



SAML V2.0 Deployment Profiles for X.509 Subjects

Committee Draft 03

11 March 2008

Specification URIs:

This Version:

<http://docs.oasis-open.org/security/saml/Post2.0/sstc-saml2-profiles-deploy-x509-cd-03.html>

<http://docs.oasis-open.org/security/saml/Post2.0/sstc-saml2-profiles-deploy-x509-cd-03.odt>

<http://docs.oasis-open.org/security/saml/Post2.0/sstc-saml2-profiles-deploy-x509-cd-03.pdf>

Previous Version:

<http://docs.oasis-open.org/security/saml/Post2.0/sstc-saml2-profiles-deploy-x509-cd-02.html>

<http://docs.oasis-open.org/security/saml/Post2.0/sstc-saml2-profiles-deploy-x509-cd-02.odt>

<http://docs.oasis-open.org/security/saml/Post2.0/sstc-saml2-profiles-deploy-x509-cd-02.pdf>

Latest Version:

<http://docs.oasis-open.org/security/saml/Post2.0/sstc-saml2-profiles-deploy-x509.html>

<http://docs.oasis-open.org/security/saml/Post2.0/sstc-saml2-profiles-deploy-x509.odt>

<http://docs.oasis-open.org/security/saml/Post2.0/sstc-saml2-profiles-deploy-x509.pdf>

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Related Work:

This specification is an alternative to the *SAML V2.0 Attribute Sharing Profile for X.509 Authentication-Based Systems* [SAMLASP].

Declared XML Namespace(s):

urn:oasis:names:tc:SAML:metadata:X509:query

Abstract:

This related set of SAML V2.0 deployment profiles specifies how a principal who has been issued an X.509 identity certificate is represented as a SAML Subject, how an assertion regarding such a principal is produced and consumed, and finally how two entities exchange attributes about such a principal.

Status:

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1 Introduction

This related set of *SAML V2.0 Deployment Profiles for X.509 Subjects* describes how a principal who has been issued an X.509 identity certificate is represented as a SAML Subject, how an assertion regarding such a principal is produced and consumed, and finally how two entities exchange attributes about such a principal.

1.1 Terminology

This specification uses normative text to describe the use of SAML assertions and attribute queries for X.509 subjects.

The keywords "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this specification are to be interpreted as described in [RFC 2119]:

...they MUST only be used where it is actually required for interoperation or to limit behavior which has potential for causing harm (e.g., limiting retransmissions)...

These keywords are thus capitalized when used to unambiguously specify requirements over protocol and application 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.

Listings of XML schemas appear like this.

Example code listings appear like this.

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
saml:	urn:oasis:names:tc:SAML:2.0:assertion	This is the SAML V2.0 assertion namespace [SAMLCore]. This is the default namespace used throughout this document.
samlp:	urn:oasis:names:tc:SAML:2.0:protocol	This is the SAML V2.0 protocol namespace [SAMLCore].
md:	urn:oasis:names:tc:SAML:2.0:metadata	This is the SAML V2.0 metadata namespace [SAMLMeta].
query:	urn:oasis:names:tc:SAML:metadata:ext:query	This is the SAML metadata query extension namespace [SAMLMeta-Ext].
x509qry:	urn:oasis:names:tc:SAML:metadata:X509:query	This is the SAML X.509 query namespace defined by this document and its accompanying schema [X509Query-XSD].
ds:	http://www.w3.org/2000/09/xmldsig#	This is the W3C XML Signature namespace, defined in the XML-Signature Syntax and Processing specification Error: Reference source not found and schema [XMLSig-XSD].
xenc:	http://www.w3.org/2001/04/xmlenc#	This is the W3C XML Encryption namespace, defined in the XML Encryption Syntax and Processing specification [XMLEnc] and schema [XMLEnc-XSD].
xs:	http://www.w3.org/2001/XMLSchema	This is the XML Schema namespace [Schema1].

Prefix	XML Namespace	Comments
xsi:	http://www.w3.org/2001/XMLSchema-instance	This is the XML Schema namespace for schema-related markup that appears in XML instances [Schema1].

This specification uses the following typographical conventions in text: <UnqualifiedElement>, <ns:QualifiedElement>, Attribute, **Datatype**, OtherKeyword.

The term *identity provider* as used in this specification refers to a typical SAML attribute authority [SAMLGloss]. The term *service provider* refers to a SAML attribute requester. However, as used in this specification, a service provider is not a typical SAML service provider since it performs X.509 authentication in lieu of consuming a SAML authentication assertion.

The term *X.509 identity certificate* as used in this specification refers to an X.509 end entity certificate [RFC3280] or a certificate based on an X.509 end entity certificate (such as an X.509 proxy certificate [RFC3820]).

1.2 Outline

Section 2 describes how a principal who has been issued an X.509 identity certificate is represented as a SAML Subject. Section 3 describes in detail how a service provider and identity provider exchange attributes about a principal who has been issued an X.509 identity certificate. Section 4 describes the special case where the requester is the subject of the query, that is, where the principal self-queries for attributes. Finally, section 5 specifies requirements that all conforming implementations must follow.

1.3 Normative References

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- [RFC 2119] S. Bradner. *Key words for use in RFCs to Indicate Requirement Levels*. IETF RFC 2119, March 1997. See <http://www.ietf.org/rfc/rfc2119.txt>
- [RFC2246] T. Dierks and C. Allen. *The TLS Protocol Version 1.0*. IETF RFC 2246, January 1999. See <http://www.ietf.org/rfc/rfc2246.txt>
- [RFC2253] M. Wahl et al. *Lightweight Directory Access Protocol (v3): UTF-8 String Representation of Distinguished Names*. IETF RFC 2253, December 1997. See <http://www.ietf.org/rfc/rfc2253.txt>
- [RFC3280] R. Housley et al. *Internet X.509 Public Key Infrastructure: Certificate and Certificate Revocation List (CRL) Profile*. IETF RFC 3280, April 2002. See <http://www.ietf.org/rfc/rfc3280.txt>
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- [SAMLCore] S. Cantor et al. *Assertions and Protocols for the OASIS Security Assertion Markup Language (SAML) V2.0*. OASIS Standard, March 2005. See <http://docs.oasis-open.org/security/saml/v2.0/saml-core-2.0-os.pdf>
- [SAMLMeta] S. Cantor et al. *Metadata for the OASIS Security Assertion Markup Language (SAML) V2.0*. OASIS Standard, March 2005. See <http://docs.oasis-open.org/security/saml/v2.0/saml-metadata-2.0-os.pdf>
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221	[X509Query-XSD]	<i>Schema for SAML V2.0 Deployment Profiles for X.509 Subjects</i> . OASIS, December 2006. Document ID sstc-saml-metadata-x509-query.xsd. See http://www.oasis-open.org/committees/documents.php?wg_abbrev=security
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224	[XMLEnc]	D. Eastlake et al. <i>XML Encryption Syntax and Processing</i> . World Wide Web Consortium Recommendation, December 2002. See http://www.w3.org/TR/2002/REC-xmlenc-core-20021210/
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226		
227	[XMLEnc-XSD]	<i>XML Encryption Schema</i> . World Wide Web Consortium Recommendation, December 2002. See http://www.w3.org/TR/2002/REC-xmlenc-core-20021210/xenc-schema.xsd
228		
229		
230	[XMLSig]	D. Eastlake et al. <i>XML-Signature Syntax and Processing</i> . World Wide Web Consortium Recommendation, February 2002. See http://www.w3.org/TR/2002/REC-xmlsig-core-20020212/
231		
232		
233	[XMLSig-XSD]	<i>Schema for XML Signatures</i> . World Wide Web Consortium Recommendation, February 2002. See http://www.w3.org/TR/2002/REC-xmlsig-core-20020212/xmlsig-core-schema.xsd
234		
235		

236 1.4 Non-Normative References

237	[MACEAttrib]	S. Cantor et al. <i>MACE-Dir SAML Attribute Profiles</i> . Internet2 MACE, December 2007. See http://middleware.internet2.edu/dir/docs/draft-internet2-mace-dir-saml-attributes-latest.pdf
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240	[RFC3820]	S. Tuecke et al. <i>Internet X.509 Public Key Infrastructure (PKI) Proxy Certificate Profile</i> . IETF RFC 3820, June 2004. See http://www.ietf.org/rfc/rfc3820.txt
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250		

2 X.509 SAML Subject Profile

The X.509 SAML Subject Profile describes how a principal who has been issued an X.509 identity certificate is represented as a SAML V2.0 Subject.

