel and protect such media from accidental damage (e.g., water, fire, and electromagnetic).

5.1.7 Waste disposal

Sensitive documents and materials are shredded before disposal. Media used to collect or transmit sensitive information are rendered unreadable before disposal. Cryptographic devices are physically destroyed or erased in accordance the manufacturers' guidance prior to disposal. Other waste is disposed of in accordance with Telia's normal waste disposal requirements.

5.1.8 Off-site backup

Telia AB performs daily routine backups of critical system data, audit log data, and other sensitive information. The backups are either daily transported over a secure channel or periodically moved physically to an off-site storage facility.

5.2 Procedural controls

Telia AB is responsible for all procedures and circumstances defined in this section. This includes everything from production and logistics to the administration of the entire process.

Critical CA and RA operations is prohibited from being performed at distance over networks and must be performed locally at the CA and RA sites.

5.2.1 Trusted roles

Trusted Persons include all employees, contractors, and consultants that have access to or control authentication, cryptographic operations and information that may materially affect:

- the administration of CA private keys and central RA system private keys
- configurations of the CA and central RA systems
- the validation of information in Certificate Applications
- the acceptance, rejection, or other processing of Certificate Applications, revocation requests, or renewal requests, or enrollment information;
- the issuance, or revocation of Certificates, including personnel having access to restricted portions of its repository;
- or the handling of Subscriber information or requests.

Trusted Persons include, but are not limited to:

- Customer service personnel,
- cryptographic business operations personnel,
- security personnel,
- system administration personnel,
- designated engineering personnel, and
- executives that are designated to manage infrastructural trustworthiness.

Telia AB considers the categories of personnel identified in this section as Trusted Persons having a Trusted Position. Persons chosen to become Trusted Persons by obtaining a Trusted Position must successfully complete the screening requirements of section 5.3.

Examples of roles defined for CA and RA operations and maintenance are:

Certification Authority Administrator (CAA)

Administrative production/operational staff for the CA and RA systems.

Typical duties which may be administered by the CAA include:

- creating CA certificates
- personalising cards
- generating CA and central RA keys
- configuration of CA and RA applications
- generating revocation lists
- Checking the certificate issue log

System Administrator (SA):

Technical production/operational staff for the CA and RA systems.

Typical duties which may be administered by the SA include:

- installations of hardware and software
- system maintenance
- changing of backup media

Security Manager:

Overall responsibility for the security of the Telia AB CA Service.

Information Systems Security Officer (ISSO):

Typical duties which may be administered by the ISSO include:

- works in conjunction with the SAs to get physical access to the systems where dual control is required
- supervision of the SAs work at the operational system level where dual control is required and responsible for that the SAs are carrying out their role within the framework of their authority

- may have a degree of delegated security responsibility for the CA and RA services.

Registration Officer:

RA Office and Customer Service staff of the CA. Registration Officers in the Customers are not trusted persons. Typical duties of the Registration Officer include processing and approving certificate applications and submitting certificate requests to the CA system that issues and signs the certificates.

Telia AB has chosen to divide the responsibility for the above roles into sub-roles in order to increase security. These roles are described in the Telia AB Operational Documentation.

5.2.2 Number of persons required per task

Telia AB maintains a policy and rigorous control procedures to ensure segregation of duties based on job responsibilities. The most sensitive tasks, such as access to and management of CA and central RA cryptographic modules and associated key material, require multiple Trusted Persons.

These internal control procedures are designed to ensure that at a minimum, two trusted personnel are required to have either physical or logical access to the device. Access to CA and central RA cryptographic hardware is strictly enforced by multiple Trusted Persons throughout its lifecycle, from incoming receipt and inspection to final logical and/or physical destruction. Once a module is activated with operational keys, further access controls are invoked to maintain split control over both physical and logical access to the device. No persons have alone both physical access to cryptographic modules and hold activation data. Requirements for CA private key activation data is specified in section 6.2.2.

Physical and operational system access to the central CA and certain RA servers require the participation of at least 2 Trusted Persons that works in conjunction. Either person work physically together or the other Trusted Person is involved via following security controls:

- Each administrative login or physical access to critical servers or environments is causing alarm to be inspected by security supervisors.
- Each operation and command entered by operator is logged on the separate log server.
- All operational remote access to critical systems is done only via secure management hosts. Log and management hosts are maintained by different persons and group than operators.
- Critical files and directories are monitored by checksum tests so they are not modified during operational access. Security supervisors get alarm if modifications are done.
- Access controls and other security measures take care that no one person can alone install software that can access CA keys. Either person can install or person can access keys.

Other requirements in terms of the presence of people when carrying out other tasks involving the CA and RA operations are detailed in the Telia AB CA Operational Documentation.

The Trusted roles in section 5.2.1 are fulfilled by at least one person each. Those working in the role of SA or RO do not simultaneously work in any of the other roles involving the system.

Initiation of a CA and generation of CA keys requires the presence of at least two persons that hold the ISSO or CAA roles and at least one auditor that is approved by the SITHS Policy Authority.

5.2.3 Identification and authentication for each role

For all personnel chosen to become Trusted Persons, verification of identity is performed by Telia AB HR, or appointed security function, by checking of a well-recognized form of identification (e.g., passport, driver license or other nationally accepted identification card). Identity is further confirmed through the background checking procedures described in section 5.3.1.

Telia AB ensures that personnel have achieved Trusted Status and departmental approval has been given before such personnel are:

- included in the access list for the CA and RA sites;
- included in the access list for physical access to the CA and RA system;
- given a certificate for the performance of their CA or RA role; or
- given a user account on the CA or RA system.

Each of these certificates and accounts (with the exception of the CA signing certificates) is:

- personal and directly attributable to the Trusted Person;

- restricted to actions authorized for that role through the use of CA and RA software, operating system and procedural controls.

Identification of roles in the CA and RA systems takes place as follows:

- Identification of SA roles takes place within the operating system in the CA and RA systems.
- Identification of the CAA roles (where applicable) takes place within the CA system applications and is based on strong authentication using personal operator smart cards.
- Identification of the RA roles takes place within the CA and RA system applications and it is based on strong authentication either using personal operator cards, software based keys and certificates or other two factor authentication mechanisms depending on the policy requirements of the applicable CA.

5.2.4 Roles requiring separation of duties

Telia AB maintains a policy and rigorous control procedures to ensure a separation of duties for critical CA and RA functions to prevent one person from maliciously using the CA or RA system without detection.

Complete documentation of all roles and what roles are allowed for a single person can be found from Telia AB CA Operational Documentation.

5.3 Personnel controls

5.3.1 Qualifications, experience, and clearance requirements

The Trusted roles according to section 5.2.1 are assigned only to specially selected and reliable persons who have proved their suitability for such a position. Same personnel controls apply to Telia AB personnel and to affiliate or partner company personnel if Telia AB is outsourcing any trusted roles.

Trusted persons may not have other roles which may be deemed to be in opposition to the role assigned.

Personnel identified to become Trusted Persons must present proof of the requisite background, qualifications, and experience needed to perform their prospective job responsibilities competently and satisfactorily.

5.3.2 Background check procedures

Prior to commencement of employment in a Trusted Role, Telia AB conducts background checks. The actual background checks conducted depend on the local law and other circumstances. In Sweden the following background checks are conducted for persons in Trusted Roles:

- confirmation of previous employment,
- check of professional reference,
- search of criminal records (local, state or provincial, and national),
- check of credit/financial records,
- search of driver's license records

In Finland, the background checks include:

- confirmation of previous employment,
- check of professional reference,
- security clearance from the Finnish Police

Background checks are repeated periodically for personnel holding Trusted Positions, if permitted by the local laws. The factors revealed in a background check that may be considered grounds for rejecting candidates for Trusted Positions or for taking action against an existing Trusted Person generally include the following:

- Misrepresentations made by the candidate or Trusted Person,
- Highly unfavourable or unreliable personal references,
- Certain criminal convictions, and
- Indications of a lack of financial responsibility.

Reports containing such information are evaluated by human resources and security personnel, who determine the appropriate course of action in light of the type, magnitude, and frequency of the behaviour uncovered by the background check. Such actions may include measures up to and

including the cancellation of offers of employment made to candidates for Trusted Positions or the termination of existing Trusted Persons.

The use of information revealed in a background check to take such actions is subject to the applicable federal, state, and local laws.

5.3.3 Training requirements

Telia AB provides its personnel with courses and training needed for personnel to perform their job responsibilities competently and satisfactorily. Telia AB periodically reviews and enhances its training programs as necessary.

Telia's training programs are tailored to the individual's responsibilities and include the following as relevant:

- Basic PKI concepts,
- Job responsibilities,
- Telia AB security and operational policies and procedures,
- Use and operation of deployed hardware and software,
- Incident and Compromise reporting and handling.

5.3.4 Retraining frequency and requirements

Telia AB provides refresher training and updates to its personnel to the extent and frequency required to ensure that such personnel maintain the required level of proficiency to perform their job responsibilities competently and satisfactorily.

5.3.5 Job rotation frequency and sequence

No stipulation.

5.3.6 Sanctions for unauthorized actions

Management will together with human resources and security personnel determine the appropriate sanctions in relation to the type, magnitude, and frequency of the unauthorized action. Such sanctions may include measures from a written warning to termination of employment and when applicable, legal action.

