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Abstract:

This document is intended for developers and architects who wish to design identity systems and applications that interoperate using the Identity Metasystem Interoperability specification.

An Identity Selector and the associated identity system components allow users to manage their Digital Identities from different Identity Providers, and employ them in various contexts to access online services. In this specification, identities are represented to users as “Information Cards”. Information Cards can be used both at applications hosted on Web sites accessed through Web browsers and rich client applications directly employing Web services.

This specification also provides a related mechanism to describe security-verifiable identity for endpoints by leveraging extensibility of the WS-Addressing specification. This is achieved via XML [XML 1.0] elements for identity provided as part of WS-Addressing Endpoint References. This mechanism enables messaging systems to support multiple trust models across networks that include processing nodes such as endpoint managers, firewalls, and gateways in a transport-neutral manner.

Status:

This document was last revised or approved by the Identity Metasystem Interoperability TC on the above date. The level of approval is also listed above. Check the “Latest Version” or “Latest Approved Version” location noted above for possible later revisions of this document.

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1 Introduction

The Identity Metasystem Interoperability specification prescribes a subset of the mechanisms defined in [WS-Trust 1.2], [WS-Trust 1.3], [WS-SecurityPolicy 1.1], [WS-SecurityPolicy 1.2], and [WS-MetadataExchange] to facilitate the integration of Digital Identity into an interoperable token issuance and consumption framework using the Information Card Model. It documents the Web interfaces utilized by browsers and Web applications that utilize the Information Card Model. Finally, it extends WS-Addressing's endpoint reference by providing identity information about the endpoint that can be verified through a variety of security means, such as https or the wealth of WS-Security specifications.

This profile constrains the schema elements/extensions used by the Information Card Model, and behaviors for conforming Relying Parties, Identity Providers, and Identity Selectors.

1.1 Notational Conventions

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in [RFC 2119].

This specification uses the following syntax to define outlines for assertions:

- The syntax appears as an XML instance, but values in italics indicate data types instead of literal values.
- Characters are appended to elements and attributes to indicate cardinality:
 - "?" (0 or 1)
 - "*" (0 or more)
 - "+" (1 or more)
- The character "|" is used to indicate a choice between alternatives.
- The characters "(" and ")" are used to indicate that contained items are to be treated as a group with respect to cardinality or choice.
- The characters "[" and "]" are used to call out references and property names.
- Ellipses (i.e., "...") indicate points of extensibility. Additional children and/or attributes MAY be added at the indicated extension points but MUST NOT contradict the semantics of the parent and/or owner, respectively. By default, if a receiver does not recognize an extension, the receiver SHOULD ignore the extension; exceptions to this processing rule, if any, are clearly indicated below.
- XML namespace prefixes (see Table 2) are used to indicate the namespace of the element being defined.

Elements and Attributes defined by this specification are referred to in the text of this document using XPath 1.0 expressions. Extensibility points are referred to using an extended version of this syntax:

- An element extensibility point is referred to using {any} in place of the element name. This indicates that any element name can be used, from any namespace other than the namespace of this specification.
- An attribute extensibility point is referred to using @{any} in place of the attribute name. This indicates that any attribute name can be used, from any namespace other than the namespace of this specification.

Extensibility points in the exemplar might not be described in the corresponding text.

1.2 Namespaces

Table 1 lists the XML namespaces that are used in this document.

Prefix	XML Namespace	Specification(s)
ds	http://www.w3.org/2000/09/xmldsig#	XML Digital Signatures
ic	http://schemas.xmlsoap.org/ws/2005/05/identity	This document
ic07	http://schemas.xmlsoap.org/ws/2007/01/identity	Namespace for additional elements also defined by this document
ic08	http://docs.oasis-open.org/imi/ns/identity-200810	Namespace for new elements defined by this document
S	<i>May refer to either http://schemas.xmlsoap.org/soap/envelope or http://www.w3.org/2003/05/soap-envelope since both may be used</i>	SOAP
S11	http://schemas.xmlsoap.org/soap/envelope	SOAP 1.1 [SOAP 1.1]
S12	http://www.w3.org/2003/05/soap-envelope	SOAP 1.2 [SOAP 1.2]
saml	urn:oasis:names:tc:SAML:1.0:assertion	SAML 1.0
sp	<i>May refer to either http://schemas.xmlsoap.org/ws/2005/07/securitypolicy or http://docs.oasis-open.org/ws-sx/ws-securitypolicy/200702 since both may be used</i>	WS-SecurityPolicy
sp11	http://schemas.xmlsoap.org/ws/2005/07/securitypolicy	WS-SecurityPolicy 1.1 [WS-SecurityPolicy 1.1]
sp12	http://docs.oasis-open.org/ws-sx/ws-securitypolicy/200702	WS-SecurityPolicy 1.2 [WS-SecurityPolicy 1.2]
wsa	http://www.w3.org/2005/08/addressing	WS-Addressing [WS-Addressing]
wsai	http://schemas.xmlsoap.org/ws/2006/02/addressingidentity	Addressing Identity extension for WS-Addressing also defined by this document
wSDL	<i>May refer to either http://schemas.xmlsoap.org/wSDL/ or http://www.w3.org/TR/wSDL20 since both may be used</i>	Web Services Description Language
wSDL11	http://schemas.xmlsoap.org/wSDL/	Web Services Description Language [WSDL 1.1]
wSDL20	http://www.w3.org/TR/wSDL20	Web Services Description Language [WSDL 2.0]
wsp	http://schemas.xmlsoap.org/ws/2004/09/policy	WS-Policy [WS-Policy]
wsse	http://docs.oasis-open.org/wss/2004/01/oasis-200401-wss-wssecurity-secext-1.0.xsd	WS-Security Extensions [WS-Security]

wst	May refer to either http://schemas.xmlsoap.org/ws/2005/02/trust or http://docs.oasis-open.org/ws-sx/ws-trust/200512 since both may be used	WS-Trust
wst12	http://schemas.xmlsoap.org/ws/2005/02/trust	WS-Trust 1.2 [WS-Trust 1.2]
wst13	http://docs.oasis-open.org/ws-sx/ws-trust/200512	WS-Trust 1.3 [WS-Trust 1.3]
wsu	http://docs.oasis-open.org/wss/2004/01/oasis-200401-wss-wssecurity-utility-1.0.xsd	WS-SecurityUtility
wsx	http://schemas.xmlsoap.org/ws/2004/09/mex	WS-MetadataExchange [WS-MetadataExchange]
xs	http://www.w3.org/2001/XMLSchema	XML Schema [Part 1 , 2]