2.1 Required Information

Identification:

urn:oasis:names:tc:SAML:2.0:profiles:query:attribute:X509-subject

Contact information: security-services-comment@lists.oasis-open.org

Description: Given below.

Updates: N/A

Extends: N/A

2.2 Profile Description

This deployment profile specifies a SAML V2.0 `<saml:Subject>` element that represents a principal who has been issued an X.509 identity certificate. An entity that produces a `<saml:Subject>` element according to this deployment profile MUST have previously determined that the principal does in fact possess the corresponding private key.

2.3 `<saml:Subject>` Usage

The `<saml:Subject>` element MUST contain exactly one of `<saml:NameID>` or `<saml:EncryptedID>`. The `<saml:Subject>` element MAY contain one or more `<saml:SubjectConfirmation>` elements that are out of scope for this deployment profile.

2.3.1 `<saml:NameID>` Usage

If the `<saml:Subject>` element contains a `<saml:NameID>` element, the following requirements MUST be satisfied:

- The value of the `<saml:NameID>` element is the Subject Distinguished Name (DN) from the principal's X.509 identity certificate.
- The `<saml:NameID>` element MUST have a `Format` attribute whose value is `urn:oasis:names:tc:SAML:1.1:nameid-format:X509SubjectName`. Thus the DN value of the `<saml:NameID>` element MUST satisfy the rules of section 8.3.3 of [SAMLCore]. Moreover, for the purposes of this deployment profile, the DN value MUST conform to RFC 2253 [RFC2253].
- As specified in [SAMLCore], the `NameQualifier` attribute of the `<saml:NameID>` element SHOULD be omitted.

2.3.2 `<saml:EncryptedID>` Usage

If the `<saml:Subject>` element contains a `<saml:EncryptedID>` element, the content of the enclosed `<xenc:EncryptedData>` element MUST be an encrypted `<saml:NameID>` element that satisfies the requirements of the previous section.

To encrypt the `<saml:NameID>` element, exactly one of the following procedures MUST be followed:

- The producer generates a new symmetric key to encrypt the `<saml:NameID>` element. After

performing the encryption, the producer places the resulting ciphertext in the `<xenc:EncryptedData>` element. The symmetric key MUST be encrypted with the consumer's public key and the resulting ciphertext MUST be placed in the `<xenc:EncryptedKey>` element.

- The producer uses a symmetric key previously established with the consumer to encrypt the `<saml:NameID>` element. After performing the encryption, the producer places the resulting ciphertext in the `<xenc:EncryptedData>` element. In this case, however, the `<saml:EncryptedID>` element MUST NOT contain an `<xenc:EncryptedKey>` element.

A symmetric key transmitted in an `<xenc:EncryptedKey>` element MUST NOT be later reused by the producer as a previously established symmetric key.

2.4 Example

An example of an unencrypted X.509 SAML Subject:

```
<!-- unencrypted X.509 SAML Subject -->
<saml:Subject>
  <saml:NameID
    Format="urn:oasis:names:tc:SAML:1.1:nameid-format:X509SubjectName">
    CN=trscavo@uiuc.edu,OU=User,O=NCSA-TEST,C=US
  </saml:NameID>
</saml:Subject>
```

An example of an encrypted X.509 SAML Subject:

```
<!-- encrypted X.509 SAML Subject -->
<saml:Subject>
  <saml:EncryptedID
    xmlns:xenc="http://www.w3.org/2001/04/xmlenc#">
    <xenc:EncryptedData
      Type="http://www.w3.org/2001/04/xmlenc#Element">
      ...
    </xenc:EncryptedData>
    <xenc:EncryptedKey
      Recipient="https://idp.example.org/saml">
      ...
    </xenc:EncryptedKey>
  </saml:EncryptedID>
</saml:Subject>
```

3 SAML Attribute Query Deployment Profile for X.509 Subjects

The *SAML Attribute Query Deployment Profile for X.509 Subjects* specifies how a service provider and an identity provider exchange attributes about a principal who has been issued an X.509 identity certificate. As such, the profile relies on the X.509 SAML Subject Profile specified in section 2 of this document. Note that the deployment profile specified in section 4 is an extension of this profile.

3.1 Profile Overview (non-normative)

Consider the use case where a principal attempts to access a secured resource at a service provider. Principal authentication at the service provider is accomplished by presenting a trusted X.509 identity certificate and by demonstrating proof of possession of the associated private key.

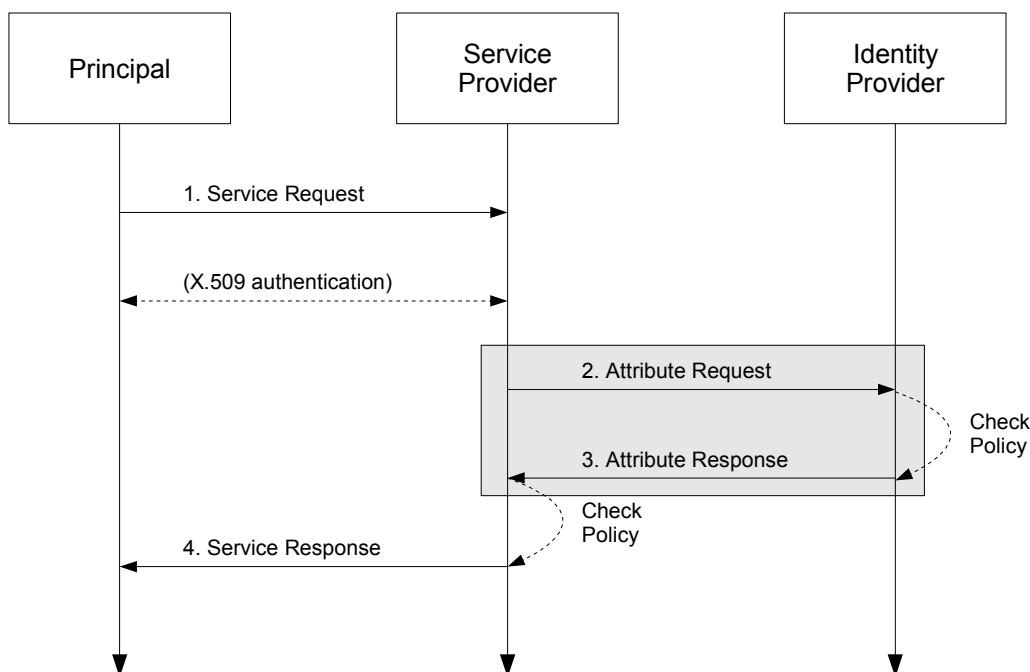
After the principal has been authenticated, the service provider requires additional information about the principal in order to determine whether to grant access to the resource. To obtain this information, the service provider uses the Subject Distinguished Name (DN) field (and perhaps other information) from the principal's X.509 identity certificate to query an identity provider for attributes about the principal. Using the attributes received from the identity provider, the service provider is able to make an informed access control decision.