5.3.7 Independent contractor requirements

In limited circumstances, independent contractors or consultants may be used to fill Trusted Positions. Any such contractor or consultant is held to the same functional and security criteria that apply to a Telia AB employees in a comparable position.

Independent contractors and consultants who have not completed the background check procedures specified in section 5.3.2 are permitted access to Telia's secure facilities only to the extent that they are escorted and directly supervised by Trusted Persons.

5.3.8 Documentation supplied to personnel

Telia AB personnel involved in the operation of Telia AB CA Services will be made aware of the requirements of applicable Certificate Policies, Certification Practice Statements and any other specific policies, procedures, documents, and/or contracts needed to perform their job responsibilities competently and satisfactorily

5.4 Audit logging procedures

5.4.1 Types of events recorded

Telia AB manually or automatically logs at least the following significant events relating to the CA and RA systems:

- CA and system keys life cycle management events, including:
 - Key generation, backup, storage, recovery, archival, and destruction
 - Cryptographic device life cycle management events.

- CA, RA, Subscriber and system certificate life cycle management events, including:
 - Certificate Applications, renewal and rekey
 - Certificate revocation, suspension and re-instatement
 - Successful or unsuccessful processing of requests
 - Generation and issuance of Certificates and CRLs.
- Security-related events including:
 - Creation of system user accounts
 - Initiation of operations at operating system level by system users with details of who requested the operation, the type of operation and indication of the initiation results
 - Security system actions performed by Telia AB personnel
 - System crashes, hardware failures and other anomalies
 - Firewall, router and intrusion detection system activity
- CA and RA system events including:
 - Software installation and updates
 - Relevant information on backups
 - Booting up and shutting down the system
 - Time and date of all hardware upgrades
 - Time and date of backups and emptying of logs
 - Time and date of backups and emptying of archive data (in accordance with section 5.5.1)

Log entries include at least the following elements:

- Date and time of the entry
- Identity of the entity making the journal entry
- Kind of entry.

Telia AB RAs log Certificate Application information including:

- Kind of identification document(s) presented by the Certificate Applicant
- Storage location of copies of applications and identification documents
- Identity of entity accepting the application
- Method used to validate organization and individual identity and authority

The following information concerning revocation requests is recorded at the Telia's Revocation Service:

- Information concerning the person requesting revocation
- Method of verifying the identity of the person requesting revocation
- Revocation request reception time
- Information concerning the certificate to be revoked.

In the case where the CA is a Customer's CA or the registration or revocation functions are performed by Registration Officer in a Customer, the information above may not be logged by the RAs.

5.4.2 Frequency of processing log

In the CA system the audit logs are reviewed at least monthly to check for any unauthorised activity.

Audit log reviews include a verification that the log has not been tampered with, a brief inspection of randomly selected log entries, and a more thorough investigation of any alerts or irregularities in the logs. Actions taken based on audit log reviews are also documented.

In the RA systems the audit logs are automatically and continuously analysed or logs are reviewed monthly to check for any unauthorized activity. The audit logs are also manually reviewed to search for any alerts or irregularities that for any reason have been missed by the automatic reviews. If such an irregularity is found the application for the automatic reviews will be updated to handle future irregularities of that type.

Telia AB also reviews its audit logs for suspicious or unusual activity in response to alerts generated based on irregularities and incidents within Telia AB CA and RA systems.

5.4.3 Retention period for audit log

Audit logs in accordance with section 5.4.1 are retained onsite at least two months after processing and thereafter archived for at least ten years after the last Subscriber certificate has expired.

5.4.4 Protection of audit log

Logs are protected against improper alteration through the logical protection mechanism of the operating system and through the system itself not being physically or logically accessible other than by authorized personnel.

The audit logs of the CA system have been protected with a digital signature.

5.4.5 Audit log backup procedures

Back-up copies of the system audit logs are made regularly according to defined schedules. Copies of the audit log and summaries of the inspection of audit logs are stored in physically secure locations in two physically separate places.

The logs are stored in such a way that they can, in the event of serious suspicion of irregularities, be produced and made legible for auditing during the stated storage time.

5.4.6 Audit collection system (internal vs. external)

Automated audit data is generated and recorded at the application, network and operating system level.

Manually generated audit data is recorded by Telia AB personnel.

5.4.7 Notification to event-causing subject

Where an event is logged by the audit collection system, no notice is required to be given to the individual, organization, device, or application that caused the event.

5.4.8 Vulnerability assessments

The CA assesses the vulnerability of its critical systems regularly. On the basis of the assessment results the configurations of firewalls and other systems are updated and operation policies and practices are revised, if necessary.

5.5 Records archival

Telia AB archives relevant materials which affect the operation of the CA service. Procedures and prerequisites for this archiving are detailed in the following subsection.

5.5.1 Types of records archived

The following information is archived on an on going basis:

- a. Transactions containing signed requests for certificate production and revocation of certificates from authorized operators.
- b. Certificate application documentation signed by applicant commissioners and by persons responsible for receiving and accepting applications.
- c. Signed receipt confirmations when issuing keys and codes.
- d. Issued certificates and related catalogue updates.
- e. History of previous CA keys, key identifiers and cross certificates between different CA key generations.
- f. Revocation, suspension and re-instatement requests and related information received by the revocation service.
- g. CRL creation times and CRL catalogue updates.
- h. Results of reviewing Telia AB compliance with this CPS and other audits.
- i. Applicable terms and conditions and contracts (in all versions applied).
- j. All CP and CPS versions published by the CA.

In those cases where the archived information constitutes a digitally signed volume of information, the necessary information required for verifying the signature during the stated archiving time is also archived.

5.5.2 Retention period for archive

All archived information in accordance with section 5.5.1 is stored for at least fifteen years from the day of occurrence or issuance.

5.5.3 Protection of archive

The archives are stored in locations other than the CA and RA sites. The archives are stored under such conditions that the archived material is protected from unauthorized viewing, modification or deletion by physical protection and in some cases combined with cryptographic protection.

Archived material which is classified as confidential in accordance with section 9.3 is not accessible to external parties in its entirety other than as required by law and court orders.

Individual pieces of information relating to a specific key holder or transaction may be released after individual investigations.

The archive is stored under such conditions that it remains legible for auditing during the stated storage time.

However, the parties are made aware that technology for storing archived material may be changed and, in such an event, the CA is not obliged to retain functioning equipment for interpreting old archived material if this is more than five years old. In such an event, the CA is however instead obliged to be prepared to set up the necessary equipment on payment of a charge corresponding to the costs of Telia AB.

In the event that changes in procedures for access to archived material have been caused by Telia AB ceasing its operations, information on procedures for continued access to archived material shall be supplied by Telia AB through the notification procedures in accordance with section 5.8.

5.5.4 Archive backup procedures

Information to be archived is collected from the places of origin at defined intervals and transferred to the archives.

No further backups are made of the archived information except for normal backups of the data in the systems at the CA and RA sites that are done for recovery purposes. Backups are taken to off-site location or copies of the backups are brought outside the CA and RA sites at defined intervals and stored at locations separated from the CA and RA sites.

5.5.5 Requirements for time-stamping of records

All documents archived pursuant to this section will be marked with the date of their creation or execution.

The date and time information in the CA system and certain other system logs is synchronized with an external UTC time source.

5.5.6 Archive collection system (internal or external)

Telia AB use internal collection system.

5.5.7 Procedures to obtain and verify archive information

Telia AB will verify the integrity of the backups at least once every 12 months to ensure usability of these backups. Material stored off-site will be periodically verified for data integrity.

5.6 Key changeover

Telia AB CA key pairs are retired from service at the end of their respective maximum lifetimes as defined in section 6.3.2. CA certificates may be renewed as long as the cumulative certified lifetime of the CA key pair does not exceed the maximum CA key pair lifetime. New CA key pairs will be generated as necessary, for example to replace CA key pairs that are being retired, to supplement existing, active key pairs and to support new services in accordance with section 6.1.

A new set of CA key pairs is created at least three months before the point when the existing CA keys ceases to be used for issuing of new certificates.

5.6.1 Root CA key changeover

Changing of CA keys for a self-signed CA will be done, for example, using the following procedure:

- a. a new CA key pair is created,
- b. a new self-signed certificate is issued for the new public CA key,
- c. a cross certificate is issued where the old public CA key is signed using the new private CA key,
- d. a cross certificate is issued where the new public CA key is signed using the old private CA key, and
- e. the certificates in accordance with b) to d) is published in the relevant directory.
- f. new Subscriber certificates are signed with the new private CA key.
- g. the old CA private key is used to issue CRLs until the expiration date of the last certificate issued using the old key pair has been reached.

5.6.2 Issuing CA key changeover

Changing of CA key pairs for a subordinate CA will be done, for example, using the following procedures:

- a. a new subordinate CA key pair is created
- b. a new subordinate CA certificate is issued for the new public CA key by the superior CA on the next level of the hierarchy,
- c. the certificate in accordance with b) is published in the relevant directory.
- d. new subordinate CA certificates or Subscriber certificates issued by the new subordinate CA are signed with the new private subordinate CA key.
- e. the old subordinate CA private key is used to issue CRLs until the expiration date of the last certificate issued using the old key pair has been reached.

A superior CA ceases to issue new subordinate CA certificates no later than three months before the point in time where the remaining lifetime of the superior CA key pair equals the approved certificate Validity Period for the specific type of certificates issued by subordinate CAs in the superior CA's hierarchy.