44 Note that the versions identified in the above table supersede versions identified in referenced
45 specifications.

46 1.3 Schema

47 A copy of the XML Schemas for this document can be found at:

```
48 http://docs.oasis-open.org/imi/identity/200810/identity.xsd
49 http://docs.oasis-open.org/imi/identity/200810/addr-identity.xsd
50 http://docs.oasis-open.org/imi/identity/200810/claims.xsd
51 http://docs.oasis-open.org/imi/identity/200810/identity2007.xsd
```

52 1.4 Terminology

53 The following definitions establish the terminology and usage in this document.

54 **Information Card Model** – The “*Information Card Model*” refers to the use of Information Cards
55 containing metadata for obtaining Digital Identity claims from Identity Providers and then conveying them
56 to Relying Parties under user control.

57 **Information Card** – An *Information Card* provides a visual representation of a Digital Identity for the end
58 user. Information Cards contain a reference to an IP/STS that issues Security Tokens containing the
59 Claims for that Digital Identity.

60 **Digital Identity** – A “*Digital Identity*” is a set of Claims made by one party about another party.

61 **Claim** – A “*Claim*” is a piece of information about a Subject that an Identity Provider asserts about that
62 Subject.

63 **Subject** – A “*Subject*” is an individual or entity about whom claims are made by an Identity Provider.

64 **Service Requester** – The term “*Service Requester*” means software acting on behalf of a party who
65 wants to obtain a service through a digital network.

66 **Relying Party** – The term “*Relying Party*” (RP) means a network entity providing the desired service, and
67 relying upon Digital Identity.

68 **Identity Provider** – The term “*Identity Provider*” (IP) means a network entity providing the Digital Identity
69 claims used by a Relying Party.

70 **Security Token Service** – The term “*Security Token Service*” (STS) refers to a WS-Trust endpoint.

71 **Identity Provider Security Token Service** – The term “*Identity Provider Security Token Service*”
72 (IP/STS) refers to the Security Token Service run by an Identity Provider to issue tokens.

73 **Relying Party Security Token Service** – The term “Relying Party Security Token Service” (RP/STS)
74 refers to a Security Token Service run by a Relying Party to accept and issue tokens.

75 **Identity Selector** – The term “*Identity Selector*” (IS) refers to a software component available to the
76 Service Requester through which the user controls and dispatches her Digital Identities.

77 **Trust Identity** – A *trust identity* is a verifiable claim about a principal (e.g. name, identity, key, group,
78 privilege, capability, etc).

79 **Security Token** – A *security token* represents a collection of claims.

80 **Signed Security Token** – A *signed security token* is a security token that is asserted and
81 cryptographically endorsed by a specific authority (e.g. an X.509 certificate, a Kerberos ticket, or a self-
82 issued Information Card).

83 **Unsigned Security Token** – An *unsigned security token* is a security token that is not cryptographically
84 endorsed by a specific authority (e.g. a security token backed by shared secrets such as usernames and
85 passwords).

86 **Proof-of-Possession** – The *proof-of-possession* information is data that is used in a proof process to
87 demonstrate the sender's knowledge of information that should only be known to the claiming sender of a
88 security token.

89 **Integrity** – *Integrity* is the process by which it is guaranteed that information is not modified in transit.

90 **Confidentiality** – *Confidentiality* is the process by which data is protected such that only authorized
91 actors or security token owners can view the data

92 **Digest** – A *digest* is a cryptographic checksum of an octet stream.

93 **Signature** - A *signature* is a cryptographic binding of a proof-of-possession and a digest. This covers
94 both symmetric key-based and public key-based signatures. Consequently, non-repudiation is not always
95 achieved.

96 **Certificate** – Uses of the term *certificate* in this specification refer to X.509 certificates unless otherwise
97 qualified. Usage of certificates is dictated by the underlying protocols, e.g. HTTPS or WS-Security, except
98 where noted.

99 1.5 Normative References

100 [DOM]

101 “Document Object Model (DOM)”, November 2000. <http://www.w3.org/DOM/>

102 [EV Cert]

103 CA / Browser Forum, “Guidelines for the Issuance and Management of Extended Validation
104 Certificates, Version 1.1”, April 2008. http://cabforum.org/EV_Certificate_Guidelines_V11.pdf

105 [HTTP]

106 R. Fielding et al., “IETF RFC 2616: Hypertext Transfer Protocol -- HTTP/1.1”, June 1999.
107 <http://www.ietf.org/rfc/rfc2616.txt>

108 [HTTPS]

109 E. Rescorla, “RFC 2818: HTTP over TLS”, May 2000. <http://www.ietf.org/rfc/rfc2818.txt>

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117 M. Wahl, "RFC 2256: A Summary of the X.500(96) User Schema for use with LDAPv3",
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120 R. Housley, W. Ford, W. Polk, and D. Solo, "RFC 2459: Internet X.509 Public Key Infrastructure -
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124 2000. <http://www.ietf.org/rfc/rfc2898.txt>

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128 **[SOAP 1.1]**
129 W3C Note, "SOAP: Simple Object Access Protocol 1.1," 08 May 2000.
130 <http://www.w3.org/TR/2000/NOTE-SOAP-20000508/>