This use case is based upon the following assumptions:

- A principal possesses an X.509 identity credential.
- The principal wields a client that requests a service from a service provider.
- The client can access the principal's X.509 identity credential.
- The principal has an account with a SAML identity provider.
- The service provider knows the principal's preferred identity provider and is able to query that identity provider for attributes.
- The identity provider is able to map an X.509 SAML Subject (as defined in section 2 of this document) to one and only one principal in its security domain. In particular, the identity provider is able to map the X.509 SAML Subject that represents this principal.

The sequence of steps for the full use case is shown below.

Note: The steps constrained by this profile are highlighted with a gray box. The other steps are shown only for completeness; the profile does not constrain them.



1. Service Request

In step 1, the principal requests a secured resource from a service provider who requires that the principal be authenticated. The principal authenticates to the service provider with an X.509 identity certificate.

2. Attribute Request

In step 2, the service provider sends a SAML V2.0 `<samlp:AttributeQuery>` message to the identity provider using a SAML SOAP Binding. The Subject DN from the principal's X.509 identity certificate (presented in step 1) is used to construct the `<saml:Subject>` element.

3. Attribute Response

In step 3, after verifying that the service provider is a valid requester, the identity provider issues a `<samlp:Response>` message containing appropriate attributes pertaining to the principal. The attributes returned to the service provider are subject to policy at the identity provider.

4. Service Response

In step 4, based on the attributes received from the identity provider, the service provider returns the requested resource or an error, subject to policy.

Of the sequence of steps described above, it is steps 2 and 3 that are profiled in sections Error: Reference source not found3.3 and 3.4 of this deployment profile.

3.2 Required Information

Identification:

`urn:oasis:names:tc:SAML:2.0:profiles:query:attribute:X509`

Contact information: security-services-comment@lists.oasis-open.org

Description: Given below.

Updates: N/A

373 **Extends:** Assertion Query/Request Profile [SAMLProf]

374 **3.3 Profile Description**

375 This deployment profile describes the use of the SAML V2.0 Assertion Query and Request Protocol
376 [SAMLCore] in conjunction with the SAML V2.0 SOAP Binding [SAMLBind] to retrieve the attributes of a
377 principal who has authenticated using an X.509 identity certificate. The attribute exchange MUST conform
378 to the Assertion Query/Request Profile given in section 6 of [SAMLProf] unless otherwise specified below.

379 As outlined in section 3.1, a service provider sends a SAML V2.0 `<samlp:AttributeQuery>` message
380 directly to an identity provider. This message contains a name identifier that identifies a principal who has
381 authenticated to the service provider using an X.509 identity certificate. If the identity provider receiving the
382 request can:

- 383 • recognize the name identifier; and
- 384 • fulfill the request subject to any applicable policies;

385 the identity provider responds with a successful `<samlp:Response>` containing the relevant attributes for
386 the identified principal.

387 **3.3.1 `<samlp:AttributeQuery>` Issued by Service Provider**

388 To initiate the profile, the service provider uses a synchronous binding such as the SAML SOAP Binding
389 [SAMLBind] to send a SAML V2.0 `<samlp:AttributeQuery>` message to an Attribute Service
390 endpoint at the identity provider. SAML metadata (section 3.8) MAY be used to determine the endpoint
391 locations and bindings supported by the identity provider.

392 The service provider uses information obtained from the principal's X.509 identity certificate to construct
393 the query. As required by the X.509 SAML Subject Profile (section 2), the service provider MUST have
394 previously determined that the principal does in fact possess the corresponding private key. The details of
395 this step are out of scope for this deployment profile.

396 The service provider MUST authenticate itself to the identity provider. SSL 3.0 [SSL3] or TLS 1.0
397 [RFC2246] with client authentication MAY be used for this purpose and to provide integrity protection and
398 confidentiality. Also, the `<samlp:AttributeQuery>` element MAY be signed.

399 **3.3.2 `<samlp:Response>` Issued by Identity Provider**

400 The identity provider MUST process the request as outlined in [SAMLCore]. After processing the message
401 or upon encountering an error, the identity provider MUST return a `<samlp:Response>` message
402 containing an appropriate status code to the service provider to complete the SAML protocol exchange. If
403 the identity provider is successful in locating one or more attributes for this principal, they will be included
404 in the response.

405 The identity provider MUST be able to map the referenced X.509 Subject to one and only one principal in
406 its security domain. If the identity provider is not able to map the `<saml:Subject>` element to a local
407 principal, it MUST return an error.

408 The identity provider processes the `<samlp:AttributeQuery>` element and any enclosed
409 `<saml:Attribute>` elements before returning an assertion containing a
410 `<saml:AttributeStatement>` to the requester. If no `<saml:Attribute>` elements are included in
411 the query, the identity provider returns all attributes for this principal, subject to policy. SAML metadata
412 (section 3.8) MAY be used to determine the attribute requirements of the service provider. If the identity
413 provider is unable to resolve attributes for this principal (for any reason), it MUST return an error.

414 The identity provider MUST authenticate itself to the service provider. Also, either the
415 `<samlp:Response>` element or the `<saml:Assertion>` element (or both) MAY be signed.

3.4 Use of SAML Request-Response Protocol

As required by the Assertion Query/Request Profile [SAMLProf], the `<samlp:AttributeQuery>` element MUST contain a `<saml:Issuer>` element.

3.4.1 `<samlp:AttributeQuery>` Usage

The request MUST contain a `<samlp:AttributeQuery>` element that conforms to the following rules:

- The `<saml:Subject>` element MUST conform to the X.509 SAML Subject Profile defined in section 2 of this document.
- The `<saml:Subject>` element MUST NOT contain a `<saml:SubjectConfirmation>` element.
- The `<samlp:AttributeQuery>` element MAY include one or more `<saml:Attribute>` elements.

3.4.2 `<samlp:Response>` Usage

If the request is successful, the `<samlp:Response>` element MUST conform to the following rules. Any assertion(s) included in the response may be encrypted or unencrypted. See section 2 of the SAML V2.0 Assertions and Protocols specification [SAMLCore] for general requirements regarding SAML assertions.

For each `<saml:Assertion>` element the following conditions MUST be satisfied:

- The `<saml:Subject>` element (which strongly matches the subject of the query [SAMLCore]) SHOULD NOT contain a `<saml:SubjectConfirmation>` element.
- The `<saml:Assertion>` element MUST contain a `<saml:Conditions>` element with `NotBefore` and `NotOnOrAfter` attributes.
- The `<saml:Assertion>` element SHOULD contain a `<saml:Audience>` element whose value is identical to the value of the `<saml:Issuer>` element in the request.
- Other conditions (including other `<saml:Audience>` elements) MAY be included as required by the service provider or at the discretion of the identity provider.
- The `<saml:Assertion>` element MUST contain at least one `<saml:AttributeStatement>` element and SHOULD contain *only* `<saml:AttributeStatement>` elements.

For each `<saml:EncryptedAssertion>` element, the content of the enclosed `<xenc:EncryptedData>` element MUST be an encrypted `<saml:Assertion>` element that satisfies the above requirements.