5.7 Compromise and disaster recovery

Telia AB has implemented a robust combination of physical, logical, and procedural controls to minimize the risk and potential impact of a key compromise or disaster. Telia AB has implemented disaster recovery procedures and key compromise response procedures described in this CPS. Telia's compromise and disaster recovery procedures have been developed to minimize the potential impact of such an occurrence and restore Telia's operations within a commercially reasonable period of time.

5.7.1 Incident and compromise handling procedures

Telia AB has implemented detailed change and incident management procedures to allow for controlled and accountable handling of incidents and recovery from system and application disasters. Regarding disaster recovery at the site level Telia AB has implemented disaster recovery plans.

Detailed instructions are provided in the Telia AB Operation Procedures with a Disaster Recovery Plan outlining the steps to be taken in the event of an incident and the incident reporting caused by such an incident.

5.7.2 Computing resources, software, and/or data are corrupted

In the event of the corruption of computing resources, software, and/or data, such an occurrence is reported to Telia AB Security staff and Telia's incident handling procedures are initiated. Such procedures require appropriate escalation, incident investigation, and incident response. If necessary, Telia's key compromise or disaster recovery procedures will be initiated.

5.7.3 Entity private key compromise procedures

Upon the suspected or known compromise of a Telia AB CA private key, Customer CA private key or the Telia AB infrastructure, Telia's Key Compromise Response procedures are followed. Detailed instructions are provided in the Telia AB Operation Procedures.

Telia AB undertakes, on suspicion that Telia AB no longer has full and exclusive control of a CA's private key, to take the following action:

- a. Revoke the CA certificate associated to the compromised CA private key if the CA is a part of a CA hierarchy and make the updated ARL (ARL is CRL for CA certificates) publicly available.
- b. Cease all revocation checking services relating to certificates issued using the compromised key and all revocation checking services signed using the comprised key or keys certified using the compromised key. This means that all associated revocation lists are removed from their assigned locations.
- c. Inform all key holders and all parties with which Telia AB has a relationship that the CA's private key has been compromised and how new CA certificates can be obtained.
- d. In the event that Telia AB has cross-certified the compromised CA key with another operational CA key, revoke any such cross certificates.

Subscriber key holders will be informed that they should immediately cease using private keys which are associated with certificates issued using the compromised CA's private key.

Key holders are furthermore informed how they should proceed in order to obtain replacement certificates and any new private keys, and the circumstances under which old private keys can be used in connection with other certificates which have not been issued using the compromised CA key.

Information will be made available to relying parties, who are clearly informed that the use of the affected certificates and the CA's issuer certificate has been revoked.

The action of relying parties is outside Telia's influence. Through Telia's revocation information process, they will receive the necessary information to be able to take the correct action.

5.7.4 Business continuity capabilities after a disaster

Telia AB will provide business continuity procedures in a Disaster Recovery Plan that outline the steps to be taken in the event of corruption or loss of computing resources, software and/or data. The Disaster Recovery Plan also contain instructions for periodic verification of procedures and material needed.

Telia AB has implemented mission critical components of its CA infrastructure in redundant configurations. This applies both to hardware and software components. The main CA system components have been implemented in two data centers located in different cities.

Telia AB maintains offsite backup of important CA information for CAs issued at the Telia's premises. Such information includes, but is not limited to: Backups of CA key pairs, application logs, certificate application data, audit data and database records for all certificates issued. In addition, CA private keys are backed up and maintained for disaster recovery purposes.

5.8 CA or RA termination

In the event that it is necessary for a Telia AB CA or a Customers CA to cease operation, Telia AB makes a commercially reasonable effort to notify Subscribers, Relying Parties, and other affected entities of such termination in advance of the CA termination. Where CA termination is required, Telia AB and, in the case of a Customer CA, the applicable Customer, will develop a termination plan to minimize disruption to Customers, Subscribers, and Relying Parties. Such termination plans may address the following, as applicable:

- a. Provision of notice to parties affected by the termination, such as Subscribers, Relying Parties, and Customers, informing them of the status of the CA.
- b. In case that the CA is publicly used, make public announcement at least three months in advance that operations will cease for the CA.
- c. Cease all revocation checking services relating to certificates issued using the CA keys of which use will cease. This means that all associated revocation lists are removed from their assigned locations and that no new revocation lists are issued to replace those that are removed.
- d. Terminate all rights for subcontractors to act in the name of the CA which will cease to operate.

- e. Ensure that all archives and logs are stored for the stated storage time and in accordance with stated instructions.

6 TECHNICAL SECURITY CONTROLS

6.1 Key pair generation and installation

6.1.1 Key pair generation

Key pair generation is performed as follows:

SITHS Type 1 CA v1

Keys are generated in a secure environment in the card factory. This can be done on the card itself or in cryptographic hardware and then securely injected in the chip. Key generation for cards may be performed in batch before personalization of the cards. Cards with generated keys, not personalized, are secured cryptographically and stored in a secure vault.

SITHS Type 3 CA v1

Keys are generated either by the applicant and presented to the CA as a PKCS#10 request. The CA cannot take any responsibility of the quality of such key.

6.1.1.1 Specific requirements for CA private keys

The CA's issuer keys are generated in hardware modules which are dedicated to storing and processing such keys. When generating issuer keys, a number of people's presence is required. The hardware modules are physically protected as per section 5.1 which, among other things, means that physical access to these requires the simultaneous presence of at least two authorized operators.

6.1.1.2 Specific requirements for subscriber private keys

SITHS Type 1 CA v1

The subscriber's private keys are stored on EID cards. Key generation is carried out in batches before the certification of the keys takes place. Key generation takes place locally in the card's or devices chip, and the private keys never leave the chip.

Before key generation and initialization:

Non-initialized cards and devices are controlled and registered at the delivery from the hardware manufacturer and are kept in a vault with the delivery batches intact. The access to the vault with the non-initialized cards and devices is restricted in such a way that two persons need to be present when managing the cards.

The generation of private keys and personalization of eID Cards and hardware devices are done in batches and the batches are used in the order they have been initialized. Every step in the process is documented both electronically and on a printed report that follows the batch through all production steps.

After key generation and initialization:

Initialized but not personalized batches of cards and devices, and remaining cards and devices from partly used batches, are kept in the same vaults as the non-initialized cards and devices and managed under dual control.

After personalization:

Personalized cards and devices are always kept separated from non-personalized cards and devices.

There exist process descriptions regarding possible discrepancies at production failures, failures in the delivery processes and at the event of lost or defective cards and devices.

SITHS Type 3 CA v1

Subscriber key pairs are typically generated by the Subscriber. Unless stated otherwise in CPS referring to this CPS, private Subscriber keys are generated in accordance to this section.

Where private keys are stored on smart cards or equivalent chip based hardware, key generation is normally carried out by on-board key generation or generated outside the chip and loaded with a secure vendor specific method.

In those cases where the Subscriber keys are created by CA, these are generated in a strongly protected server and stored in a suitable format, then erased from the server's primary memory.

6.1.2 Private key delivery to subscriber

EID cards and other hardware devices are distributed via registered mail, using a commercial delivery service and tamper evident packaging, usually to the RA where the application of the certificate were made.

The activation data required to activate the device is communicated to the subscriber using an out of band process where the activation data is sent to the subscriber's home address according to the Swedish SPAR register or equivalent register approved by Telia. Subscribers with protected personal data receive their activation data via the Swedish government service "Förmedlingsuppdrag" (mail forwarding). Subscribers not present in SPAR register or equivalent register approved by Telia get their activation data sent to the address specified by the RA.

Hardware devices not packed and sent the same day as they are personalized (due to lack of time) are locked into a vault until being sent.

The hardware devices are only handed out to the subscriber personally after the subscriber has been identified according to 3.2.3. This is stated in the notifying letter and in the RA routines according to the Telia issuer regulations.

The reception of the hardware device is signed by the subscriber. The signed receipt is kept for ten years after the expiration date of the hardware device.

6.1.3 Public key delivery to certificate issuer

Subscribers and RAs submit their public key to Telia AB for certification electronically through the use of a PKCS#10 Certificate Signing Request (CSR), Certificate Request Syntax (CRS) or other digitally signed package in a session secured by Secure Sockets Layer (SSL). CA will verify that the subject has possession of the private key before generating the certificate.

When CA, RA, or end-user Subscriber key pairs are generated by Telia AB, this requirement is not applicable.

6.1.4 CA public key delivery to relying parties

CA public keys are delivered as certificates to Inera, responsible of publishing them on agreed addresses, specified in the AIA of the issued certificates, and/or any other place Inera finds suitable.

6.1.5 Key sizes

Key size for Root CA certificate is minimum 4096 bits RSA.

Key sizes for issuing CAs are minimum 4096 bits RSA.

Key size for subscriber certificates are minimum 2048 bits RSA.

Hash algorithm used for Root CA certificate is SHA-1.

Hash algorithm used for issuing CA certificates is SHA-1.

Hash algorithm used for SITHS Type 1 CA v1 subscriber certificates is SHA-1.

Hash algorithm used for SITHS Type 3 CA v1 subscriber certificates is SHA-512.

6.1.6 Public key parameters generation and quality checking

Public keys are given parameters agreed upon with SITHS Policy Authority group.

6.1.6.1 Generation of keys in hardware/software

SITHS Type 1 CA v1 keys are generated in cryptographic hardware and stored on smartcards. This can be done as on board- or off board generation.