131 **[SOAP 1.2]**
132 M. Gudgin, et al., "SOAP Version 1.2 Part 1: Messaging Framework", June 2003.
133 <http://www.w3.org/TR/soap12-part1/>

134 **[URI]**
135 T. Berners-Lee, R. Fielding, L. Masinter, "Uniform Resource Identifiers (URI): Generic Syntax,"
136 RFC 2396, MIT/LCS, U.C. Irvine, Xerox Corporation, August 1998.
137 <http://www.ietf.org/rfc/rfc2396.txt>

138 **[WS-Addressing]**
139 W3C Recommendation, "Web Service Addressing (WS-Addressing)", 9 May 2006.
140 <http://www.w3.org/TR/2006/REC-ws-addr-core-20060509/>

141 **[WS-MetadataExchange]**
142 "Web Services Metadata Exchange (WS-MetadataExchange), Version 1.1", August 2006.
143 <http://specs.xmlsoap.org/ws/2004/09/mex/WS-MetadataExchange.pdf>

144 **[WSDL 1.1]**
145 W3C Note, "Web Services Description Language (WSDL 1.1)," 15 March 2001.
146 <http://www.w3.org/TR/wsdl>

147 **[WSDL 2.0]**
148 "Web Services Description Language (WSDL) Version 2.0 Part 1: Core Language", June 2007.
149 <http://www.w3.org/TR/wsdl20>

150 **[WS-Policy]**
151 "Web Services Policy Framework (WS-Policy), Version 1.2", March 2006.
152 <http://specs.xmlsoap.org/ws/2004/09/policy/ws-policy.pdf>

153 **[WS-Security]**
154 A. Nadalin et al., "Web Services Security: SOAP Message Security 1.0", May 2004.
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175 Imamura, T., Dillaway, B., and Simon, E., “XML Encryption Syntax and Processing”, August
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178 H. Thompson et al., “XML Schema Part 1: Structures”, May 2001.
179 <http://www.w3.org/TR/xmlschema-1/>
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181 P. Biron et al., “XML Schema Part 2: Datatypes”, May 2001. <http://www.w3.org/TR/xmlschema-2/>
- 182 *Non-Normative References*
- 183 **[Addressing-Ext]**
184 J. Alexander et al., “Application Note: Web Services Addressing Endpoint References and
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199 [b73e626f6764&DisplayLang=en](http://www.microsoft.com/downloads/details.aspx?FamilyID=b94817fc-3991-4dd0-8e85-b73e626f6764&DisplayLang=en)

200 2 Relying Party Interactions

201 This section defines the constructs used by a Relying Party Web service for specifying and conveying its
202 Security Token requirements to the Service Requester.

203 2.1 Expressing Token Requirements of Relying Party

204 A Relying Party specifies its Security Token requirements as part of its Security Policy using the primitives
205 and assertions defined in WS-SecurityPolicy. The primary construct in the Security Policy of the Relying
206 Party used to specify its requirement for a Security Token from an Identity Provider is the
207 `sp:IssuedToken` policy assertion. The basic form of the issued token policy assertion as defined in WS-
208 SecurityPolicy is as follows.

```
209 <sp:IssuedToken sp:Usage="xs:anyURI" sp:IncludeToken="xs:anyURI"  
210   xmlns:sp="..." xmlns:wsa="..." xmlns:wsp="..." ...>  
211   <sp:Issuer>  
212     wsa:EndpointReference | xs:any  
213   </sp:Issuer>  
214   <sp:RequestSecurityTokenTemplate>  
215     ...  
216   </sp:RequestSecurityTokenTemplate>  
217   <wsp:Policy>  
218     ...  
219   </wsp:Policy>  
220   ...  
221 </sp:IssuedToken>
```

222 The attributes and elements listed in the schema fragment above are described in WS-SecurityPolicy.

223 The ensuing subsections describe special parameters added by this profile as extensions to the
224 `sp:IssuedToken` policy assertion that convey additional instructions to the Identity Selector available to
225 the Service Requester.

226 2.1.1 Issuer of Tokens

227 The `sp:IssuedToken/sp:Issuer` element in an issued token policy specifies the issuer for the
228 requested token. More specifically, it SHOULD contain the endpoint reference of an Identity Provider STS
229 that can issue the requested token.

230 A Relying Party MUST specify the issuer for a requested token in one of the following ways:

- 231 ▪ Indicate a *specific* issuer by specifying the issuer's endpoint as the value of the
232 `sp:Issuer/wsa:Address` element.
- 233 ▪ Indicate that the issuer is *unspecified* by omitting the `sp:Issuer` element, which means that the
234 Service Requester should determine the appropriate issuer for the requested token with help from
235 the user if necessary.

236 When requiring a specific issuer, a Relying Party MAY specify that it will accept self-issued Security
237 Tokens by using the special URI below as the value of the `wsa:Address` element within the endpoint
238 reference for the issuer.

239 **URI:**

```
240 http://schemas.xmlsoap.org/ws/2005/05/identity/issuer/self
```

241 Following is an example of using this URI within an issued token policy.

242 *Example:*

```
243 <sp:IssuedToken xmlns:sp="..." xmlns:wsa="..." ...>  
244   <sp:Issuer>  
245     <wsa:Address>
```

246
247
248
249
250

```
    http://schemas.xmlsoap.org/ws/2005/05/identity/issuer/self
  </wsa:Address>
</sp:Issuer>
...
</sp:IssuedToken>
```

251 A Relying Party MAY specify the value of the `sp:Issuer/wsa:Address` element in policy as a “logical
252 name” of the token issuer instead of an actual network address where the token is issued. An Identity
253 Selector SHOULD resolve the logical name to an appropriate endpoint for the token issuer by matching
254 the issuer name in Information Cards available to it.

