



Implementation Profile for using OASIS DSS in Central Signing Services

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1. Introduction

This document specifies an implementation profile for exchange of sign requests and responses using the OASIS DSS protocol [DSS], enhanced by the DSS Extensions for Federated Central Signing Services [DSS-Ext].

Section 2 defines the sign request and response messages and section 3 defines the transport of these messages using HTTP POST.

1.1. Terminology

| Term | Defined meaning |
|--------------------|---|
| User | The entity requested to sign a document. |
| Requesting Service | The service requesting the signature on a particular document by a particular user. |
| Signing Service | A centralized service that manages the process to authenticate the user that has been requested to sign a document, and the process to obtain the user's signature on the requested document. |

1.2. Requirement key words

The key words **MUST**, **MUST NOT**, **REQUIRED**, **SHALL**, **SHALL NOT**, **SHOULD**, **SHOULD NOT**, **RECOMMENDED**, **MAY**, and **OPTIONAL** are to be interpreted as described in [RFC2119].

These keywords are capitalized when used to unambiguously specify requirements over protocol features and behavior that affect the interoperability and security of implementations. When these words are not capitalized, they are meant in their natural-language sense.

1.3. Namespace references

Conventional XML namespace prefixes are used throughout the listings in this specification to stand for their respective namespaces as follows, whether or not a namespace declaration is present in the example:

| Prefix | XML Namespace | Comments |
|--------|---|---|
| csig | http://id.elegnamnden.se/csig/1.1/dss-ext/ns | For the DSS extension namespace [DSS-Ext] (default namespace). |
| dss | urn:oasis:names:tc:dss:1.0:core:schema | The DSS core namespace [DSS]. |
| ds | http://www.w3.org/2000/09/xmldsig# | The XML Signature Syntax and Processing specification [XMLSig] and its governing schema [XMLSig-XSD]. |
| saml | urn:oasis:names:tc:SAML:2.0:assertion | The SAML V2.0 assertion namespace, defined in the schema [SAML-XSD]. |

1.4. Identification

The following URI identifier identifies this profile:

<http://id.elegnamnden.se/csig/1.1/dss-ext/profile>

1.5. Structure

This specification uses the following typographical conventions in text: `<EidElement>`, `<ns:ForeignElement>`, `Attribute`, **Datatype**, `OtherCode`.

2. Sign Request and Response Messages

This section defines a profile for sign requests and responses using the OASIS DSS standard [DSS] in combination with “DSS extensions for Federated Central Signing Services” [DSS-Ext].

In the following sections the OASIS DSS standard is referred to as “DSS” and the DSS extensions are referred to as “DSS-Ext”.

Conformance with this implementation profile requires full conformance with DSS and DSS-Ext. In case of conflict between DSS-Ext and DSS, DSS-Ext is the normative one. In case of differences between this implementation profile and DSS-Ext, this implementation profile is the normative one.

2.1. Sign Requests

Sign requests are carried in a `<dss:SignRequest>` element according to requirements and conditions of the following subsections.

The `<dss:SignRequest>` element MUST have a `Profile` attribute with the value `http://id.elegnamnden.se/csig/1.1/dss-ext/profile`, which specifies conformance to this implementation profile.

The `<dss:SignRequest>` element MUST have a `RequestID` attribute with a value that uniquely identifies this request. The `RequestID` value MUST be a random generated value with at least 128 bit entropy and a length of at least 20 bytes.

2.1.1. Signature on Sign Requests

Sign requests MUST be signed. The signature MUST have a Same-Document URI-Reference (`URI=""`) to ensure that the signature covers the complete `<dss:SignRequest>` element.

The resulting `<ds:Signature>` element MUST be placed inside the `<dss:OptionalInputs>` element in accordance with section 5 of [DSS-Ext].

The Signature Service MUST NOT process the sign request unless the signature of the sign request can be authenticated as originating from a legitimate Requesting Service.

2.1.2. Data To Be Signed

A representation of the document to be signed MUST be provided in accordance with section 4.1 of [DSS-Ext].