SITHS Type 3 CA v1 certificates have their keys generated by the applicant and presented as a PKCS#10 to the CA, such keys cannot be accounted for in this document.

6.1.7 Key usage purposes (as per X.509 v3 key usage field)

Issued subscriber certificates contain information, which defines suitable areas of application for the certificate and its associated keys. For more information regarding the subscriber key usage see section 4.5.

6.2 Private key protection and cryptographic module engineering controls

Telia AB has implemented a combination of physical, logical, and procedural controls to ensure the security of Telia AB and Customers CA private keys. Logical and procedural controls are described here in section 6.2. Physical access controls are described in section 5.1.2. Subscribers are required by contract to take necessary precautions to prevent the loss, disclosure, modification, or unauthorized use of private keys.

The Subscriber is required to protect its private key from disclosure according to the requirements as defined by the issuing CA. The Subscriber is responsible for its private keys.

6.2.1 Cryptographic module standards and controls

All CA Digital Signature key generation, CA Digital Signature key storage and certificate signing operations will be performed in a hardware cryptographic module rated to at least FIPS 140-2 Level 3. The cryptographic module is physically protected in a separate safe which is stored within the protected environment defined in section 5.1.

All other CA cryptographic operations, such as certificates and keys used for administering the CA, will be performed in a cryptographic module in smart cards.

End entities private keys can be enclosed and protected in two different ways:

- a. Hardware protected private keys which are created and stored in smart cards or equivalent chip based hardware rated at a minimum FIPS 140-2 level 2 or Common Criteria EAL4.
- b. Software protected private keys generated by the CA are generated on a secure server and stored in an encrypted form.

Subscriber generated software-protected keys is the key holder (and the key holder's organization) sole responsibility.

EID cards used are agreed upon with SITHS Policy Authority.

6.2.2 Private key (n out of m) multi-person control

Telia AB has implemented technical and procedural mechanisms that require the participation of multiple trusted individuals to perform sensitive CA cryptographic operations.

Telia AB uses "Secret Sharing" to split the activation and recovery data needed to make use of a CA private key into separate parts called "Secret Shares". A threshold number of Secret Shares (n) out of the total number of Secret Shares created and distributed for a particular hardware cryptographic module (m) is required to activate or recover a CA private key stored on the cryptographic module.

6.2.3 Private key escrow

Telia AB does not escrow private keys.

6.2.4 Private key backup

Telia AB creates backup copies of CA's private keys for routine recovery and disaster recovery purposes. Backups are dealt with in accordance with the same access protection rules which apply to the original keys.

Backups may be made of the Subscribers' or RA's private confidentially keys. The keys are then copied and stored in encrypted form and protected at a level no lower than stipulated for the primary version of the keys.

No subscriber private keys are backed up.

6.2.5 Private key archival

No Subscriber, RA or CA private keys will be archived by Telia AB.

6.2.6 Private key transfer into or from a cryptographic module

Telia AB generates CA key pairs on the hardware cryptographic modules in which the keys will be used. Where CA key pairs are transferred to another hardware cryptographic module for clustering

reasons such key pairs are transported between modules in encrypted form using private networks dedicated for Telia AB CA.

In addition, Telia AB makes encrypted copies of CA key pairs for routine recovery and disaster recovery purposes.

6.2.7 Private key storage on cryptographic module

CA private digital signature key storage is kept in a secure cryptographic hardware module rated to at least FIPS 140-2 Level 3.

Subscriber keys protected by smart cards will be stored locally on the smart card.

6.2.8 Method of activating private key

The activation of the private key of the CA is included in the procedure described in paragraph 6.1.1. At least one person serving in a trusted role of the CA and authenticated with a two-factor authentication method is required for the re-activation. The key remains active in the CA system for a single process until it is deactivated.

Essential information exchange between a RA and the CA is encrypted. All CA and RA operators are authenticated in CA or RA system in accordance with section 5.2.3 and transactions affecting the use of a CA's private issuer keys are authenticated by the CA system based on a digital signature.

Activation of the private key of the Telia AB RA requires the use of activation data as described in section 6.4.

Telia AB strongly recommends that Subscribers and Registration Officers in Customers store their private keys in encrypted form and protect their private keys through the use of a hardware token and/or strong passphrase. The use of two factor authentication mechanisms (e.g., token and passphrase or biometric and token) is encouraged.

6.2.9 Method of deactivating private key

The CA private issuer key is deactivated, for example, by closing the application using it, restarting or removing the cryptographic module.

6.2.10 Method of destroying private key

For operational keys that are stored on the issuer system's hard disk or other media in encrypted form, the following applies:

- a. If the equipment is to be used further in the same protected environment, erasing is carried out in such a way that these keys cannot be recovered at least without physical access to the media. Old or broken CA key storage media may be temporarily stored in the protected CA environment.
- b. If the media that has contained CA key material will permanently leave the protected CA environment, it will be destroyed. Reliable de-magnetizer or physical destruction is used when destroying the media.

The Subscriber private confidentiality keys that are stored by the CA for backup purposes are securely destroyed at the end of service. Customer is responsible to destroy or otherwise prevent misuse of expired or deserted subscriber private keys in their possession.

6.2.11 Cryptographic module rating

All CA digital signature key generation, CA digital signature key storage and certificate signing operations are performed in a secure cryptographic hardware module rated to at least FIPS 140-2 Level 3.

All subscriber cryptographic module specifications are agreed upon with SITHS Policy Authority.

6.3 Other aspects of key pair management

No private keys or other confidential information within the CA may leave its prescribed protected environment. When servicing and in other similar situations where the prescribed protection methods cannot be maintained, all storage media containing sensitive information or sensitive private issuer keys are removed or destroyed. Encrypted keys may temporarily be transferred outside the protected environments for backup and clustering purposes like described in 6.2.6.

6.3.1 Public key archival

Telia AB retain archives of all verification public keys for the period of at least ten years after the expiration of the last Subscriber certificate that has been issued by the CA.

6.3.2 Certificate operational periods and key pair usage periods

Private Root CA keys are used for a maximum of twenty five (25) years in order to issue subordinate CA certificates.

Private CA keys are used for a maximum of twenty five (25) years in order to issue Subscriber certificates and revocation lists. CA certificates are given a maximum validity period to cover the time from generation up to and including the point when associated private keys cease to be used for signing of Subscriber certificates and revocation lists.

Cross certificates between different generations of CA keys are given a maximum validity period of five years plus an overlap time of maximum six months (the time before changing the key when the new key and the cross certificate for the old key are available for updating).

Subscriber certificates issued in accordance with this CPS are issued both for new keys and for existing keys that have been certified previously in connection with the keys being generated on smart cards.

Subscriber certificates are given a maximum period of validity of five years.

Subscriber certificates for existing keys on smart cards are given a maximum period of validity which is equal to the expiry date of the original certificate, but no more than five years. Certificates used by Telia AB staff for operating the CA and RA systems and internal system certificates are given a maximum validity period of five years.

Maximum validity for subscriber certificates:

CA	Operational period
HCC Person (SITHS Type 1 CA v1)	Maximum 1827 days
HCC Funktion SHA-512 (SITHS Type 3 CA v1)	Maximum 731 days
CA operator certificate (Telia Officers CA)	Maximum 1096 days
Root CA	Maximum 7306 days
Issuing CA	Maximum 3653 days

6.4 Activation data

6.4.1 Activation data generation and installation

SITHS Type 1 CA v1

The Subscriber uses his private keys with the help of activation data, which are given on the keyboard of a card reader, workstation, mobile phone or other device. PINs of at least six digits and a PUK of eight digits protect all subscribers' private keys.

The subscribers PIN and PUK are generated in cryptographic hardware at Telia, or a card manufacturer appointed by Telia.

The subscribers' PUKs are stored encrypted at Telia, or a card manufacturer appointed by Telia, and can, if agreed in applicable agreements, be distributed to the subscriber's home address by registered mail after a separate request from the subscriber.

SITHS Type 3 CA v1

A PKCS#10 request have keys generated by the Applicant and cannot be accounted for in this document.

6.4.2 Activation data protection

SITHS Type 1 CA v1

The activation data required to use the private keys on the hardware device is communicated to the subscriber using an out of band process. The activation data is sent to the subscriber's home address according to the Swedish SPAR register or equivalent register approved by Telia.

Subscribers with protected personal data receive their activation data via the Swedish government service "Förmedlingsuppdrag" (mail forwarding).

Subscribers not present in SPAR register or equivalent register approved by Telia get their activation data sent to the address specified by the RA.

SITHS Type 3 CA v1

A PKCS#10 request have keys generated by the Applicant and cannot be accounted for in this document. How the RA protects the certificate cannot be accounted for in this document.

6.4.3 Other aspects of activation data

6.4.3.1 Activation data transmission

Please refer to 6.4.1 and 6.4.2.

6.4.3.2 Activation data destruction

Please refer to 6.4.1 and 6.4.2.

6.5 Computer Security controls

6.5.1 Specific computer security technical requirements

The entire CA system is built in such a way that individual roles as per section 5.2 can be separated.

The access control systems used is built in such a way that every operator is identified at an individual level and authenticated in accordance with the section 5.2.3.

The above shall apply regardless of whether an operator acts directly within the CAs central premises or whether the operator is in an external RA function.

6.5.2 Computer security rating

The CA software used by Telia AB is Common Criteria EAL4+ certified.