255 If a Relying Party specifies the token issuer as a network endpoint in policy, then it MUST also specify the
256 location of issuer metadata from where the issuer’s policy metadata can be obtained. This is done using
257 the mechanism defined in [WS-Addressing] for embedding metadata within an endpoint reference. The
258 following example shows a token policy where the issuer endpoint and its corresponding metadata
259 location are specified.

260 *Example:*

261
262
263
264
265
266
267
268
269
270
271
272
273
274
275
276

```
<sp:IssuedToken xmlns:sp="..." xmlns:wsa="..." xmlns:wsx="..." ...>
  <sp:Issuer>
    <wsa:Address>http://contoso.com/sts</wsa:Address>
    <wsa:Metadata>
      <wsx:Metadata>
        <wsx:MetadataSection
          Dialect="http://schemas.xmlsoap.org/ws/2004/09/mex">
          <wsx:MetadataReference>
            <wsa:Address>https://contoso.com/sts/mex</wsa:Address>
          </wsx:MetadataReference>
        </wsx:MetadataSection>
      </wsx:Metadata>
    </wsa:Metadata>
  </sp:Issuer>
  ...
</sp:IssuedToken>
```

277 2.1.2 Type of Proof Key in Issued Tokens

278 If no explicit key type is specified by the Relying Party, then an Identity Selector SHOULD request an
279 asymmetric key token from the Identity Provider to maximize user privacy and security.

280 A Relying Party MAY explicitly request the use of an *asymmetric* or *symmetric* key in the requested token
281 by using the `wst:KeyType` element within its issued token policy assertion. The key type URIs are
282 defined in [WS-Trust]. The following example illustrates the use of this element in the Relying Party’s
283 Security Policy to request a symmetric key in the issued token.

284 *Example:*

285
286
287
288
289
290
291

```
<sp:IssuedToken xmlns:sp="..." xmlns:wst="...">
  <sp:RequestSecurityTokenTemplate>
    <wst:KeyType>
      http://schemas.xmlsoap.org/ws/2005/02/trust/SymmetricKey
    </wst:KeyType>
  </sp:RequestSecurityTokenTemplate>
</sp:IssuedToken>
```

292 2.1.3 Claims in Issued Tokens

293 The claims requirement of a Relying Party can be expressed in its token policy by using the optional
294 `wst:Claims` parameter defined in [WS-Trust 1.2] and [WS-Trust 1.3]. However, the `wst:Claims`
295 parameter has an open content model. This profile defines the `ic:ClaimType` element for use as a child
296 of the `wst:Claims` element. A Relying Party MAY use this element to specify an individual claim type

297 requested. Further, each requested claim MAY be specified as being *required* or *optional*. Multiple
298 `ic:ClaimType` elements can be included to specify multiple claim types requested.

299 The outline for the `ic:ClaimType` element is as follows:

300 **Syntax:**

```
301 <ic:ClaimType Uri="xs:anyURI" Optional="xs:boolean"? xmlns:ic="..." /> *
```

302 The following describes the attributes and elements listed in the schema outlined above:

303 `/ic:ClaimType`

304 Indicates the requested claim type.

305 `/ic:ClaimType/@Uri`

306 The unique identifier of the requested claim type.

307 `/ic:ClaimType/@Optional`

308 Indicates if the claim can be absent in the Security Token. By default, any requested claim type is
309 a required claim and MUST be present in the issued Security Token.

310 Two `<ic:ClaimType>` elements refer to the same claim type if and only if the values of their XML
311 attribute named `Uri` are equal in a case-sensitive string comparison.

312 When the `ic:ClaimType` element is used within the `wst:Claims` parameter in a token policy to specify
313 claims requirement, the `wst:Dialect` attribute on the `wst:Claims` element MUST be qualified with the
314 URI value below.

315 **Dialect URI:**

```
316 http://schemas.xmlsoap.org/ws/2005/05/identity
```

317 The above dialect URI value indicates that the specified claim elements are to be processed according to
318 this profile.

319 Following is an example of using this assertion within an issued token policy to require two claim types
320 where one claim type is optional.

321 *Example:*

```
322 <sp:IssuedToken xmlns:sp="..." xmlns:wst="..." xmlns:ic="..." ...>  
323   ...  
324   <sp:RequestSecurityTokenTemplate>  
325     ...  
326     <wst:Claims  
327       Dialect="http://schemas.xmlsoap.org/ws/2005/05/identity">  
328       <ic:ClaimType  
329         Uri="http://.../ws/2005/05/identity/claims/givenname"/>  
330       <ic:ClaimType  
331         Uri="http://.../ws/2005/05/identity/claims/surname"  
332         Optional="true" />  
333     </wst:Claims>  
334   </sp:RequestSecurityTokenTemplate>  
335   ...  
336 </sp:IssuedToken>
```

337 This profile also defines a standard set of claim types for common personal information about users that
338 may be requested by Relying Party Web services in Security Tokens and supported by any Identity
339 Provider. These standard claim types are defined in Section 7.5.

340 2.2 Expressing Privacy Policy of Relying Party

341 A Relying Party Web service SHOULD publish its "Privacy Policy". Users might decide to release tokens
342 and interact further with that service based on its Privacy Policy. No assumptions are made regarding the

343 format and content of the Privacy Policy and an Identity Selector is NOT REQUIRED to parse, interpret or
344 act on the Privacy Policy programmatically.

345 To express the location of its privacy statement, a Web service MUST use the optional policy assertion
346 `ic:PrivacyNotice` defined below:

347 **Syntax:**

```
348 <ic:PrivacyNotice Version="xs:unsignedInt"? xmlns:ic="...">  
349   xs:anyURI  
350 </ic:PrivacyNotice>
```

351 The following describes the attributes and elements listed in the schema outlined above:

352 */ic:PrivacyNotice*

353 This element is used to express the location of the privacy statement of a Web service.

354 */ic:PrivacyNotice/@Version*

355 This optional attribute provides a version number for the privacy statement allowing changes in its
356 content to be reflected as a change in the version number. If present, it MUST have a minimum
357 value of 1.