Data to be signed MUST be provided in a `<SignTaskData>` element.

The `<SignTasks>` element MAY contain one or more `<SignTaskData>` elements, representing one or more requested signatures.

2.1.3. DSS Extension

The `<dss:OptionalInput>` element of the sign request MUST contain a `<SignRequestExtension>` element according to requirements and conditions of the following subsections.

2.1.3.1. Version

The `Version` attribute giving the version number of the [DSS-Ext] specification SHOULD be set to the version number that is supported by the sender. If absent, the default value "1.1" MUST be assumed.

2.1.3.2. Conditions

A `<saml:Conditions>` element MUST be present. This element MUST NOT contain any information in addition to what is defined in section 3.1 of [DSS-Ext].

2.1.3.3. Signer

The `<Signer>` element MUST contain at least the SAML attributes that are necessary in order to uniquely identify the signer. The present attributes MUST match the attributes that are provided for this signer when authenticating the signer using the Identity Provider specified in the `<IdentityProvider>` element.

The Signing Service MUST match all attribute values provided in the `<Signer>` element with SAML attributes provided for this signer subject in a valid assertion obtained from the specified Identity Provider.

If any of the attributes specified in the `<Signer>` element cannot be found or matched with a corresponding attribute value from an obtained assertion from the specified Identity Provider, the Signing Service MUST reject the sign request.

2.1.3.4. IdentityProvider

This element MUST be present, specifying the SAML entityID of the Identity Provider that MUST be used to authenticate the signer. The Signing Service MUST NOT generate the requested signature unless the signer is successfully authenticated through this Identity Provider.

2.1.3.5. SignRequester

This element MUST be present, specifying the identity of the Requesting Service in the form of its SAML entityID.

2.1.3.6 SignService

This element MUST be present, specifying the SAML entityID of the Signing Service that is the target of this sign request.

2.1.3.7. RequestedSignatureAlgorithm

This element MAY be present, specifying a URI that identifies a signature algorithm that the Requesting Service prefers to be used when generating the requested signature.

When this element is absent, the default signing algorithm is RSA with SHA-256, <http://www.w3.org/2001/04/xmldsig-more#rsa-sha256>.

2.1.3.8. SignMessage

2.1.3.8.1. SignMessage Element

This element MAY be present to provide information that the Identity Provider MAY display for the user before obtaining the user's consent to sign. The message MAY be provided in clear text or in encrypted form. The attribute `MustShow` MUST be set to `true` if the Identity Provider is required to show this message to the user. When the message is provided in encrypted form, the `DisplayEntity` attribute MUST include the entityID of the Identity Provider holding the private decryption key. The encryption key included in the metadata of the identified Identity Provider SHOULD be used to encrypt the message.

The message MUST be encoded using UTF-8 and MUST be using one of the formats plain text, HTML or markdown. The appropriate MIME type must be declared in the `MimeType` attribute.

For messages in HTML format, the message MUST NOT contain tags and attributes for each tag other than those listed in the following table:

| HTML Tags | Type | Allowed attributes |
|-----------|------|--------------------|
|-----------|------|--------------------|

| HTML Tags | Type | Allowed attributes |
|----------------|-----------|--------------------|
| h1, h2, h3, h4 | Headings | style |
| div, span, p | Section | style |
| table, tr, td | Table | style |
| b, strong | Highlight | style |
| i, u, br | Format | |
| ol, ul, li | List | |

Allowed HTML entities for character replacement SHALL be restricted to amp, gt, lt, quot and nbsp (in the form &entity-name;).

HTML messages MUST NOT contain any URI references to data outside of the message and MUST NOT contain any JavaScript in any form.

2.1.3.8.2. Requesting Identity Provider to Display SignMessage

The means through which the Service Provider requests the Identity Provider to display a sign message is defined in section 7.2.1 of “Deployment Profile for the Swedish eID Framework” [Eid-Profile].