6.6 Life cycle security controls

6.6.1 System development controls

Two-phase testing is used in the development of the CA and RA production systems. The changes that have emerged as a result of development work will be first tested in a separate development system. After a successful testing the changes are taken into the test system that is similar to the production system. The acceptance test is performed in the test system before the changes are taken into production.

All the changes in the system, which are to be taken into production, are properly documented.

6.6.2 Security management controls

The CA follows the policies defined by Telia's Corporate Security Unit in security management. Furthermore, the CA follows the Security Policy, Certificate Policy, and Certification Practice Statement defined by it in all of its operations. The auditing of the operation has been described in paragraph 8.

Evaluation of business risks and establishment of reaction and recovery models for potential risks belong to the management of the Business Continuity Plan drawn up by the CA. The reporting of abnormal events and of detected or suspected weaknesses in security is carried out according to the procedures defined by the CA.

The CA ensures by contractual arrangements that the level of security is preserved also when the outsourced functions are concerned, and that the defined policies and practices are followed also when subcontractors are involved.

Operational documentation has been drawn up which documents in detail how roles and authorization are applied and maintained.

6.7 Network security controls

Firewalls have been implemented which strictly limit all types of information exchange that have been defined as forbidden. Only the type of information exchange which is strictly necessary for the CA service is permitted.

Essential information exchange between the RA and the CA is encrypted and transactions affecting the use of the CA's private issuer keys are individually signed. All communication ports in the CA system which are not needed are deactivated and associated software routines which are not used are blocked.

6.8 Time stamping

Certificates, CRLs, and other revocation database entries contain time and date information. Such time information is not cryptographic-based.

7 CERTIFICATE, CRL, AND OCSP PROFILES

7.1 Certificate profile

All certificates issued are subject to the certificate profiles that are in use for SITHS (HCC). The SITHS Policy Authority maintains these certificate profiles. The HCC certificate profiles are available at: <http://www.inera.se/infrastrukturtjanster/siths/dokument-for-siths/rootcertifikat-siths-ca/>

If and when the HCC-specification changes Telia will, on request by the SITHS Policy Authority, implement the new HCC-profile to applicable systems. The proceedings will be agreed upon with SITHS Policy Authority.

7.2 CRL profile

CRLs conform to RFC 5280.

The information contained in a Certificate Revocation List is described below. The CRL is used to state which of the certificates, whose validity period has not yet expired, have been revoked.

CRL basic fields are listed in the table below:

Field name	Field description and contents
Version	This field states which of the CRL versions defined in the X.509 standard the CRL conforms to. The CRLs conform to the version 2.
Signature algorithm	The CRLs are signed by using the same algorithm as is used for signing of the certificates. The algorithm used is sha1RSA* or sha512RSA**.
Issuer	This field states the name of the Issuer of the CRL. The CRL issuer name is always the same as the Issuer name (the CA's name) in the certificates listed on the CRL.
This update	Date and time of the CRL issuance.
Next update	Date and time by which the next CRL shall be issued. The next CRL may be issued at any time after the issuing of the previous CRL, however, it shall be issued before the time stated in the "Next update" field. The time difference between "This update" and "Next update" is defined in section 4.9.7.
Revoked certificates	This field states the serial numbers of revoked certificates, and for each revoked certificate the date and time of revocation and the reason for revocation.

In general, following CRL extension may be used:

Extension	Extension description and contents
Authority key identifier	The identifier of the public key of the CRL Issuer is given in this field. The identifier can be used to identify the public key that corresponds to the private key used for the signing of the CRL. Within Telia AB PKI the SHA-1 hash algorithm is used to calculate the identifier.
CRL number	The CRL number is a number that indicates the position of the CRL in the sequence of issued CRLs. The numbering starts with 1, and it increase monotonically by one for each issued CRL. Based on the CRL number the

	user is able to determine if a certain CRL replaces another CRL.
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* Used by SITHS Root CA v1 and SITHS Type 1 CA v1

** Used by SITHS Type 3 CA v1

7.2.1 Version number(s)

All issued CRL's are X.509 version 2 CRL's in accordance with the RFC 5280 "Internet X.509 Public Key Infrastructure Certificate and Certificate Revocation List (CRL) Profile".

7.2.2 CRL and CRL entry extensions

CRL extensions will be supported in accordance with RFC 5280 "Internet X.509 Public Key Infrastructure Certificate and Certificate Revocation List (CRL) Profile".

In general, the following entry extensions may be included in a CRL:

Extension	Extension description and contents
Reason Code of the CRL Entry	The reason for revocation can be one of the following: KeyCompromise, CACompromise, AffiliationChanged, Superseded, CessationOfOperation, CertificateHold
Invalidity date	The invalidity date provides the date, on which it is known or suspected that the private key was compromised or that the certificate otherwise became invalid. This date may be earlier than the revocation date in the CRL entry, which is the date at which the CA processed the revocation.

7.3 OCSP profile

7.3.1 Version number(s)

Version 1 of the OCSP specification as defined by RFC2560 (X.509 Internet Public Key Infrastructure Online Certificate Status Protocol) is implemented for the OCSP responders.

7.3.2 OCSP extensions

OCSP Nonce extension should be used in requests.

8 COMPLIANCE AUDIT AND OTHER ASSESSMENTS

8.1 Frequency or circumstances of assessment

An independent, qualified third party will perform an annual Compliance Audit.

8.2 Identity/qualifications of assessor

The Compliance Auditor must demonstrate competence in the field of compliance audits, and must be thoroughly familiar with the requirements, which a CA service imposes on the issuance and management of certificates.

8.3 Assessor's relationship to assessed entity

The Compliance Auditor should not have any financial, legal or organizational relationship with the audited party.

8.4 Topics covered by assessment

The purpose of the Compliance Audit is to verify that Telia AB and all involved subcontractors comply with the requirements of this CPS.

8.5 Actions taken as a result of deficiency

The audited entity and the SITHS Policy Authority shall, in good faith, use commercially reasonable efforts to agree on a corrective action plan for correcting the problems causing the exceptions or deficiencies and to implement the plan.

8.6 Communication of results

Telia AB does not communicate any results regarding the Compliance Audit to anyone but the SITHS Policy Authority.

9 OTHER BUSINESS AND LEGAL MATTERS

9.1 Fees

Fees are defined in applicable Customer agreement.

9.1.1 Certificate issuance or renewal fees

Certificate issuance and renewal fees are defined in applicable Customer agreement.

9.1.2 Certificate access fees

Certificate access fees are defined in applicable Customer agreement.

9.1.3 Revocation or status information access fees

Revocation and status information access fees are defined in applicable Customer agreement.

9.1.4 Fees for other services

Fees for other services are defined in applicable Customer agreement.

9.1.5 Refund policy

Refund policy is defined in applicable Customer agreement.

9.2 Financial responsibility

9.2.1 Insurance coverage

Telia AB and all CAs residing in the Telia AB production environment will maintain adequate levels of insurance necessary to support its business practices.

9.2.2 Other assets

No stipulation.

9.2.3 Insurance or warranty coverage for end-entities

No stipulation.

9.3 Confidentiality of business information

9.3.1 Scope of confidential information

Information which is not excluded in section 9.3.2, is treated as confidential by the CA in relation to the Customer and/or keyholder and will not be disclosed without the consent of the Customer and/or key holder.

Telia AB will disclose confidential information where this is required by law or by a decision of a court or public authority. Private keys linked to issued certificates cannot be disclosed when these are not stored by Telia AB.

9.3.2 Information not within the scope of confidential information

The following information is not deemed to be confidential in the relation between the CA and the Customer and/or keyholder:

- a) This CPS and each CPS referring to this CPS
- b) Information in issued certificates including public keys (but not private keys)
- c) Revocation lists and OCSP responses
- d) General key holder terms and conditions

Exceptions may apply to key holder information if this is stated in a specific agreement with the key holder's organisation.

9.3.3 Responsibility to protect confidential information

All confidential information will be physically and/or logically protected by CA from unauthorized viewing, modification or deletion.

Storage media used by the CA system is protected from environmental threats such as temperature, humidity and magnetism and that also applies to backup and archive media.

Confidentiality keys will in some cases be backed up by Telia AB, and in those cases the keys will be protected in accordance with Section 6, and will not be disclosed without prior consent of the Subscriber or a duly authorized representative of the issuing CA.

9.4 Privacy of personal information

Telia AB processes personal data in accordance with applicable national legislation (Swedish or Finnish) and any agreement with Customer and/or keyholder.

9.4.1 Privacy plan

Please refer to chapter 9.4.

9.4.2 Information treated as private

Please refer to chapter 9.4.

9.4.3 Information not deemed private

Please refer to chapter 9.4.

9.4.4 Responsibility to protect private information

Please refer to chapter 9.4.

9.4.5 Notice and consent to use private information

Please refer to chapter 9.4.

9.4.6 Disclosure pursuant to judicial or administrative process

Please refer to chapter 9.4.

9.4.7 Other information disclosure circumstances

Please refer to chapter 9.4.

9.5 Intellectual property rights

No part of this CPS (other than in accordance with the exceptions detailed below) may be reproduced, published in a database system or transmitted in any form (electronic, mechanical, photocopied, recorded or similar) without written permission from Telia AB.

However, permission generally applies for reproducing and disseminating this CPS in its entirety provided that this is at no charge and that no information in the document is added to, removed or changed.

Applications to reproduce and disseminate parts of this document in any other way may be made to Telia AB in accordance with section 1.5.2.