358 Following is an example of using this policy element to express the location of the privacy statement of a
359 Web service.

360 *Example:*

```
361 <wsp:Policy xmlns:wsp="..." xmlns:ic="...">  
362   ...  
363   <ic:PrivacyNotice Version="1">  
364     http://www.contoso.com/privacy  
365   </ic:PrivacyNotice>  
366   ...  
367 </wsp:Policy>
```

368 An Identity Selector MUST be able to accept a privacy statement location specified as an URL using the
369 [\[HTTP\]](#) scheme (as illustrated above) or the [\[HTTPS\]](#) scheme.

370 Because the Privacy Policy assertion points to a “privacy statement” that applies to a service endpoint,
371 the assertion MUST apply to `[Endpoint Policy Subject]`. In other words, a policy expression containing the
372 Privacy Policy assertion MUST be attached to a `wsdl:binding` in the metadata for the service.

373 Further, when an Identity Selector can only render the privacy statement document in a limited number of
374 document formats (media types), it MAY use the HTTP request-header field “Accept” in its HTTP GET
375 request to specify the media-types it can accept. For example, the following request-header specifies that
376 the client will accept the Privacy Policy only as a plain text or a HTML document.

```
377 Accept: text/plain, text/html
```

378 Similarly, if an Identity Selector wants to obtain the privacy statement in a specific language, it MAY use
379 the HTTP request-header field “Accept-Language” in its HTTP GET request to specify the languages it is
380 willing to accept. For example, the following request-header specifies that the client will accept the
381 Privacy Policy only in Danish.

```
382 Accept-Language: da
```

383 A Web service, however, is NOT REQUIRED to be able to fulfill the document format and language
384 requests of an Identity Selector. It MAY publish its privacy statement in a fixed set of document formats
385 and languages.

386 2.3 Employing Relying Party STSs

387 The Security Policy of a Relying Party MAY require that an issued token be obtained from a Relying Party
388 STS. This can create a chain of STSs. The Identity Selector MUST follow the RP/STS chain, contacting
389 each referenced STS, resolving its Policy statements and continuing to the STS it refers to.

390 When following a chain of STSs, when an STS with an
391 `ic:RequireFederatedIdentityProvisioning` declaration is encountered as per Section 3.2.1, this
392 informs the Identity Selector that the STS is an IP/STS and therefore ends the STS chain, rather than a
393 member of the RP/STS chain. Furthermore, if an RP or RP/STS provides an incomplete Security Policy,
394 such as no issuer or no required claims, the Identity Selector MUST be invoked so a card and requested
395 claims can be selected by the user, enabling a Request for Security Token (RST) to be constructed and
396 sent to the selected IP/STS.

397 The RP/STS's Policy is used for card matching. If the RP/STS requests a private personal identifier
398 (PPID) claim (see Section 7.5.14), the RP/STS's certificate is used for calculating PPID, Signing Key, and
399 Client Pseudonym (see Section 3.3.4) values – not the certificate of the Relying Party. This enables a
400 single RP/STS to service multiple Relying Parties while always receiving the same PPID value for a given
401 user from the Identity Selector.

402 Identity Selectors MUST enable users to make Relying Party trust decisions based on the identity of the
403 Relying Party, possibly including displaying attributes from its certificate. By trusting the RP, the user is
404 implicitly trusting the chain of RP/STSs that the RP employs.

405 Each RP/STS endpoint MUST provide a certificate. This certificate MAY be communicated either via
406 Transport (such as HTTPS) or Message (such as WS-Security) Security. If Message Security is
407 employed, transports not providing security (such as HTTP) MAY be used.

408 Like IP/STSs, RP/STSs publish endpoint metadata. This metadata MAY be retrieved via
409 either WS-MetadataExchange or HTTPS GET in the same manner that IP/STS metadata can
410 be, as described in Section 3.1.1.2.

411 Like IP/STSs, no changes to the syntax used to specify metadata locations occurs when
412 RP/STS metadata is published by the Relying Party STS as a page retrievable using HTTPS
413 GET. Relying Parties and Identity Providers MAY consequently support either or both
414 retrieval methods for the same metadata addresses.

415 3 Identity Provider Interactions

416 This section defines the constructs used by an Identity Selector for interacting with an Identity Provider to
417 obtain Information Cards, and to request and obtain Security Tokens.

418 3.1 Information Card

419 An Information Card represents a Digital Identity of a Subject that can be issued by an Identity Provider. It
420 is an artifact containing metadata that represents the token issuance relationship between an Identity
421 Provider and a Subject, and provides a visual representation of the Digital Identity. Multiple Digital
422 Identities for a Subject from the same Identity Provider are represented by different Information Cards.
423 Subjects may obtain an Information Card from an Identity Provider, and may have a collection of
424 Information Cards from various Identity Providers.

425 3.1.1 Information Card Format

426 An Information Card is represented as a signed XML document that is issued by an Identity Provider. The
427 XML schema for an Information Card is defined below:

428 Syntax:

429

```
<ic:InformationCard xml:lang="xs:language"
```

```

430     xmlns:ic="..." xmlns:ic07="..." ...>
431     <ic:InformationCardReference> ... </ic:InformationCardReference>
432     <ic:CardName> xs:string </ic:CardName> ?
433     <ic:CardImage MimeType="xs:string"> xs:base64Binary </ic:CardImage> ?
434     <ic:Issuer> xs:anyURI </ic:Issuer>
435     <ic:TimeIssued> xs:dateTime </ic:TimeIssued>
436     <ic:TimeExpires> xs:dateTime </ic:TimeExpires> ?
437     <ic:TokenServiceList> ... </ic:TokenServiceList>
438     <ic:SupportedTokenTypeList> ... </ic:SupportedTokenTypeList> ?
439     <ic:SupportedClaimTypeList> ... </ic:SupportedClaimTypeList> ?
440     <ic:RequireAppliesTo ...> ... </ic:RequireAppliesTo> ?
441     <ic:PrivacyNotice ...> ... </ic:PrivacyNotice> ?
442     <ic07:RequireStrongRecipientIdentity /> ?
443     <ic07:IssuerInformation> ... </ic07:IssuerInformation> *
444     ...
445 </ic:InformationCard>

```

446 The following describes the attributes and elements listed in the schema outlined above:

447 */ic:InformationCard*

448 An Information Card issued by an Identity Provider.

449 */ic:InformationCard/@xml:lang*

450 A required language identifier, using the language codes specified in [RFC 3066](#), in which the
451 content of localizable elements have been localized.