As of version 1.6 of the “Deployment Profile for the Swedish eID Framework” [Eid-Profile] specification, the use of the special purpose Authentication Context URI:s for sign messages has been deprecated and replaced by the issuance of the `signMessageDigest` attribute (see section 7 of [Eid-Profile]).

Note: Identity Providers compliant with the Swedish eID Framework MUST support a new version of a Swedish eID Framework specification within 180 days from its publishing date. Before this time has passed, a Signature Service needs to have knowledge about whether a particular Identity Provider is compliant with version 1.6 of [Eid-Profile] in order to apply a process to determine which `AuthnContextClassRef` URI to include in the `AuthnRequest` sent to the Identity Provider when authenticating the user for signing. Therefore, the previously required steps for this process are listed at the end of this section.

Also, [Eid-Profile] states that all compliant Identity Providers MUST support processing of the special purpose `sigmessage` URI:s according to previous versions of the specification up until the 31th of December 2020.

In addition to the requirements in section 7.2.1 of [Eid-Profile] the Signature Service MUST apply the following process regarding the inclusion of the `AuthnContextClassRef` URI to include in the `AuthnRequest` sent to the Identity Provider when authenticating the user for signing:

1. Determine requested LoA (Level of Assurance) by either:
 - i. Get the LoA, or LoA:s, from the `AuthnContextClassRef` specified in the sign request as `CertRequestProperties`, or
 - ii. if the LoA reference from the sign request is absent then use the default LoA according to the governing policy.
2. Include the LoA URI(s) from the step above as `RequestedAuthnContext` if supported by the Identity Provider. If none of the LoA:s are supported by the Identity Provider, fail signing and return an error sign response, indicating a request failure (the requested LoA(s) was inconsistent with the specified Identity Provider).

Deprecated process:

Must not be used after the 31th of December 2020, when all Identity Providers compliant with the Swedish eID Framework may drop support of the special purpose Authentication Context URI:s for sign messages.

In addition to the requirements in section 7.2.1 of [Eid-Profile] the Signature Service MUST apply the following process to determine which AuthnContextClassRef URI to include in the AuthnRequest sent to the Identity Provider when authenticating the user for signing:



The input data for the process is:

| Input | Description |
|---------------------------|---|
| ClassRef | The AuthnContextClassRef specified in the sign request as CertRequestProperties. |
| SignMessage | The SignMessage element in the sign request. |
| MustShow | The MustShow attribute of the SignMessage element. |
| AuthnContextClassRef URIs | URIs supported by the Identity Provider, retrieved from the Identity Provider's metadata. |

Functions and values:

| Functions | Values |
|----------------------------|--|
| getLoa (ClassRef) | Returns the Level of Assurance represented by a specified AuthnContextClassRef URI. |
| ClassRef (LoA) | The default AuthnContextClassRef URI specified for a specified LoA with no requirements to display a sign message. |
| ClassRef (LoA + SM) | The AuthnContextClassRef URI specified for a specified LoA with requirements to display a sign message. |
| Default LoA | The default Level of Assurance according to the governing policy. |

Process steps:

1. Determine requested LoA (Level of Assurance) by either:
 - i. Get the LoA from the ClassRef URI specified in the sign request, if present, or
 - ii. if the ClassRef from the sign request is absent (NULL) then use the default LoA.
2. If no SignMessage is present in the sign request:
 - i. Request **ClassRef**(LoA) as RequestedAuthnContext if supported by the Identity Provider.
 - ii. Otherwise fail signing and return an error sign response, indicating a request failure (the requested LoA was inconsistent with the specified Identity Provider).
 - iii. End.
3. If the Identity Provider supports **ClassRef**(LoA + SM):
 - i. Include sign message in the AuthnRequest to the Identity Provider.
 - ii. Request **ClassRef**(LoA + SM) as RequestedAuthnContext.
 - iii. End.
4. If MustShow = true:
 - i. Fail signing and return an error sign response, indicating a request failure (a sign message included a requirement to be displayed but the specified Identity Provider does not support display of sign messages).
 - ii. End.
5. Proceed with normal authentication:

- i. Include sign message in the AuthnRequest to the Identity Provider (just in case the Identity Provider can make use of this information anyway).
- ii. Request **ClassRef(LoA)** as RequestedAuthnContext if supported by the Identity Provider.
- iii. Otherwise fail signing and return an error sign response, indicating a request failure (the requested LoA was inconsistent with the specified Identity Provider).
- iv. End.