To encrypt the `<saml:Assertion>` element, exactly one of the following procedures MUST be followed:

- The identity provider generates a new symmetric key to encrypt the `<saml:Assertion>` element. After performing the encryption, the identity provider places the resulting ciphertext in the `<xenc:EncryptedData>` element. The symmetric key MUST be encrypted with the service provider's public key and the resulting ciphertext placed in the `<xenc:EncryptedKey>` element.
- The identity provider uses a symmetric key previously established with the service provider to encrypt the `<saml:Assertion>` element. After encrypting the `<saml:Assertion>` element using this key, the identity provider places the resulting ciphertext in the `<xenc:EncryptedData>` element. In this case, however, the `<saml:EncryptedAssertion>` element MUST NOT contain an `<xenc:EncryptedKey>` element.

See section 3.6 for additional rules regarding encryption.

If the request is unsuccessful and the identity provider wishes to return an error, the `<samlp:Response>`

element MUST NOT contain a `<saml:Assertion>` element. Possible error responses include the following:

- The identity provider MAY return one of the status codes
`urn:oasis:names:tc:SAML:2.0:status:UnknownAttrProfile` or
`urn:oasis:names:tc:SAML:2.0:status:InvalidAttrNameOrValue` as suggested in section 3.3.2.3 of [SAMLCore].
- If the identity provider does not recognize the `<saml:NameID>` element or otherwise is unable to map the `<saml:NameID>` element to a local principal name, it MAY return the following status code:
`urn:oasis:names:tc:SAML:2.0:status:UnknownPrincipal`

3.5 Example

For example, the requester issues the following attribute query:

```
<samlp:AttributeQuery
  xmlns:saml="urn:oasis:names:tc:SAML:2.0:assertion"
  xmlns:samlp="urn:oasis:names:tc:SAML:2.0:protocol"
  ID="aaf23196-1773-2113-474a-fe114412ab72"
  Version="2.0"
  IssueInstant="2006-07-17T22:26:40Z">
  <saml:Issuer>https://sp.example.org/saml</saml:Issuer>
  <saml:Subject>
    <saml:NameID
      Format="urn:oasis:names:tc:SAML:1.1:nameid-format:X509SubjectName">
      CN=trscavo@uiuc.edu,OU=User,O=NCSA-TEST,C=US
    </saml:NameID>
  </saml:Subject>
  <saml:Attribute
    xmlns:x500="urn:oasis:names:tc:SAML:2.0:profiles:attribute:X500"
    x500:Encoding="LDAP"
    NameFormat="urn:oasis:names:tc:SAML:2.0:attrname-format:uri"
    Name="urn:oid:1.3.6.1.4.1.5923.1.1.1.6"
    FriendlyName="eduPersonPrincipalName">
  </saml:Attribute>
  <saml:Attribute
    xmlns:x500="urn:oasis:names:tc:SAML:2.0:profiles:attribute:X500"
    x500:Encoding="LDAP"
    NameFormat="urn:oasis:names:tc:SAML:2.0:attrname-format:uri"
    Name="urn:oid:1.3.6.1.4.1.5923.1.1.1.1"
    FriendlyName="eduPersonAffiliation">
  </saml:Attribute>
</samlp:AttributeQuery>
```

After processing the request, the identity provider issues the following response:

```
<samlp:Response
  xmlns:saml="urn:oasis:names:tc:SAML:2.0:assertion"
  xmlns:samlp="urn:oasis:names:tc:SAML:2.0:protocol"
  InResponseTo="aaf23196-1773-2113-474a-fe114412ab72"
  ID="b07b804c-7c29-ea16-7300-4f3d6f7928ac"
  Version="2.0"
  IssueInstant="2006-07-17T22:26:41Z">
  <saml:Issuer>https://idp.example.org/saml</saml:Issuer>
  <samlp:Status>
    <samlp:StatusCode
      Value="urn:oasis:names:tc:SAML:2.0:status:Success"/>
  </samlp:Status>
  <saml:Assertion
    xmlns:saml="urn:oasis:names:tc:SAML:2.0:assertion"
    xmlns:xs="http://www.w3.org/2001/XMLSchema"
    xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
    xmlns:ds="http://www.w3.org/2000/09/xmldsig#"
    ID="a144e8f3-adad-594a-9649-924517abe933">
```

```

516 Version="2.0"
517 IssueInstant="2006-07-17T22:26:41Z">
518 <saml:Issuer>https://idp.example.org/saml</saml:Issuer>
519 <saml:Subject>
520   <saml:NameID
521     Format="urn:oasis:names:tc:SAML:1.1:nameid-
522 format:X509SubjectName">
523     CN=trscavo@uiuc.edu,OU=User,O=NCSA-TEST,C=US
524   </saml:NameID>
525 </saml:Subject>
526 <saml:Conditions
527   NotBefore="2006-07-17T22:21:41Z"
528   NotOnOrAfter="2006-07-17T22:51:41Z">
529   <saml:AudienceRestriction>
530     <saml:Audience>https://sp.example.org/saml</saml:Audience>
531   </saml:AudienceRestriction>
532 </saml:Conditions>
533 <saml:AttributeStatement>
534   <saml:Attribute
535     xmlns:x500="urn:oasis:names:tc:SAML:2.0:profiles:attribute:X500"
536     x500:Encoding="LDAP"
537     NameFormat="urn:oasis:names:tc:SAML:2.0:attrname-format:uri"
538     Name="urn:oid:1.3.6.1.4.1.5923.1.1.1.6"
539     FriendlyName="eduPersonPrincipalName">
540     <saml:AttributeValue xsi:type="xs:string">
541       trscavo@uiuc.edu
542     </saml:AttributeValue>
543   </saml:Attribute>
544   <saml:Attribute
545     xmlns:x500="urn:oasis:names:tc:SAML:2.0:profiles:attribute:X500"
546     x500:Encoding="LDAP"
547     NameFormat="urn:oasis:names:tc:SAML:2.0:attrname-format:uri"
548     Name="urn:oid:1.3.6.1.4.1.5923.1.1.1.1"
549     FriendlyName="eduPersonAffiliation">
550     <saml:AttributeValue xsi:type="xs:string">
551       member
552     </saml:AttributeValue>
553     <saml:AttributeValue xsi:type="xs:string">
554       staff
555     </saml:AttributeValue>
556   </saml:Attribute>
557 </saml:AttributeStatement>
558 </saml:Assertion>
559 </samlp:Response>

```

The attributes in the above example (eduPersonAffiliation and eduPersonPrincipalName) conform to the MACE-Dir Attribute Profile for SAML 2.0 [MACEAttrib] and are for illustration purposes only.

3.6 Use of Encryption

If the service provider encrypts the <saml:NameID> element in the query, the identity provider SHOULD encrypt any resulting assertions. Moreover, if the service provider uses a previously established symmetric key, the identity provider SHOULD use the same symmetric key to encrypt the assertion. In the case where the service provider generates a new symmetric key, the identity provider MUST treat this key as a previously established key, that is, the identity provider SHOULD use the same symmetric key to encrypt the assertion and MUST NOT encrypt this key into the <xenc:EncryptedKey> element.

An encryption algorithm satisfying FIPS 140-2 Security Requirements [FIPS 140-2] SHALL be used for all encryption operations.

3.7 Use of Digital Signatures

If the service provider encrypts the `<saml:NameID>` element in the query, the `<samlp:AttributeQuery>` element MUST be signed *after* the encryption operation takes place. If the identity provider encrypts a `<saml:Assertion>` element in the response, the `<saml:Assertion>` element MUST be signed *before* the encryption operation takes place. Whether or not an assertion is encrypted, the `<saml:Response>` element MAY be signed.