The allocation of intellectual property rights among SITHS participants other than subscribers and relying parties shall be governed by the applicable agreements between such SITHS participants.

9.6 Representations and warranties

9.6.1 CA representations and warranties

Telia AB will operate in accordance with this CPS and each CPS referring to this CPS, when issuing and managing certificates provided to CAs, RAs, sub-CAs and Subscribers. Telia AB will require that all the RAs operating on its behalf will comply with the relevant provisions of this CPS and applicable CPS referring to this CPS concerning the operations of the RAs. Telia AB will take commercially reasonable measures to make Subscribers and Relying Parties aware of their respective rights and

obligations with respect to the operation and management of any keys, certificates or End-Entity hardware and software used in connection with the PKI. Subscribers will be notified as to procedures for dealing with suspected key compromise and service cancellation.

When a CA publishes or delivers a certificate, it declares that it has issued a certificate to a Subscriber and that the information stated in the certificate was verified in accordance with the applicable CPS.

CA personnel associated with PKI roles will be individually accountable for actions they perform.

"Individually accountable" means that there shall be evidence that attributes an action to the person performing the action.

All CA personnel are authenticated when performing any actions in the CA applications. The audit logs are the main tool to control any misuse of the CA personnel's authorities. For the processes authenticating the CA personnel see section 5 of this CPS.

9.6.2 RA representations and warranties

The CA bears overall responsibility for the issued certificates. Registration responsibilities of the CA's overall responsibility can, however, be transferred through an agreement between the CA and a Relying Party, to the Relying Party, when the last-mentioned party acts also as Registration Authority. A Customer can, through an agreement, take responsibility for a separately defined part of the CA's responsibilities related to registration.

Telia AB will require that all Registration Officers comply with all the relevant provisions of this CPS and applicable CPS referring to this CPS. Telia AB will make available registration policies and Customer responsibility descriptions to Customers acting as RA and will require them to comply with the registration policies and Customer responsibility descriptions through a certification service agreement. The registration policies and Customer responsibility descriptions contain all relevant information pertaining the rights and obligations of the Registration Officers, Subscribers and Relying Parties.

The Registration Officer is responsible for the identification and authentication of Subscribers following section 3.1 and section 4.1. of the applicable CPS referring to this CPS. The Registration Officer is also responsible for revoking certificates in accordance with the CPS.

Registration Officers are individually accountable for actions performed on behalf of a CA. Individually accountability means that there must be evidence that attributes an action to the person performing the action (audit logs). Records of all actions carried out in performance of RA duties shall identify the individual who performed the particular duty. When an RA submits Subscriber information to a CA, it will certify to that CA that it has authenticated the identity of that Subscriber and that the Subscriber is authorized to submit a certificate request in accordance with the CPS.

Submission of the certificate request to the CA will be performed in a secure manner as described in the applicable CPS.

All Registration Officers are authenticated when performing any actions in the RA applications. The audit logs are the main tool to control any misuse of the RA personnel's authorities. For the processes authenticating the RA personnel see section 5 of this CPS.

9.6.3 Subscriber representations and warranties

Telia AB will require that Subscribers comply with all the relevant provisions of this CPS and applicable CPS referring to this CPS. Subscribers are required to protect their private keys, associated pass phrase(s) and tokens, as applicable, and to take all reasonable measures to prevent their loss, disclosure, modification, or unauthorized use.

Any Subscriber information shall be complete, validated and accurate with full disclosure of all required information in connection with a certificate or a query to a CA.

The Subscriber shall only use the keys and certificates for the purposes identified in applicable CPS and in any applicable agreement(s).

When a Subscriber suspects a private key compromise, the Subscriber shall notify the issuing Certification Authority in the manner specified in applicable CPS. When any other entity suspects private key compromise, they should notify the issuing CA.

Telia AB is not a trustee, agent, fiduciary, or other representative of the Subscriber and the relationship between Telia AB and the Subscriber is not that of an agent and a principal. Telia AB makes no representation to the contrary, either implicitly, explicitly, by appearance or otherwise. The

Subscriber does not have any authority to bind Telia AB by contract, agreement or otherwise, to any obligation.

9.6.4 Relying party representations and warranties

Telia AB will require that Relying Parties comply with all the relevant provisions of this CPS and applicable CPS referring to this CPS.

Prior to accepting a Subscriber's certificate, a relying party is responsible to:

- a) Verify that the certificate is appropriate for the intended use;
- b) Check the validity of the certificate, i.e. verify the validity dates and the validity of the certificate and issuance signatures; and
- c) Check the status of the certificate against the appropriate and current CRL or OCSP Responder in accordance with the requirements stated in this CPS. As part of this verification process the digital signature of the CRL or OCSP Responder should also be validated. If certificate status can't be received due to system failure or similar, the certificates shall not be accepted.

It is also up to the relying party to study this CPS and applicable CPS referring to this CPS to decide whether the security level of the issuance process is appropriate for the actual application where to be used.

Telia AB will provide certificate status information identifying the access point to the CRL or on-line certificate status server in every certificate Telia AB issues in accordance with the CPS referring to this CPS.

9.6.5 Representations and warranties of other participants

No stipulation.

9.7 Disclaimers of warranties

Telia AB assumes no liability except as stated in the relevant Customer contracts pertaining to certificate issuance and management.

9.8 Limitations of liability

Telia AB assumes no liability except as stated in the relevant Customer contracts pertaining to certificate issuance and management.

9.9 Indemnities

If a claim for damages will be presented against the CA based on the matters listed below, the Customer shall be bound to compensate the CA for any damages and costs due to the claim and the necessary statement of defence, including any legal expenses. The Customer shall compensate the CA for any damage caused by:

- the Subject's failure to protect his private key or prevent it from being lost, disclosed or compromised,
- the failure to submit a certificate revocation request to the Revocation Service under the conditions that require notification to the CA, as stated in section 9.6.3.
- the Customer's failure as a Relying Party to verify the validity of the certificate according to section 9.6.4,
- the Customer's otherwise non-justified trust on the certificate as Relying Party, in consideration of the circumstances.

The CA shall notify the Customer of any such claim in writing within a reasonable time after being informed of a claim.

9.10 Term and termination

9.10.1 Term

This CPS remains in force until notice of the opposite is communicated by Telia AB on its web site in the Telia AB CA Service Repository, specified in section 2.1.1.

9.10.2 Termination

Termination of this document will be upon publication of a newer version or replacement document, or upon termination of CA operations.

9.10.3 Effect of termination and survival

The conditions and effect resulting from termination of this document will be communicated, on Telia's web site in the Telia AB CA Service Repository, specified in section 2.1.1, upon termination outlining the provisions that may survive termination of the document and remain in force.

9.11 Individual notices and communications with participants

Telia AB will define in any applicable agreement the appropriate provisions governing notices.

9.12 Amendments

Telia Company CA Policy Management Team is the responsible authority for reviewing and approving changes to this CPS. Written and signed comments on proposed changes shall be directed to the Telia AB CA Service contact as described in Section 1.5. Decisions with respect to the proposed changes are at the sole discretion of the Telia Company CA Policy Management Team.

9.12.1 Procedure for amendment

The only changes which can be carried out to this CPS without notification are linguistic amendments and rearrangements which do not affect the security level of the described procedures and regulations.

Changes which shall take place with notification can be made to this CPS 15 days after notification.

The Telia Company CA Policy Management Team will post the notification at the CPS publishing point at <https://repository.trust.telia.com>. Changes affecting the terms of an agreement shall be notified in writing to the address given in the contact information of the signatory of the agreement.

Telia Company CA Policy Management Team decides which measures are taken in relation to the comments received. If comments received necessitate changes to the original change proposal which were not covered by the original notification, these changes may come into force no earlier than 15 days after publication of a new modified notification.

9.12.2 Notification mechanism and period

See 9.12.1

9.12.3 Circumstances under which OID must be changed

If Telia Company CA Policy Management Team determines that a new Object Identifier (OID) is required, Telia Company CA Policy Management Team will assign a new OID and required amendments will be made.

9.13 Dispute resolution provisions

If a dispute relating to this CPS or CPS referring to this CPS is not successfully resolved by negotiations, it shall be settled by arbitration in accordance with the Reconciliation and Arbitration Rules of the International Chamber of Commerce (ICC). The Stockholm or Helsinki Chamber of Commerce shall administer the reconciliation in accordance with the ICC's rules, and the venue for arbitration shall be Stockholm or Helsinki. The proceedings shall be held in Swedish or Finnish unless the parties agree to hold them in English.

9.14 Governing law

Swedish or Finnish law shall apply to the interpretation of this CPS or CPS referring to this CPS depending where the related Customer agreement has been made, if not otherwise agreed.

9.15 Compliance with applicable law

Telia AB will, in relation to the CA Service, comply with applicable national, state, local and foreign laws, rules, regulations, ordinances, decrees and orders including but not limited to restrictions on exporting or importing software, hardware or technical information.

9.16 Miscellaneous provisions

9.16.1 Entire agreement

No stipulation.

9.16.2 Assignment

No stipulation.

9.16.3 Severability

No stipulation.

9.16.4 Enforcement (attorneys' fees and waiver of rights)

No stipulation.

9.16.5 Force Majeure

Telia AB shall not be held responsible for any delay or failure in performance of its obligations hereunder to the extent such delay or failure is caused by fire, flood, strike, civil, governmental or military authority, acts of terrorism or war, sabotage, or other similar causes beyond its reasonable control and without the fault or negligence of Telia AB or its subcontractors.