Note: The process defined above requires that the **ClassRef(LoA + SM)** MUST be used when the sign request includes a sign message and the Identity Provider has declared that it supports display of sign messages. This allows a requesting service to send a sign request with a sign message with `MustShow = false` and still obtain proof of display of sign message from those Identity Providers that do support display of sign messages.

2.1.3.9. CertRequestProperties

This element MAY be present to provide requested properties of generated signature certificates according with section 3.1.1 of [DSS-Ext].

When the `CertType` attribute is present with a value of `QC/SSCD` the signature service MUST request authentication in accordance with section 7.2.2 of "Deployment Profile for the Swedish eID Framework" [Eid-Profile], or reject the request.

2.1.3.9.1. AuthnContextClassRef

This element MAY be present to specify the Level of Assurance(s) required in order to issue the signing certificate.

2.1.3.9.2. RequestedCertAttributes

This element MAY be present to specify any number of attributes that the Requesting Service requires or requests to be included as a representation of the subject in the signature certificate that is generated with the requested signature.

The Signature Service MUST NOT generate the requested signature unless it can obtain attribute values from an authoritative source for all requested attributes that is marked as "required". The Signature service SHOULD attempt to provide all "requested" attributes.

The Signing Service MAY use an Attribute Authority as complementary source to obtain requested attribute values, as long as the identity assertion provided by the specified Identity Provider is sufficient to uniquely identify the signer. The Sign Requester MAY provide one or more SAML entityID identifiers of Attribute Authorities in `<AttributeAuthority>` elements, which could be used to obtain an attribute value for the requested attribute.

It is left to local policy of the Signature Service whether it accepts any `DefaultValue` attribute value for any requested attributes as being provided by an authoritative source. If a `DefaultValue` is accepted as authoritative, it MUST NOT conflict with any attributes received by the specified Identity Provider or Attribute Authority when authenticating the signer. If the requested attribute is provided by the Identity Provider or any Attribute Authority used by the Signing Service, then these values MUST be used over the `DefaultValue`.

2.2. Sign Responses

Sign responses are carried in a `<dss:SignResponse>` element according to requirements and conditions of the following subsections.

The `<dss:SignResponse>` element MUST have a `Profile` attribute with the value `http://id.elegnamnden.se/csig/1.1/dss-ext/profile`, which specifies conformance to this implementation profile.

The `<dss:SignResponse>` element MUST have a `RequestID` attribute with a value that is identical to the sign request that is being serviced through this sign response.

2.2.1. Signature on Sign Responses

Sign responses MUST be signed. The signature MUST have a Same-Document URI-Reference (URI="") to ensure that the signature covers the complete `<dss:SignResponse>` element.

The resulting `<ds:Signature>` element MUST be placed inside the `<dss:OptionalOutputs>` element in accordance with section 5 of [DSS-Ext].

2.2.2. Sign Response Status Information

Implementations of this specification MUST return a `<dss:ResultMajor>` value and MAY return a `<dss:ResultMinor>` value. Implementations of this specification are released from the requirement to return any of the listed values of `<dss:ResultMinor>`, specified in the DSS standard, when returning the `<dss:ResultMajor>` value `urn:oasis:names:tc:dss:1.0:resultmajor:Success`, since all the listed `<dss:ResultMinor>` values relates to signature validation and not signature creation.

With the exception above, the response values defined in section 2.6 of the DSS standard, amended by status identifiers defined in section 3.1.7 of [Eid-Registry], SHOULD be used.

2.2.3. Generated Signature

The generated signature result data SHALL be provided in `<SignTaskData>` element according to section 4.1.1 of [DSS-Ext].

One `<SignTaskData>` element shall be provided for each successfully generated signature as a result of the corresponding request.