A signing algorithm satisfying FIPS 140-2 Security Requirements [FIPS 140-2] SHALL be used for all digital signature operations on encrypted elements or elements with encrypted content.

3.8 Use of Metadata

The identity provider and the service provider MAY use metadata for locating endpoints, communicating key information, and so forth. The use of SAML V2.0 metadata [SAMLMeta], which is RECOMMENDED, is profiled in sections 3.8.1 and 3.8.2 below.

3.8.1 Identity Provider Metadata

An identity provider that uses SAML V2.0 metadata MUST include an `<md:AttributeAuthorityDescriptor>` element that satisfies the following rules:

- The containing `<md:EntityDescriptor>` element MUST have an `entityID` attribute whose value is the same unique identifier given as the `<saml:Issuer>` element in assertions issued by the identity provider.
- The `<md:AttributeAuthorityDescriptor>` element MUST include an `<md:NameIDFormat>` element with value `"urn:oasis:names:tc:SAML:1.1:nameid-format:X509SubjectName"`.
- One or more `<saml:Attribute>` elements MAY be included in the `<md:AttributeAuthorityDescriptor>` element. Since a service provider may choose not to query the identity provider based on the attributes in this list, this list SHOULD be comprehensive or otherwise omitted.

To distinguish between this deployment profile and other uses of `X509SubjectName`, an identity provider requires the means to explicitly call out its support of this deployment profile. An XML attribute has been specified for this purpose [X509Query-XSD]:

```
<xs:attribute
  name="supportsX509Query" type="boolean" use="optional"/>
```

Use of this attribute is OPTIONAL. An identity provider that chooses to use this attribute, however, MUST do so as follows:

- The `<md:AttributeAuthorityDescriptor>` element MUST include at least one `<md:AttributeService>` element having attribute `supportsX509Query` set to `"true"`.
- At least one `<md:AttributeService>` element having attribute `supportsX509Query` set to `"true"` MUST have its `Binding` attribute set to `"urn:oasis:names:tc:SAML:2.0:bindings:SOAP"`.

An example of identity provider metadata follows:

```
<!-- An Identity Provider supporting this deployment profile -->
<md:EntityDescriptor
  xmlns:md="urn:oasis:names:tc:SAML:2.0:metadata"
  entityID="https://idp.example.org/saml">
  <md:AttributeAuthorityDescriptor
    protocolSupportEnumeration="urn:oasis:names:tc:SAML:2.0:protocol">
```

```

618     <md:AttributeService
619         x509qry:supportsX509Query="true"
620         xmlns:x509qry="urn:oasis:names:tc:SAML:metadata:X509:query"
621         Binding="urn:oasis:names:tc:SAML:2.0:bindings:SOAP"
622         Location="https://idp.example.org:8443/saml-idp/AA"/>
623
624     <md:NameIDFormat>
625         urn:oasis:names:tc:SAML:1.1:nameid-format:X509SubjectName
626     </md:NameIDFormat>
627
628     <!-- see [MACEAttr] -->
629     <md:AttributeProfile>
630         urn:mace:dir:profiles:attribute:samlv2
631     </md:AttributeProfile>
632
633 </md:AttributeAuthorityDescriptor>
634
635 </md:EntityDescriptor>

```

3.8.2 Service Provider Metadata

A service provider that uses SAML V2.0 metadata MUST include an `<md:RoleDescriptor>` element that satisfies the following rules:

- The containing `<md:EntityDescriptor>` element MUST have an `entityID` attribute whose value is the same unique identifier used as the `<saml:Issuer>` element in attribute queries issued by the service provider.
- The type of the `<md:RoleDescriptor>` element MUST be derived from type **query:AttributeQueryDescriptorType** [SAMLMeta-Ext].
- The `<md:RoleDescriptor>` element MUST include an `<md:NameIDFormat>` element with value "urn:oasis:names:tc:SAML:1.1:nameid-format:X509SubjectName".
- One or more `<md:RequestedAttribute>` elements MAY be included in the `<md:AttributeConsumingService>` element.

An example of service provider metadata follows:

```

649 <!-- A Service Provider supporting this profile -->
650 <md:EntityDescriptor
651     xmlns:md="urn:oasis:names:tc:SAML:2.0:metadata"
652     entityID="https://sp.example.org/saml">
653
654     <md:RoleDescriptor
655         xmlns:query="urn:oasis:names:tc:SAML:metadata:ext:query"
656         xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
657         xsi:type="query:AttributeQueryDescriptorType"
658         protocolSupportEnumeration="urn:oasis:names:tc:SAML:2.0:protocol">
659
660         <md:NameIDFormat>
661             urn:oasis:names:tc:SAML:1.1:nameid-format:X509SubjectName
662         </md:NameIDFormat>
663
664         <md:AttributeConsumingService isDefault="true" index="0">
665             <md:ServiceName xml:lang="en">
666                 Grid Service Provider
667             </md:ServiceName>
668             <md:RequestedAttribute
669                 NameFormat="urn:oasis:names:tc:SAML:2.0:attrname-format:uri"
670                 Name="urn:oid:1.3.6.1.4.1.5923.1.1.1.6"
671                 FriendlyName="eduPersonPrincipalName">
672             </md:RequestedAttribute>
673             <md:RequestedAttribute
674                 NameFormat="urn:oasis:names:tc:SAML:2.0:attrname-format:uri"
675                 Name="urn:oid:1.3.6.1.4.1.5923.1.1.1.1"

```

```

        FriendlyName="eduPersonAffiliation">
      </md:RequestedAttribute>
    </md:AttributeConsumingService>

  </md:RoleDescriptor>

</md:EntityDescriptor>

```

The attributes in the above example (`eduPersonAffiliation` and `eduPersonPrincipalName`) conform to the MACE-Dir Attribute Profile for SAML 2.0 [MACEAttrib] and are for illustration purposes only.

3.9 Security and Privacy Considerations

The motivation for this deployment profile is to specify a secure means of obtaining SAML attributes in conjunction with X.509 authentication.

3.9.1 Background

The SAML Security and Privacy specification [SAMLSecure] provides general background material relevant to all SAML bindings and profiles. Section 6.1 of [SAMLSecure], in particular, considers the security requirements of the SAML SOAP Binding, and is therefore pertinent to this deployment profile. In addition, section 3.1.2 of the SAML Bindings specification [SAMLBind] provides further security guidelines regarding SAML bindings.

3.9.2 General Security Requirements

SAML profiles often involve a system entity that relies on an earlier act of user authentication. For example, the SAML Web Browser SSO Profile [SAMLProf] relies on an authentication service that validates a credential (typically a username/password) for a user. The authentication service must be securely linked to an identity provider that issues SAML authentication assertions based on that user's act of authentication. Similarly, this deployment profile assumes that the system entity that performs the X.509 authentication is operating in a secure environment that includes the attribute requester.

In this deployment profile, an end user presents an X.509 identity certificate to authenticate at the service provider. The system entity that performs this authentication (i.e., validates the certificate and its trust chain) must be securely linked to the SAML attribute requester that subsequently initiates this deployment profile. The latter must have a secure means of obtaining the X.509 subject name (and other information) from the certificate and issuing a SAML V2.0 `<samlp:AttributeQuery>` for that subject to the appropriate asserting party. The mechanism by which these system entities are linked is out of scope for this deployment profile.

Local policy settings at the attribute authority will determine whether or not the asserting party is permitted to return attributes for the requested subject.