452 */ic:InformationCard/ic:InformationCardReference*

453 This required element provides a specific reference for the Information Card by which it can be
454 uniquely identified within the scope of an issuer. This reference MUST be included by an Identity
455 Selector in all token requests sent to the Identity Provider based on that Information Card. The
456 detailed schema of this element is defined in Section 3.1.1.1.

457 */ic:InformationCard/ic:CardName*

458 This optional element provides a friendly textual name for the issued Information Card. The
459 content of this element MAY be localized in a specific language.

460 */ic:InformationCard/ic:CardImage*

461 This optional element contains a base64 encoded inline image that provides a graphical image
462 for the issued Information Card. It SHOULD contain an image within the size range of 60 pixels
463 wide by 40 pixels high and 240 pixels wide by 160 pixels high. It is RECOMMENDED that the
464 image have an aspect ratio of 3:2 and the image size be 120 by 80 pixels.

465 */ic:InformationCard/ic:CardImage/@MimeType*

466 This required attribute provides a MIME type specifying the format of the included card image.
467 This value MUST be one of the five image formats: image/jpeg, image/gif, image/bmp,
468 image/png, or image/tiff.

469 */ic:InformationCard/ic:Issuer*

470 This required element provides a logical name for the issuer of the Information Card. If a Relying
471 Party specifies a token issuer by its logical name, then the content of this element MUST be used
472 to match the requested token issuer with an Information Card.

473 */ic:InformationCard/ic:TimeIssued*

474 This required element provides the date and time when the Information Card was issued.

475 */ic:InformationCard/ic:TimeExpires*

476 This optional element provides the date and time after which the Information Card SHOULD be
477 treated as expired and invalid.

478 */ic:InformationCard/ic:TokenServiceList*
479 This required element provides an ordered list of Security Token Service (IP/STS) endpoints, and
480 corresponding credential descriptors (implying the REQUIRED authentication mechanisms),
481 where tokens can be requested. Each service endpoint MUST be tried in order by the Service
482 Requester when requesting tokens.

483 */ic:InformationCard/ic:SupportedTokenTypeList*
484 This optional element contains the list of token types that are offered by the Identity Provider.

485 */ic:InformationCard/ic:SupportedClaimTypeList*
486 This optional element contains the list of claim types that are offered by the Identity Provider.

487 */ic:InformationCard/ic:RequireAppliesTo*
488 This optional element indicates that token requests MUST include information identifying the
489 Relying Party where the issued token will be used. The Relying Party information MUST be
490 included as the content of a `wsp:AppliesTo` element in the token request.

491 */ic:InformationCard/ic:PrivacyNotice*
492 This optional element provides the location of the privacy statement of the Identity Provider.

493 */ic:InformationCard/ic07:RequireStrongRecipientIdentity*
494 This optional element informs the Identity Selector that it MUST only allow the card to be used at
495 a Relying Party that presents a cryptographically protected identity, for example, an X.509v3
496 certificate.

497 */ic:InformationCard/ic07:IssuerInformation*
498 This optional element provides information from the card issuer about the card that can be
499 displayed by the Identity Selector user interface.

500 *.../ic:InformationCard/@{any}*
501 This is an extensibility point to allow additional attributes to be specified. While an Identity
502 Selector MAY ignore any extensions it does not recognize it SHOULD preserve those that it does
503 not recognize and emit them in the respective `ic:InformationCard` element of an
504 `ic:RoamingStore` when representing the card in the Information Cards Transfer Format in
505 Section 6.1.

506 *.../ic:InformationCard/{any}*
507 This is an extensibility point to allow additional metadata elements to be specified. While an
508 Identity Selector MAY ignore any extensions it does not recognize it SHOULD preserve those that
509 it does not recognize and emit them in the respective `ic:InformationCard` element of an
510 `ic:RoamingStore` when representing the card in the Information Cards Transfer Format in
511 Section 6.1.

512 3.1.1.1 Information Card Reference

513 Every Information Card issued by an Identity Provider MUST have a unique reference by which it can be
514 identified within the scope of the Identity Provider. This reference is included in all token requests sent to
515 the Identity Provider based on that Information Card.

516 The card reference MUST be expressed using the following schema element within an Information Card.

517 Syntax:

```
518 <ic:InformationCardReference xmlns:ic="...">  
519 <ic:CardId> xs:anyURI </ic:CardId>  
520 <ic:CardVersion> xs:unsignedInt </ic:CardVersion>  
521 </ic:InformationCardReference>
```

522 The following describes the attributes and elements listed in the schema outlined above:

523 *.../ic:InformationCardReference*

524 A specific reference for an Information Card.

525 *.../ic:InformationCardReference/ic:CardId*

526 This required element provides a unique identifier in the form of a URI for the specific Information
527 Card. The identifier provider MUST be able to identify the specific Information Card based on this
528 identifier.