2.2.4. DSS Extension

The `<dss:OptionalInput>` element of the sign response MUST contain a `<SignResponseExtension>` element according to requirements and conditions of the following subsections.

2.2.4.1. Version

The version of the [DSS-Ext] specification under which the request was processed and response was constructed. This version MUST be the same version as given in the `SignRequestExtension` (see section 2.1.3.1, "Version").

For backwards compatibility reasons that attribute MAY be absent if version "1.1" was requested. Otherwise it MUST be set.

2.2.4.2. ResponseTime

The `<ResponseTime>` element MUST be present in the response.

2.2.4.3. Request

The `<Request>` element MAY be present in a response. However, it is RECOMMENDED not to include this element since it makes the response message unnecessary large. Instead the requester of a sign operation is expected to save the request message in its session for later use when processing a response message.

2.2.4.4. SignerAssertionInfo

The `<SignerAssertionInfo>` element MUST be present if the signer has been successfully authenticated using the specified Identity Provider. The present `<ContextInfo>` child element MUST include an `<AssertionRef>` child element. The `<AssertionRef>` child element MUST contain the value of the ID attribute of the root element of the SAML assertion used to authenticate the signer.

2.2.4.5. SignatureCertificateChain

The <SignatureCertificateChain> element MUST be present if a certificate was issued to the signer. This element MUST provide a complete chain of certificates up to a self-signed root certificate.

All signature values according to section [2.2.3](#) MUST be verifiable using the signer certificate provided in this element.