3.9.3 User Privacy

Since a DN persists for the life of the certificate, a service provider may query for attributes at any time. To prevent service providers from querying for attributes after the certificate has expired, an identity provider SHOULD check the lifetime of the referenced certificate before issuing an assertion regarding an X.509 Subject. If the certificate has expired, an error should be returned.

As a further privacy measure, the principal may use a short-lived X.509 identity certificate. For example, an X.509 proxy certificate [RFC3820] may be used.

3.10 Implementation Guidelines (non-normative)

The following non-normative guidelines are provided for the convenience of implementers.

3.10.1 Discovery

The service provider must determine the principal's preferred identity provider. This is called *identity provider discovery*.

Some possible approaches to identity provider discovery in the context of this deployment profile are discussed briefly below:

- The identity provider's unique identifier may be preconfigured at the service provider. This is useful, for instance, if there is only one identity provider per deployment.
- The subject DN of the principal's X.509 identity certificate may include a reference to the identity provider. New deployments are discouraged from decorating long-lived DNs in this manner, however, since this practice may lessen interoperability with existing PKIs. For short-lived X.509 identity certificates, this practice may be satisfactory.
- The issuer DN or the issuer alternative name may provide clues about the principal's preferred identity provider. This technique may not be practical, however, since SAML authorities do not typically issue X.509 credentials.
- A reference to the identity provider may be inserted into a non-critical X.509 extension [RFC3280] at the time the credential is issued. For long-term credentials, this practice may not be feasible, but for short-term credentials, this technique may be satisfactory.

This deployment profile does not specify a particular method of identity provider discovery.

3.10.2 Name Mapping

An identity provider that consumes a `<saml:Subject>` element produced according to this deployment profile must be able to map the referenced X.509 Subject to one and only one principal in its security domain. If the identity provider issued the X.509 credential in the first place, or otherwise has access to the principal's X.509 identity certificate, this should be straightforward. Otherwise a persistent certificate registration process to facilitate the mapping of X.509 Subjects to principals may be used.

3.10.3 Canonicalization

According to this deployment profile, the format of the DNs used to construct the `<saml:Subject>` element is dictated by [SAMLCore]. Since the latter allows some flexibility in the precise format of a DN (by virtue of its dependence on [RFC2253]), it may be necessary for an identity provider to canonicalize the DN during the course of mapping it to a local principal name. Note that the details of the canonicalization process are of concern only to the identity provider. As long as the service provider provides a DN whose canonicalization is recognized by the identity provider, the correct mapping will occur.

3.10.4 Identity Provider Policy

Service providers may explicitly enumerate the required attributes in queries or may issue so-called "empty queries" that essentially request all available attributes. Regardless of the attribute requirements called out in the query (or in metadata, if used for this purpose), it is the identity provider that determines the actual attributes returned to the service provider. Thus a responsible identity provider will initiate and enforce policy that strictly limits the attributes released to service providers.

758 **3.10.5 Caching of Attributes**

759 A service provider will most likely provide a capability to cache user attributes returned in assertions. If so,
760 cache expiration settings should be configurable by administrators.

4 SAML Attribute Self-Query Deployment Profile for X.509 Subjects

The *SAML Attribute Self-Query Deployment Profile for X.509 Subjects* specifies how a principal who has been issued an X.509 identity certificate self-queries an identity provider for attributes. The profile extends the SAML Attribute Query Deployment Profile for X.509 Subjects specified in section 3 of this document. Where the two profiles conflict, this deployment profile takes precedence.

4.1 Profile Overview (non-normative)

In this scenario, a principal self-queries an identity provider for attributes. The principal uses the Subject Distinguished Name (DN) field (and perhaps other information) from its X.509 identity certificate to formulate the query. Principal authentication is accomplished by presenting a trusted X.509 identity certificate (the same certificate used to construct the query) and by demonstrating proof of possession of the associated private key. After the principal has been authenticated, the identity provider binds the principal's public key to an assertion, which is issued directly to the principal.

The principal subsequently requests a secured resource at the service provider. The principal presents the previously obtained assertion to the service provider and demonstrates proof of possession of the corresponding private key. Using the attributes in the assertion, the service provider is able to make an informed access control decision.

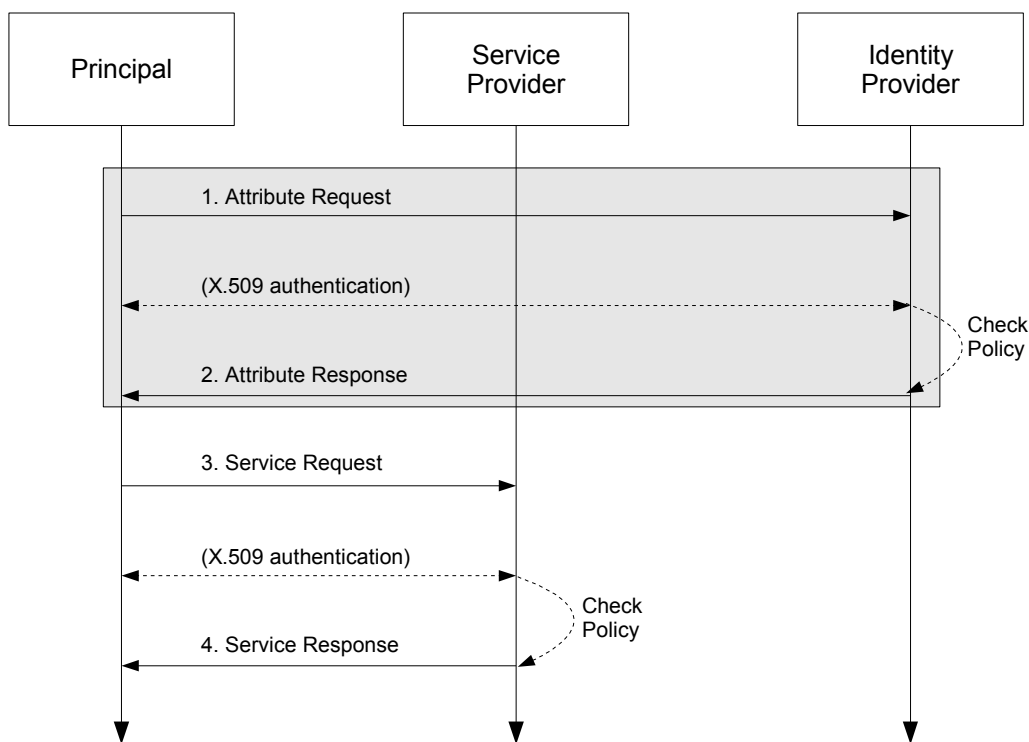
This use case is based on the following assumptions:

- A principal possesses an X.509 credential.
- The principal wields a client that can both query an identity provider for attributes and request a service from a service provider.
- The client can access the principal's X.509 credential.
- The principal has an account with a SAML identity provider.
- The client knows the principal's preferred identity provider and the attribute requirements of the target service provider.
- The identity provider is able to map an X.509 SAML Subject (as defined in section 2 of this document) to one and only one principal in its security domain. In particular, the identity provider is able to map the X.509 SAML Subject that represents this principal.

Note that in the case of a self-query, the client possesses significantly more functionality than the client alluded to in section 3.1.

The sequence of steps for the full use case is shown below.

Note: The steps constrained by this profile are highlighted with a gray box. The other steps are shown only for completeness; the profile does not constrain them.



1. Attribute Request

In step 1, the principal sends a SAML V2.0 `<samlp:AttributeQuery>` message to the identity provider using a SAML SOAP Binding. The Subject DN from the principal's X.509 identity certificate is used to construct the `<saml:Subject>` element of the query. The identity provider requires that the principal be authenticated. The principal authenticates to the identity provider using the same X.509 credential used to construct the query.