9.17 Other provisions

No stipulation.

Appendix A. Acronyms

CA	Certification Authority
CP	Certificate Policy
CPS	Certification Practice Statement
CRL	Certificate Revocation List
DER	Distinguished Encoding Rules
DN	Distinguished Name
DSA	Digital Signature Algorithm
EAL	Evaluation Assurance Level
EID	Electronic Identification
FIPS	Federal Information Processing Standard
HSM	Hardware Security Module
IETF	Internet Engineering Task Force
ISO	International Organization for Standardization
LDAP	Lightweight Directory Access Protocol
MD5	Message Digest 5
OCSP	On-line Certificate Status Protocol
OID	Object Identifier
PIN	Personal Identification Number
PKCS	Public Key Cryptography Standards
PKI	Public Key Infrastructure
PKIX	Public Key Infrastructure X.509 (IETF Working Group)
RA	Registration Authority
RFC	Request For Comments
RSA	Rivest-Shamir-Adleman asymmetric encryption algorithm
SEIS	Secure Electronic Information in Society
SHA	Secure Hash Algorithm
S/MIME	Secure Multipurpose Internet Mail Extension
SSL	Secure Sockets Layer
TTP	Trusted Third Party
UPS	Uninterruptible Power Supply
URI	Uniform Resource Identifier
URL	Uniform Resource Locator

Appendix B. Definitions

Access control:

The granting or denial of use or entry.

Activation Data:

Activation data, in the context of certificate enrollment, consists of a one-time secret communicated to the enrolling user (Subscriber) out of band. This shared secret permits the user to complete the enrollment process.

Administrator:

A Trusted Person within the organization of a Processing Center, Service Center, Managed PKI Customer, or Gateway Customer that performs validation and other CA or RA functions.

Administrator Certificate:

A Certificate issued to an Administrator that may only be used to perform CA or RA functions.

Agent:

A person, contractor, service provider, etc. that is providing a service to an organization under contract and are subject to the same corporate policies as if they were an employee of the organization.

Application Server:

An application service that is provided to an organizational or one of its partners and may own a certificate issued under the organizational PKI. Examples are Web SSL servers, VPN servers (IPSec), object signer services, Domain Controllers, etc.

Authentication:

Checking the identity provided, e.g. when logging in, in the event of communication between two systems or when exchanging messages between users. General: strengthening of authenticity.

Authorization:

The granting of permissions of use.

Authorised representative:

An employee of the commissioner who has the authority to order and revoke certificates at the CA.

Asymmetric encryption algorithm:

An encryption technique which uses two related transformation algorithms: a public transformation, with the use of a public key, and a private transformation with the use of a private key. The two transformations are such that if the public transformation is known, it is mathematically impossible to derive the private transformation from this.

Base certificate:

See primary certificate.

Business process:

A set of one or more linked procedures or activities which collectively realize a business objective or policy goal, normally within the context of an organizational structure defining functional roles and relationships.

CA certificate:

Certificate which certifies that a particular public key is the public key for a specific CA.

CA key:

Key pair where the private key is used by the CA in order to sign certificates and where the public key is used to verify the same certificate.

Certificate:

The public key of a user, together with related information, digitally signed with the private key of the Certification Authority that issued it. The certificate format is in accordance with ITU-T Recommendation X.509.

Certificate Applicant:

An individual or organization that requests the issuance of a Certificate by a CA.

Certificate Application:

A request from a certificate Applicant (or authorized representative) to a CA for the issuance of a certificate.

Certification Authority (CA):

An authority trusted by one or more users to manage X.509 certificates and CRLs.

Certification Chain:

An ordered list of Certificates containing an end-user Subscriber Certificate and CA Certificates, which terminates in a root Certificate.

Certificate Extensions:

Sections of certificate content defined by standard X.509 version 3.

Certificate Level:

Certificates exist at two levels: primary certificates and secondary certificates.

Certificate Policy (CP):

Named set of rules that indicates the applicability of a certificate to a particular community and/or class of applications with common security requirements. It is the principal statement of certificate policy governing the organizational PKI. The CP is a high-level document that describes the requirements, terms and conditions, and policy for issuing, utilizing and managing certificates issued by a CA.

Certification Practice Statement (CPS):

A statement of the practices, which a Certification Authority employs in issuing certificates. It is a comprehensive description of such details as the precise implementation of service offerings and detailed procedures of certificate life-cycle management and will be more detailed than the certificate policies supported by the CA.

Certificate Revocation List (CRL):

A periodically issued list, digitally signed by a CA, of identified Certificates that have been revoked prior to their expiration dates. The list generally indicates the CRL issuer's name, the date of issue, the date of the next scheduled CRL issue, the revoked Certificates' serial numbers, and the specific times and reasons for revocation. CRL can be used to check the status of certificates.

Confidential:

A security classification used to describe information which if disclosed could result in personal loss or minor financial loss. Personal information and tactical information would be deemed confidential.

Confidentiality:

Information that has an identifiable value associated with it such that if disclosed might cause damage to an entity.

Cross Certification:

The process describing the establishing of trust between two or more CAs. Usually involves the exchange and signing of CA certificates and involves the verification of assurance levels.

Cryptographic Module:

A unit in which encryption keys are stored together with a processor which can carry out critical cryptographic algorithms. Examples of cryptographic modules include EID cards.

Decryption:

The process of changing encrypted (coded) information into decrypted (legible) information. See also encryption.

Distinguished Encoding Rules (DER):

The Distinguished Encoding Rules for ASN.1, abbreviated DER, gives exactly one way to represent any ASN.1 value as an octet string. DER is intended for applications in which a unique octet string encoding is needed, as is the case when a digital signature is computed on an ASN.1 value.

Digital Signature:

The result of the transformation of a message by means of a cryptographic system using keys such that a person who has the initial message can determine that the key that corresponds to the signer's key created the transformation and the message was not altered.

Directory Service:

Database service which in this document relates to a database structure in accordance with standard X.500 or LDAP.

Distinguished Name (DN):

Every entry in a X.500 or LDAP directory has a Distinguished Name, or DN. It is a unique entry identifier through out the complete directory. No two Entries can have the same DN within the same directory. A DN is used in certificates to uniquely identify a certificate-owner.

Dual Control:

A process utilizing two or more separate entities (usually persons), operating in concert, to protect sensitive functions or information, whereby no single entity is able to access or utilize the materials, e.g., cryptographic key.

EID card:

Electronic ID card in the form of an active card containing certificates and keys while the front of the card can be used as a visual ID document.

Electronic identity check:

Identity check which can be carried out without the persons whose identity is being checked being present in person.

Electronic signature:

General signature designation created using IT. Digital equivalent to traditional signature. See also digital signature.

Encryption:

The process of changing information which can be interpreted (clear text) into encrypted information. The aim of the encrypted information is that it shall not be interpretable by anyone who does not hold exactly the right key (in symmetrical encryption) or exactly the right private key (in asymmetrical encryption) required to correctly decrypting the information.

E-mail Certificates:

Certificates utilized for encrypting and verifying digital signatures. Normally two separate certificate: one for encryption, the other for signature verification.

Entity:

Any autonomous element or component within the Public Key Infrastructure that participate is one form or another, such managing certificates or utilizing certificates. An Entity can be a CA, RA, Subscriber, Relying Party, etc.

FIPS 140-2:

Federal Information Processing Standard 140-2(FIPS 140-2) is a standard that describes US Federal government requirements that IT products shall meet for Sensitive, but Unclassified (SBU) use. The standard was published by the National Institute of Standards and Technology (NIST), has been adopted by the Canadian government's Communication Security Establishment (CSE), and is likely to be adopted by the financial community through the American National Standards Institute (ANSI). The different levels (1 to 4) within the standard provide different levels of security and in the higher levels, have different documentation requirements.

FIPS 180-1:

Standard specifying a Secure Hash Algorithm, SHA-1, for computing a condensed representation of a message or a data files.

EV Certificate:

A digital certificate that contains information specified in the EV Guidelines and that has been validated in accordance with the Guidelines

Extended Validation:

Validation Procedures defined by the Guidelines for Extended Validation Certificates published by a forum consisting of major certification authorities and browser vendors.

HCC Profile:

The certificate profiles used within SITHS are labeled as HCC Profiles.

Intellectual Property Rights:

Rights under one or more of the following: any copyright, patent, trade secret, trademark, and any other intellectual property rights.

Integrity:

Ensuring consistency of an object or information. Within security systems, integrity is the principle of ensuring that a piece of data has not been modified maliciously or accidentally.

ISO 11568-5:

Basic principles and requirements for Key lifecycle for public key cryptosystems, provides instructions to financial institutions in the development, implementation and/or the operation of systems and procedures throughout Key's lifecycle

Key:

When used in the context of cryptography, it is a secret value, a sequence of characters that is used to encrypt and decrypt data. A key is a unique, generated electronic string of bits used for encrypting, decrypting, e-signing or validating digital signatures.

Key holder:

In this context, a person, an organisation, an organisational unit or a function which has exclusive control of the private key, the public equivalent of which is certified in a certificate. See also subscriber.

Key Generation Ceremony:

A procedure whereby a CA or RA key pair is generated, its private key is transferred into a cryptographic module, its private key is backed up, and/or its public key is certified.