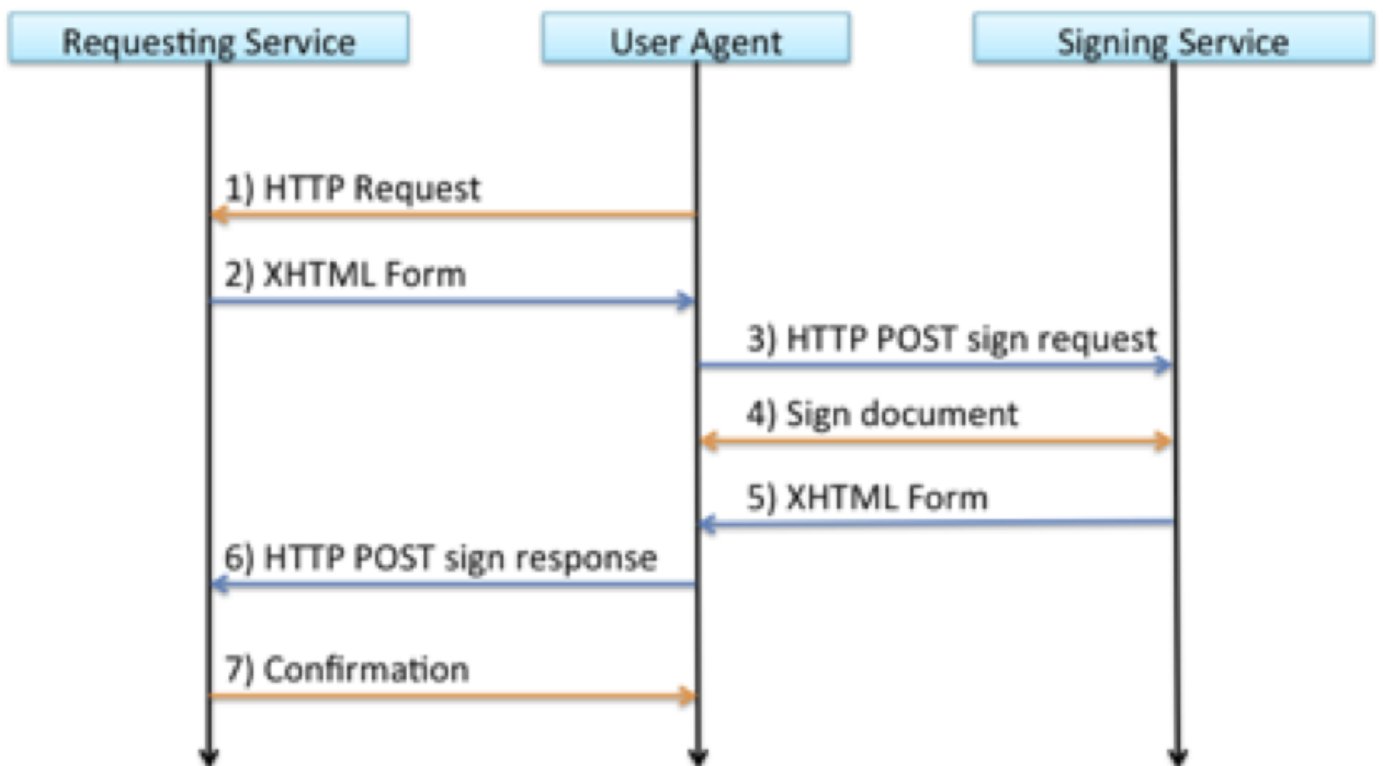
3. HTTP POST Binding

This section specifies the protocol binding for transport of sign request and sign response messages using HTTP POST. This protocol binding implements the message exchange model in section 3.1.

This process is technically equivalent to the procedures implemented by SAML HTTP POST bindings [SAML2Bind], section 3.5.

3.1. Message Exchange Model

Sign request and response messages are exchanged between the Requesting Service and the Signing Service with the user acting as an intermediary through a user agent (typically a web browser) according to the following message flow:



1. The user agent initiates the signing process by an HTTP request to the Service Provider, for example caused by the user clicking a button on a web page.
2. The Service Provider responds to the user agent with an XHTML form, containing a Base64 encoded sign request.
3. A JavaScript in the XHTML form causes the user agent to send the sign request to the Signing Service using HTTP POST.
4. The user interacts with the Signing Service to complete the requested signature.
5. The Signing Service responds to the user agent with an XHTML form, containing a Base64 encoded sign response.
6. A JavaScript in the XHTML form causes the user agent to send the sign response to the Service Provider using HTTP POST.
7. The Service Provider processes the sign response and a confirmation or status message is returned to the user agent.

The steps 1,4 and 7 are part of the service infrastructure and are outside the scope of this HTTP POST binding specification.

3.1.1. Sign Request XHTML Form

The sign request XHTML form SHALL have functional properties that are equivalent to the following implementation example:

```
<?xml version='1.0' encoding='UTF-8'?>
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.1//EN" 'http://www.w3.org/TR/xhtml11/DTD/xhtml11.dtd'>
<html xmlns='http://www.w3.org/1999/xhtml' xml:lang='en'>
<body onload='document.forms[0].submit()''>
  <noscript>
    <p><strong>Note:</strong> Since your browser does not support JavaScript,
      you must press the Continue button once to proceed.</p>
  </noscript>
  <form action='https://csig.example.com/signrequest' method='post'>
    <div>
      <input type='hidden' name='Binding' value='POST/XML/1.0' />
      <input type='hidden' name='RelayState' value='56345145a482995d' />
      <input type='hidden' name='EidSignRequest' value='PD94bWw...wVzdD4=' />
    </div>
    <noscript>
      <div>
        <input type='submit' value='Continue' />
      </div>
    </noscript>
  </form>
</body>
```

The form’s action attribute specifies the URL to the Signing Service and the form MUST have a method attribute with the value “post”.