2. Attribute Response

In step 2, after verifying that the principal is a valid requester, the identity provider issues a `<samlp:Response>` message containing appropriate attributes. The attributes returned to the principal are subject to policy at the identity provider.

3. Service Request

In step 3, the principal requests a secured resource at the service provider. The principal presents the assertion obtained at step 2 to the service provider. The service provider requires that the principal be authenticated. The principal authenticates to the service provider using the same X.509 credential used to authenticate to the identity provider at step 1.

4. Service Response

In step 4, based on the attributes in the pushed assertion, the service provider returns the requested resource or an error, subject to policy.

Of the sequence of steps described above, it is steps 1 and 2 that are profiled in sections 4.3 and 4.4 of this deployment profile.

4.2 Required Information

Identification:

`urn:oasis:names:tc:SAML:2.0:profiles:query:attribute:X509-self`

Contact information: security-services-comment@lists.oasis-open.org

819 **Description:** Given below.

820 **Updates:** N/A

821 **Extends:** SAML Attribute Query Deployment Profile for X.509 Subjects (section 3)

822 **4.3 Profile Description**

823 This deployment profile extends the SAML Attribute Query Deployment Profile for X.509 Subjects
824 described in section 3.3.

825 As outlined in section 4.1, a principal sends a SAML V2.0 `<samlp:AttributeQuery>` message directly
826 to an identity provider. The principal authenticates to the identity provider using an X.509 identity
827 certificate. If the identity provider receiving the request can:

- 828 • recognize the name identifier; and
- 829 • determine that the requester is the principal; and
- 830 • fulfill the request subject to any applicable policies;

831 the identity provider responds with a successful `<samlp:Response>` containing the relevant attributes for
832 the principal. To determine that the requester is the principal, the identity provider MUST authenticate the
833 principal.

834 **4.3.1 `<samlp:AttributeQuery>` Issued by Principal**

835 To initiate the profile, the principal uses a synchronous binding such as the SAML SOAP Binding
836 [SAMLBind] to send a SAML V2.0 `<samlp:AttributeQuery>` message as described in section 3.3.
837 The principal uses information obtained from its X.509 identity certificate to construct the query. The
838 principal MUST authenticate itself to the identity provider using the same X.509 credential used to
839 construct the query. SSL 3.0 [SSL3] or TLS 1.0 [RFC2246] with client authentication MAY be used for this
840 purpose and to provide integrity protection and confidentiality.

841 **4.3.2 `<samlp:Response>` Issued by Identity Provider**

842 The identity provider MUST process the request as outlined in section 3.3.

843 **4.4 Use of SAML Request-Response Protocol**

844 As required by the Assertion Query/Request Profile [SAMLProf], the `<samlp:AttributeQuery>`
845 element MUST contain a `<saml:Issuer>` element. Since the requester is the principal, the
846 `<saml:Issuer>` element MUST be identical to the `<saml:NameID>` element, that is, both MUST satisfy
847 the rules of the X.509 SAML Subject Profile (section 2).

848 **4.4.1 `<samlp:AttributeQuery>` Usage**

849 The request MUST contain a `<samlp:AttributeQuery>` element that conforms to the rules of
850 section 3.4.1.

851 **4.4.2 `<samlp:Response>` Usage**

852 If the request is successful, the `<samlp:Response>` element MUST conform to the rules of section 3.4.2
853 except as noted below:

- 854 • The `<saml:Subject>` element MUST contain a `<saml:SubjectConfirmation>` element

whose Method attribute has value "urn:oasis:names:tc:SAML:2.0:cm:holder-of-key".

- A <saml:SubjectConfirmationData> element MUST be present and it MUST contain a <ds:KeyInfo> element that refers to the principal's X.509 identity certificate.
- On the <saml:Conditions> element, the value of the NotBefore attribute (resp., the NotOnOrAfter attribute) MUST be greater than or equal to (resp., less than or equal to) the NotBefore field (resp., the NotOnOrAfter field) of the certificate.
- The <saml:Assertion> element MUST be signed.
- The <saml:Assertion> element MAY include a <saml:AuthnStatement> element.

4.4.3 Processing Rules

In addition to the assertion processing rules outlined in [SAMLCore], the service provider MUST verify the following:

- The <saml:SubjectConfirmationData> element MUST be present and it MUST contain a <ds:KeyInfo> element that refers to the principal's X.509 identity certificate.
- The value of the NotBefore attribute (resp., the NotOnOrAfter attribute) MUST be greater than or equal to (resp., less than or equal to) the NotBefore field (resp., the NotOnOrAfter field) of the certificate.

The certificate referred to in the above processing rules MUST be the same certificate used to construct the <saml:Subject> of the query.

4.5 Example

For example, the principal issues the following attribute query:

```
<samlp:AttributeQuery
  xmlns:saml="urn:oasis:names:tc:SAML:2.0:assertion"
  xmlns:samlp="urn:oasis:names:tc:SAML:2.0:protocol"
  ID="aaf23196-1773-2113-474a-fe114412ab72"
  Version="2.0"
  IssueInstant="2006-07-17T20:31:40Z">
  <saml:Issuer
    Format="urn:oasis:names:tc:SAML:1.1:nameid-format:X509SubjectName">
    CN=trscavo@uiuc.edu,OU=User,O=NCSA-TEST,C=US
  </saml:Issuer>
  <saml:Subject>
    <saml:NameID
      Format="urn:oasis:names:tc:SAML:1.1:nameid-format:X509SubjectName">
      CN=trscavo@uiuc.edu,OU=User,O=NCSA-TEST,C=US
    </saml:NameID>
  </saml:Subject>
  <saml:Attribute
    NameFormat="urn:oasis:names:tc:SAML:2.0:attrname-format:uri"
    Name="urn:oid:1.3.6.1.4.1.5923.1.1.1.6"
    FriendlyName="eduPersonPrincipalName">
  </saml:Attribute>
  <saml:Attribute
    NameFormat="urn:oasis:names:tc:SAML:2.0:attrname-format:uri"
    Name="urn:oid:2.5.4.42"
    FriendlyName="givenName">
  </saml:Attribute>
  <saml:Attribute
    NameFormat="urn:oasis:names:tc:SAML:2.0:attrname-format:uri"
    Name="urn:oid:2.5.4.4"
    FriendlyName="sn">
  </saml:Attribute>
  <saml:Attribute
```



```

972 <saml:AttributeStatement>
973   <saml:Attribute
974     xmlns:x500="urn:oasis:names:tc:SAML:2.0:profiles:attribute:X500"
975     x500:Encoding="LDAP"
976     NameFormat="urn:oasis:names:tc:SAML:2.0:attrname-format:uri"
977     Name="urn:oid:1.3.6.1.4.1.5923.1.1.1.6"
978     FriendlyName="eduPersonPrincipalName">
979     <saml:AttributeValue xsi:type="xs:string">
980       trscavo@uiuc.edu
981     </saml:AttributeValue>
982   </saml:Attribute>
983   <saml:Attribute
984     xmlns:x500="urn:oasis:names:tc:SAML:2.0:profiles:attribute:X500"
985     x500:Encoding="LDAP"
986     NameFormat="urn:oasis:names:tc:SAML:2.0:attrname-format:uri"
987     Name="urn:oid:2.5.4.42"
988     FriendlyName="givenName">
989     <saml:AttributeValue xsi:type="xs:string">
990       Tom
991     </saml:AttributeValue>
992   </saml:Attribute>
993   <saml:Attribute
994     xmlns:x500="urn:oasis:names:tc:SAML:2.0:profiles:attribute:X500"
995     x500:Encoding="LDAP"
996     NameFormat="urn:oasis:names:tc:SAML:2.0:attrname-format:uri"
997     Name="urn:oid:2.5.4.4"
998     FriendlyName="sn">
999     <saml:AttributeValue xsi:type="xs:string">
1000       Scavo
1001     </saml:AttributeValue>
1002   </saml:Attribute>
1003   <saml:Attribute
1004     xmlns:x500="urn:oasis:names:tc:SAML:2.0:profiles:attribute:X500"
1005     x500:Encoding="LDAP"
1006     NameFormat="urn:oasis:names:tc:SAML:2.0:attrname-format:uri"
1007     Name="urn:oid:1.3.6.1.4.1.1466.115.121.1.26"
1008     FriendlyName="mail">
1009     <saml:AttributeValue xsi:type="xs:string">
1010       trscavo@gmail.com
1011     </saml:AttributeValue>
1012   </saml:Attribute>
1013 </saml:AttributeStatement>
1014 </saml:Assertion>