Key Pair:

Often referred to as public/private key pair. One key is used for encrypting and the other key used for decrypting. Although related, the keys are sufficiently different that knowing one does not allow derivation or computation of the other. This means that one key can be made publicly available without reducing security, provided the other key remains private.

Log:

A sequential and unbroken list of events in a system or a process. A typical log contains log entries for individual events, each containing information on the event, who initiated it, when it occurred, what it resulted in, etc.

MD5:

A Message Digest Algorithm.

Non-repudiation:

An attribute of a communication that provides protection against a party to a communication falsely denying its origin, denying that it was submitted, or denying its delivery. Denial of origin includes the denial that a communication originated from the same source as a sequence of one or more prior messages, even if the identity associated with the sender is unknown.

Non-repudiation services:

Service which aim to hold a key holder responsible for signed messages in such a way that they can be verified by a third party at a later point in time.

Non-verified Subscriber Information

Information submitted by a certificate applicant to a CA or RA, and included within a certificate, that has not been confirmed by the CA or RA and for which the applicable CA and RA provide no assurances other than that the information was submitted by the certificate applicant.

Object Identifier:

The unique alpha-numeric identifier registered under the ISO registration standard to reference a standard object or class.

Offline CA:

CAs that are maintained offline for security reasons in order to protect them from possible attacks by intruders by way of the network.

Online CA:

CAs that sign end entity subscriber certificates are maintained online so as to provide continuous signing services.

Online Certificate Status Protocol (OCSP):

A protocol for providing relying parties with real-time certificate status information.

Operator:

Employee of a CA.

Out of band process:

Communications which occur outside of a previously established communication method or channel.

Operational Period:

The period starting with the date and time a certificate is issued (or on a later date and time certain if stated in the certificate) and ending with the date and time on which the certificate expires or is earlier revoked.

PKCS #1:

Standard that provides recommendations for the implementation of public-key cryptography based on the RSA algorithm, covering the following aspects: cryptographic primitives; encryption schemes; signature schemes, etc.

PKCS #7:

A cryptographic message format or syntax managed and edited by RSA Laboratories. A standard describing general syntax for data that may have cryptography applied to it, such as digital signatures and digital envelopes.

PKCS #10:

A certificate request format or syntax managed and edited by RSA Laboratories. It is a standard describing syntax for a request for certification of a public key, a name, and possibly a set of attributes.

PKCS #12:

Public-Key Cryptography Standard #12, developed by RSA Security Inc., which defines a secure means for the transfer of private keys.

PKIX:

The Public Key Infrastructure (X.509) or PKIX is an IETF Working Group established with the intent of developing Internet standards needed to support an X.509-based PKI. The scope of PKIX extends to also develop new standards for use of X.509-based PKIs in the Internet.

PKI personnel:

Persons, generally employees, associated with the operation, administration and management of a CA or RA.

Policy:

The set of laws, rules and practices that regulates how an organization manages its business. Specifically, security policy would be the set of laws, rules and practices that regulates how an organization manages, protects and distributes sensitive information.

Primary certificate:

A certificate which is issued on the basis of identifying key holders other than by the key holder producing another certificate. Identification then normally takes place through the key holder instead producing an identity document.

PrintableString:

String format for representing names, such as Common Name (CN), in X.509 certificates. The encoding of a value in this syntax is the string value itself.

Private Key:

The private key is one of the keys in a public/private key pair. This is the key that is kept secret as opposed to the other key that is publicly available. Private keys are utilized for digitally signing documents, uniquely authenticating an individual, or decrypting data that was encrypted with the corresponding public key.

Processing Center:

An organization that creates a secure facility housing, among other things, the cryptographic modules used for the issuance of certificates.

Public Key Infrastructure (PKI):

A set of policies, procedures, technology, audit and control mechanisms used for the purpose of managing certificates and keys.

Public:

A security classification for information that if disclosed would not result in any personal damage or financial loss.

Public Key:

The community verification key for digital signature and the community encryption key for encrypting information to a specific Subscriber.

RA policy:

A named set of rules for the RA's role in producing, issuing and revoking certificates and which regulates the applicability of certificates within a specific area of application.

Registration Authority (RA):

An entity that performs registration services on behalf of a CA. RAs work with a particular CA to vet requests for certificates that will then be issued by the CA.

Re-key:

The process of replacing or updating the key(s). The expiration of the crypto period involves the replacement of the public key in the certificate and therefore the generation of a new certificate.

Relative Distinguished Name (RDN):

A Distinguished Name is made up of a sequence of Relative Distinguished Names, or RDNs. The sequences of RDNs are separated by commas (,) or semi-colons (;). There can be more than one identical RDN in a directory, but they must be in different bases, or branches, of the directory.

Relying Party:

A person or entity that uses a certificate signed by the CA to authenticate a digital signature or encrypt communications to a certificate Subject. The relying party relies on the certificate as a result of the certificate being signed by a CA, which is trusted. A relying party normally is but does not have to be a Subscriber of the PKI.

Relying Party Agreement:

An agreement used by a CA setting forth the terms and conditions under which an individual or organization acts as a relying party.

Repository:

A place or container where objects are stored. A data repository is technology where data is stored logically. In PKI terms, a repository accepts certificates and CRLs from one or more CAs and makes them available to entities that need them for implementing security services.

Revocation:

In PKI, revocation is the action associated with revoking a certificate. Revoking a certificate is to make the certificate invalid before its normal expiration. The Certification Authority that issued the certificate is the entity that revokes a certificate. The revoked status is normally published on a certificate revocation list (CRL).

RSA:

A public key cryptographic algorithm invented by Rivest, Shamir, and Adelman.

Secondary certificate:

A certificate issued on the basis of another certificate, the primary certificate. This means that the issuing CA relies on the CA which issued the primary certificate, i.e. accepts the public key's certification of the key holder, which in turn requires reliance on the identification of the key holder when issuing the primary certificate being correct.

Sensitive:

Used to describe the security classification of information where the information if disclosed would result in serious financial loss, serious loss in confidence or could result in personal harm or death.

Signature Verification Certificate:

Often referred to as simply a Signature Certificate. It is the certificate containing the public key used to verify a digital signature that was signed by the corresponding private key.

Split Knowledge

A condition under which two or more parties separately and confidentially have custody of components of a single key that, individually, convey no knowledge of the resultant cryptographic key. The resultant key exists only within secure cryptographic devices.

SSL Client Certificate:

Certificate utilized to verify the authentication of an end user to a server when a connection is being established via a SSL session (secure channel).

SSL Server Certificate:

Certificate utilized to verify the authentication of a web or application server to the end user (client) when a connection is being established via a SSL session (secure channel).

Storage module:

In this document relates to cryptographic module.

Subject:

Entity identified in a certificate as the holder of the private key associated with the public key given in the certificate. [ETSI TS 101 456 v1.2.1] Subject can also be a device (a data network component or software, hereafter referred to as "Device").

Subscriber:

Entity subscribing with a Certification Authority on behalf of one or more Subjects. The Subject may be a Subscriber acting on its own behalf. [ETSI TS 101 456 v1.2.1]

Surveillance Camera:

A surveillance camera is a video recording device used for detection and identification of unauthorized physical entry to a secured area. A camera used for recording a signing ceremony for auditing purposes is not considered a surveillance camera.

Symmetric encryption:

Encryption system characterised by both the sender and the recipient of encrypted information using the same secret key for both encryption and decryption.

Threat:

A danger to an asset in terms of that asset's confidentiality, integrity, availability or legitimate use.

Token:

Hardware devices, normally associated with a reader, used to store and/or generate encryption keys, such as smartcards and USB tokens.

Trusted Third Party (TTP):

A party on which two or more collaborative parties rely. A TTP carries out services for the collaborative parties, such as time-stamping, certificate issuing, etc.

Trusting party:

A recipient of a certificate which trusts this certificate on authentication, verification of digital signatures and/or encryption of information. See also Relying Party.

Unambiguous identity:

An identity comprising a set of attributes which relate unambiguously to a specific person. The unambiguous connection between the identity and the person may be dependant on the context within which the identity term is used. Certain contexts may require assistance from the current registrar of various attributes.

URI:

Universal Resource Indicator - an address on the Internet.

UTF8String:

UTF-8 is a type of Unicode, which is a character set supported across many commonly used software applications and operating systems. UTF-8 is a multibyte encoding in which each character can be encoded in as little as one byte and as many as four bytes. Most Western European languages require less than two bytes per character. Greek, Arabic, Hebrew, and Russian require an average of 1.7 bytes. Japanese, Korean, and Chinese typically require three bytes per character. Such Unicode is important to ensure that universal /foreign characters are supported.

Verification:

The process of ensuring that an assumption is correct. This term relates primarily to the process of ensuring that a digital signature represents the party which the signed information details as its issuer.

Vettor:

A person who verifies information provided by a person applying for a certificate.

Vulnerability:

Weaknesses in a safeguard or the absence of a safeguard.

Written:

Where this CPS specifies that information shall be written, this requirement is generally also met by digital data provided that the information it contains is accessible in such a way that it is useable by the parties involved.

X.500:

Specification of the directory service required to support X.400 e-mail initially but common used by other applications as well.

X501 PrintableString:

String format for representing names, such as Common Name (CN), in X.509 certificates. The encoding of a value in this syntax is the string value itself; an arbitrary string of printable characters.

X.509:

ITU standard that describes the basic format for digital certificates.