The form MUST provide the following parameters:

| Parameter | Value |
|----------------|---|
| Binding | “POST/XML/1.0” Identifying implementation of this binding specification |
| RelayState | This parameter MUST contain the value of the RequestID attribute of the <dss:SignRequest> element that is present in the base64 encoded sign request. |
| EidSignRequest | Base64 encoded sign request. |

3.1.2. Sign Response XHTML Form

The sign response XHTML form SHALL have functional properties that are equivalent to the following implementation example:

```
<?xml version='1.0' encoding='UTF-8'?>
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.1//EN" 'http://www.w3.org/TR/xhtml11/DTD/xhtml11.dtd'>
<html xmlns='http://www.w3.org/1999/xhtml' xml:lang='en'>
<body onload='document.forms[0].submit()''>
  <noscript>
    <p><strong>Note:</strong> Since your browser does not support JavaScript,
      you must press the Continue button once to proceed.</p>
  </noscript>
  <form action='https://sp.example.com/sigResponseHandler' method='post'>
    <div>
      <input type='hidden' name='Binding' value='POST/XML/1.0' />
      <input type='hidden' name='RelayState' value='56345145a482995d' />
      <input type='hidden' name='EidSignResponse' value='PD94bWw...wVzdD4=' />
    </div>
  </form>
</body>
```

```
<div>
  <input type='submit' value='Continue' />
</div>
</noscript>
</form>
</body>
```

The form's action attribute specifies the URL to the requesting Service Provider. This URL MUST specify a URL from the <saml:AudienceRestriction> element that was provided in the corresponding sign request. The form MUST have a method attribute with the value "post".

The form MUST provide the following parameters:

| Parameter | Value |
|-----------------|--|
| Binding | "POST/XML/1.0" Identifying implementation of this binding specification |
| RelayState | This parameter MUST contain the value of the RequestID attribute of the <dss:SignResponse> element that is present in the base64 encoded sign request. |
| EidSignResponse | Base64 encoded sign response. |

4. References

4.1. Normative References

[RFC2119]

Bradner, S., Key words for use in RFCs to Indicate Requirement Levels, March 1997.

[DSS]

OASIS Standard - Digital Signature Service Core Protocols, Elements, and Bindings Version 1.0, April 11, 2007.

[SAML-XSD]

S. Cantor et al., SAML assertions schema. OASIS SSTC, March 2005. Document ID: saml-schema-assertion-2.0. See <http://www.oasisopen.org/committees/security/>.

[XMLSig]

D. Eastlake et al, XML-Signature Syntax and Processing, W3C Recommendation, February 2002.

[XMLSig-XSD]

XML Signature Schema. World Wide Web Consortium. See <https://www.w3.org/TR/xmlsig-core/xmlsig-core-schema.xsd>.

[Eid-Profile]

Deployment Profile for the Swedish eID Framework.

[DSS-Ext]

DSS Extension for Federated Central Signing Services.

[Eid-Registry]

Swedish eID Framework - Registry for identifiers.

4.2. Informative References

[SAML2Bind]

OASIS Standard, Bindings for the OASIS Security Assertion Markup Language (SAML) V2.0, March 2005.

5. Changes between versions

Changes between version 1.4 and version 1.5:

- The requirements in section 2.2.4.3, "Request", were updated. The Request element is no longer mandatory to include in a response message.
- Sections 2.1.3.1 and 2.2.4.1 defining the requirements concerning the use of the Version attribute in SignRequestExtension and SignResponseExtension elements were updated in order to implement support for newer versions of the DSS extension specification.

Changes between version 1.3 and version 1.4:

- Updates of references and change of logotype.
- Updates to section 2.1.3.8.2, "Requesting Identity Provider to Display SignMessage", with a more simple process of determining the Level of Assurance URI to include in requests.

Changes between version 1.2 and version 1.3:

- In section 2.1.3.9, "CertRequestProperties", an requirement to adapt authentication request procedures when the requested signature is a qualified electronic signature was added.

Changes between version 1.1 and version 1.2:

- In section 2.2.2, a reference to section 3.1.5 in [Eid-Registry] was changed to section 3.1.7.

Changes between version 1.0 and version 1.1:

- This profile now refers to version 1.1 of the "DSS Extensions for Federated Central Signing Services" specification.
- Changes were made to section 2.1.3.8, "SignMessage", in order to define usage of the <SignMessage> element.
- The URI identifier that identifies this profile has been changed from <http://id.elegnamnden.se/csig/1.0/eid2-dss/profile> to <http://id.elegnamnden.se/csig/1.1/dss-ext/profile>.