```

1015 The attributes in the above example (eduPersonPrincipalName, givenName, sn, and mail) conform
 1016 to the MACE-Dir Attribute Profile for SAML 2.0 [MACEAttrib] and are for illustration purposes only.

1017 4.6 Use of Metadata

1018 As outlined in section 3.8, the use of SAML V2.0 metadata [SAMLMeta] is RECOMMENDED, but since a
 1019 principal is not expected to publish metadata about itself, only the use of identity provider metadata is
 1020 profiled below. Note, however, that the principal may wield a client that relies on service provider metadata
 1021 (see, e.g., section 4.8.1), in which case the rules in section 3.8.2 apply as well.

1022 4.6.1 Identity Provider Metadata

1023 An identity provider that uses SAML V2.0 metadata MUST include an
 1024 <md:AttributeAuthorityDescriptor> element that satisfies the rules given in section 3.8.1, except
 1025 that in this case the identity provider uses XML attribute supportsX509SelfQuery instead of
 1026 supportsX509Query [X509Query-XSD]:

```

1027 <xsi:attribute

```

```
name="supportsX509SelfQuery" type="boolean" use="optional"/>
```

As before, use of this attribute is OPTIONAL.

An example of identity provider metadata follows:

```
<!-- An Identity Provider supporting both deployment profiles -->
<md:EntityDescriptor
  xmlns:md="urn:oasis:names:tc:SAML:2.0:metadata"
  entityID="https://idp.example.org/saml">

  <md:AttributeAuthorityDescriptor
    protocolSupportEnumeration="urn:oasis:names:tc:SAML:2.0:protocol">

    <md:AttributeService
      x509qry:supportsX509Query="true"
      x509qry:supportsX509SelfQuery="true"
      xmlns:x509qry="urn:oasis:names:tc:SAML:metadata:X509:query"
      Binding="urn:oasis:names:tc:SAML:2.0:bindings:SOAP"
      Location="https://idp.example.org:8443/saml-idp/AA"/>

    <md:NameIDFormat>
      urn:oasis:names:tc:SAML:1.1:nameid-format:X509SubjectName
    </md:NameIDFormat>

    <!-- see [MACEAttr] -->
    <md:AttributeProfile>
      urn:mace:dir:profiles:attribute:samlv2
    </md:AttributeProfile>
  </md:AttributeAuthorityDescriptor>
</md:EntityDescriptor>
```

Note that this identity provider supports both X.509 attribute query deployment profiles at the same endpoint location.

4.7 Security and Privacy Considerations

Except for section 3.9.2, the security and privacy considerations outlined in section 3.9 apply equally as well in the case of self-query. As a further privacy measure, a principal may limit the self-query to non-identity attributes (such as givenName) and push the resulting assertion to the service provider who subsequently queries the identity provider for additional attributes (according to the deployment profile in section 3). In this way, a service provider receives only those attributes that are actually required for access.

4.8 Implementation Guidelines (non-normative)

In addition to the guidelines outlined in section 3.10, the following non-normative guidelines are provided for the convenience of implementers.

4.8.1 Discovery

In the SAML Attribute Query Deployment Profile for X.509 Subjects (section 3), we encounter the problem of identity provider discovery (section 3.10.1). In the case where the principal self-queries for attributes, we encounter a different problem, which we call *service provider discovery*. In both cases, we assume the client knows the principal's preferred identity provider, so identity provider discovery is a non-issue in the case of self-queries, but in that case the client is faced with a self-query for unknown attributes.

If the client had access to the published metadata of potential service providers, and that metadata included the attribute requirements of the service providers, the client would be able to formulate specific attribute queries targeted for specific service providers.

1079 This deployment profile does not specify a particular method of service provider discovery.

5 Implementation Conformance

1080

1081 A client implementation of this specification shall be a conforming *Extended Mode X.509 Attribute Query*
1082 *Requester* or a conforming *Extended Mode X.509 Attribute Self-Query Requester* (or both). On the server
1083 side, an implementation of this specification shall be a conforming *Extended Mode X.509 Attribute Query*
1084 *Responder* or a conforming *Extended Mode X.509 Attribute Self-Query Responder*, respectively.

1085 An Extended Mode X.509 Attribute Query Requester or Responder MUST conform to the relevant
1086 normative statements in section 3. An Extended Mode X.509 Attribute Self-Query Requester or
1087 Responder MUST conform to the relevant normative statements in section 4, which includes references to
1088 normative portions of section 3.

6 Acknowledgments

The editors would like to acknowledge the contributions of the OASIS Security Services Technical Committee, whose voting members at the time of publication were:

- Hal Lockhart, BEA Systems, Inc.
- Rob Philpott, EMC Corporation
- Eric Tiffany, Liberty Alliance Project
- Scott Cantor, Internet2
- Bob Morgan, Internet2
- Tom Scavo, National Center for Supercomputing Applications (NCSA)
- Peter Davis, Neustar, Inc.
- Jeff Hodges, Neustar, Inc.
- Frederick Hirsch, Nokia Corporation
- Abbie Barbir, Nortel Networks Limited
- Paul Madsen, NTT Corporation
- Ari Kermaier, Oracle Corporation
- Prateek Mishra, Oracle Corporation
- Brian Campbell, Ping Identity Corporation
- Anil Saldhana, Red Hat
- Eve Maler, Sun Microsystems
- Emily Xu, Sun Microsystems
- Kent Spaulding, Tripod Technology Group, Inc.
- David Staggs, Veterans Health Administration

The editors would also like to acknowledge the contributions of the following individuals:

- Von Welch, National Center for Supercomputing Applications (NCSA)

7 Revision History

<i>Document ID</i>	<i>Date</i>	<i>Committer</i>	<i>Comment</i>
sstc-saml2-profiles-deploy-x509-draft-01	18 Dec 2006	T. Scavo	Initial draft.
sstc-saml2-profiles-deploy-x509-draft-02	26 Mar 2007	T. Scavo	
sstc-saml2-profiles-deploy-x509-cd-01	07 May 2007	T. Scavo	Committee Draft
sstc-saml2-profiles-deploy-x509-cd-02	28 Aug 2007	T. Scavo	Committee Draft
sstc-saml2-profiles-deploy-x509-draft-03	26 Feb 2008	T. Scavo	
sstc-saml2-profiles-deploy-x509-cd-03	11 Mar 2008	T. Scavo	Committee Draft