529 *.../ic:InformationCardReference/ic:CardVersion*

530 This required element provides a versioning epoch for the Information Card issuance
531 infrastructure used by the Identity Provider. The minimum value for this field MUST be 1. Note
532 that it is possible to include version information in CardId as it is a URI, and can have hierarchical
533 content. However, it is specified as a separate value to allow the Identity Provider to change its
534 issuance infrastructure, and thus its versioning epoch, independently without changing the CardId
535 of all issued Information Cards. For example, when an Identity Provider makes a change to the
536 supported claim types or any other policy pertaining to the issued cards, the version number
537 allows the Identity Provider to determine if the Information Card needs to be refreshed. The
538 version number is assumed to be monotonically increasing. If two Information Cards have the
539 same CardId value but different CardVersion values, then the one with a higher numerical
540 CardVersion value SHOULD be treated as being more up-to-date.

541 3.1.1.2 Token Service Endpoints and Authentication Mechanisms

542 Every Information Card issued by an Identity Provider MUST include an ordered list of IP/STS endpoints,
543 and the corresponding credential type to be used, for requesting tokens. The list MUST be in a
544 decreasing order of preference. Identity Selectors SHOULD attempt to use the endpoints in the order
545 listed, using the first endpoint in the list for which the metadata is retrievable and the endpoint is
546 reachable. For each endpoint, the credential type implicitly determines the authentication mechanism to
547 be used. Each credential descriptor is personalized for the user to allow an Identity Selector to
548 automatically locate the credential once the user has selected an Information Card.

549 Further, each IP/STS endpoint reference in the Information Card MUST include the Security Policy
550 metadata for that endpoint. The policy metadata MAY be specified as a metadata location within the
551 IP/STS endpoint reference. If a metadata location URL is specified, it MUST use the [HTTPS] transport.
552 An Identity Selector MAY retrieve the Security Policy it will use to communicate with the IP/STS from that
553 metadata location using the mechanism specified in [WS-MetadataExchange].

554 The ordered list of token service endpoints MUST be expressed using the following schema element
555 within an Information Card.

556 **Syntax:**

```
557 <ic:TokenServiceList xmlns:ic="..." xmlns:wsa="...">  
558   (<ic:TokenService>  
559     <wsa:EndpointReference> ... </wsa:EndpointReference>  
560     <ic:UserCredential>  
561       <ic:DisplayCredentialHint> xs:string </ic:DisplayCredentialHint> ?  
562       (  
563         <ic:UsernamePasswordCredential>...</ic:UsernamePasswordCredential> |  
564         <ic:KerberosV5Credential>...</ic:KerberosV5Credential> |  
565         <ic:X509V3Credential>...</ic:X509V3Credential> |  
566         <ic:SelfIssuedCredential>...</ic:SelfIssuedCredential> | ...  
567       )  
568     </ic:UserCredential>  
569   </ic:TokenService>) +  
570 </ic:TokenServiceList>
```

571 The following describes the attributes and elements listed in the schema outlined above:

572 *.../ic:TokenServiceList*
573 This required element provides an ordered list of Security Token Service endpoints (in decreasing
574 order of preference), and the corresponding credential types, for requesting tokens. Each service
575 endpoint MUST be tried in order by a Service Requester.

576 *.../ic:TokenServiceList/ic:TokenService*
577 This required element describes a single token issuing endpoint.

578 *.../ic:TokenServiceList/ic:TokenService/wsa:EndpointReference*
579 This required element provides the endpoint reference for a single token issuing endpoint. For the
580 Self-issued Identity Provider, the special address value defined in Section 2.1.1 MAY be used.
581 The `wsai:Identity` extension element (see Section 12) for endpoint references MAY be used
582 to include the protection token for this endpoint to secure communications with it.

583 *.../ic:TokenServiceList/ic:TokenService/ic:UserCredential*
584 This required element indicates the credential type to use to authenticate to the token issuing
585 endpoint.

586 *.../ic:TokenServiceList/ic:TokenService/ic:UserCredential/ic:DisplayCredentialHint*
587 This optional element provides a hint (string) to be displayed to the user to prompt for the correct
588 credential (e.g. a hint to insert the right smart card). The content of this element MAY be localized
589 in a specific language.

590 *.../ic:TokenServiceList/ic:TokenService/ic:UserCredential/<credential descriptor>*
591 This required element provides an unambiguous descriptor for the credential to use for
592 authenticating to the token issuing endpoint. The schema to describe the credential is specific to
593 each credential type. This profile defines the schema elements
594 `ic:UsernamePasswordCredential`, `ic:KerberosV5Credential`,
595 `ic:X509V3Credential` or `ic:SelfIssuedCredential` later in Section 4 corresponding to
596 username/password, Kerberos v5, X.509v3 certificate and self-issued token based credential
597 types. Other credential types MAY be introduced via the extensibility point defined in the schema
598 within this element.

599 Alternatively, Identity Providers MAY publish metadata for Information Cards as WSDL documents that
600 can be retrieved by Identity Selectors via HTTPS GET operations on URLs using the HTTPS scheme. An
601 endpoint's metadata URL is communicated to Identity Selectors in a token service
602 `wsx:MetadataReference` element in an Information Card using exactly the same syntax as when WS-
603 MetadataExchange is employed to retrieve the metadata. No change occurs in the card.

604 The metadata documents published via HTTPS GET SHOULD contain the WSDL for the endpoint as the
605 top-level element of the document without any SOAP or WS-MetadataExchange elements enclosing it.

606 Identity Providers MAY publish endpoint metadata via both the HTTPS GET and WS-MetadataExchange
607 methods at the same metadata location. If they publish the metadata via multiple mechanisms, the
608 metadata delivered via both mechanisms SHOULD be the same. Likewise, Identity Selectors MAY
609 attempt to retrieve metadata via multiple mechanisms, either in sequence or in parallel.

610 The following example illustrates an Identity Provider with two endpoints for its IP/STS, one requiring
611 Kerberos (higher priority) and the other requiring username/password (lower priority) as its authentication
612 mechanism. Further, each endpoint also includes its policy metadata location as a URL using the
613 [\[HTTPS\]](#) scheme.

614 *Example:*

```
615 <ic:TokenServiceList xmlns:ic="..." xmlns:wsa="..." xmlns:wsai="..."  
616   xmlns:wsx="...">  
617   <ic:TokenService>  
618     <wsa:EndpointReference>  
619       <wsa:Address>http://contoso.com/sts/kerb</wsa:Address>
```

```

620 <wsai:Identity>
621   <wsai:Spn>host/corp-sts.contoso.com</wsai:Spn>
622 </wsai:Identity>
623 <wsa:Metadata>
624   <wsx:Metadata>
625     <wsx:MetadataSection
626       Dialect="http://schemas.xmlsoap.org/ws/2004/09/mex">
627       <wsx:MetadataReference>
628         <wsa:Address>https://contoso.com/sts/kerb/mex</wsa:Address>
629       </wsx:MetadataReference>
630     </wsx:MetadataSection>
631   </wsx:Metadata>
632 </wsa:Metadata>
633 </wsa:EndpointReference>
634 <ic:UserCredential>
635   <ic:KerberosV5Credential />
636 </ic:UserCredential>
637 </ic:TokenService>
638 <ic:TokenService>
639   <wsa:EndpointReference>
640     <wsa:Address>http://contoso.com/sts/pwd</wsa:Address>
641     <wsa:Metadata>
642       <wsx:Metadata>
643         <wsx:MetadataSection
644           Dialect="http://schemas.xmlsoap.org/ws/2004/09/mex">
645           <wsx:MetadataReference>
646             <wsa:Address>https://contoso.com/sts/pwd/mex</wsa:Address>
647           </wsx:MetadataReference>
648         </wsx:MetadataSection>
649       </wsx:Metadata>
650     </wsa:Metadata>
651   </wsa:EndpointReference>
652   <ic:UserCredential>
653     <ic:UsernamePasswordCredential>
654       <ic:Username>Zoe</ic:Username>
655     </ic:UsernamePasswordCredential>
656   </ic:UserCredential>
657 </ic:TokenService>
658 </ic:TokenServiceList>

```

659 3.1.1.3 Token Types Offered

660 Every Information Card issued by an Identity Provider SHOULD include an unordered list of token types
661 that can be issued by the Identity Provider. The set of token types offered by the Identity Provider MUST
662 be expressed using the following schema element within an Information Card.

663 Syntax:

```

664 <ic:SupportedTokenTypeList xmlns:ic="..." xmlns:wst="...">
665   <wst:TokenType> xs:anyURI </wst:TokenType> +
666 </ic:SupportedTokenTypeList>

```

667 The following describes the attributes and elements listed in the schema outlined above:

668 *.../ic:SupportedTokenTypeList*

669 This optional element contains the set of token types offered by the Identity Provider.

670 *.../ic:SupportedTokenTypeList/wst:TokenType*

671 This required element indicates an individual token type that is offered.

672 The following example illustrates an Identity Provider that offers both SAML 1.1 and SAML 2.0 tokens.

673 Example:

```

674 <ic:SupportedTokenTypeList xmlns:ic="..." xmlns:wst="...">

```

```
675 <wst:TokenType>urn:oasis:names:tc:SAML:1.0:assertion</wst:TokenType>
676 <wst:TokenType>urn:oasis:names:tc:SAML:2.0:assertion</wst:TokenType>
677 </ic:SupportedTokenTypeList>
```

678 3.1.1.4 Claim Types Offered

679 Every Information Card issued by an Identity Provider SHOULD include an unordered list of claim types
680 that can be issued by the Identity Provider. The set of claim types offered by the Identity Provider MUST
681 be expressed using the following schema element within an Information Card.

682 Syntax:

```
683 <ic:SupportedClaimTypeList xmlns:ic="...">
684   (<ic:SupportedClaimType Uri="xs:anyURI">
685     <ic:DisplayTag> xs:string </ic:DisplayTag> ?
686     <ic:Description> xs:string </ic:Description> ?
687   </ic:SupportedClaimType>) +
688 </ic:SupportedClaimTypeList>
```

689 The following describes the attributes and elements listed in the schema outlined above:

690 *.../ic:SupportedClaimTypeList*

691 This optional element contains the set of claim types offered by the Identity Provider.

692 *.../ic:SupportedClaimTypeList/ic:SupportedClaimType*

693 This required element indicates an individual claim type that is offered.

694 *.../ic:SupportedClaimTypeList/ic:SupportedClaimType/@Uri*

695 This required attribute provides the unique identifier (URI) of this individual claim type offered.

696 *.../ic:SupportedClaimTypeList/ic:SupportedClaimType/ic:DisplayTag*

697 This optional element provides a friendly name for this individual claim type. The content of this
698 element MAY be localized in a specific language.

699 *.../ic:SupportedClaimTypeList/ic:SupportedClaimType/ic:Description*

700 This optional element provides a description of the semantics for this individual claim type. The
701 content of this element MAY be localized in a specific language.

702 The following example illustrates an Identity Provider that offers two claim types.

703 *Example:*

```
704 <ic:SupportedClaimTypeList xmlns:ic="...">
705   <ic:SupportedClaimType Uri=".../ws/2005/05/identity/claims/givenname">
706     <ic:DisplayTag>Given Name</DisplayTag>
707   </ic:SupportedClaimType>
708   <ic:SupportedClaimType Uri=".../ws/2005/05/identity/claims/surname">
709     <ic:DisplayTag>Last Name</DisplayTag>
710   </ic:SupportedClaimType>
711 </ic:SupportedClaimTypeList>
```

712 3.1.1.5 Requiring Token Scope Information

713 An Identity Selector, by default, SHOULD NOT convey information about the Relying Party where an
714 issued token will be used (i.e., target scope) when requesting Security Tokens. This helps safeguard user
715 privacy. However, an Identity Provider MAY override that behavior.

716 Every Information Card issued by an Identity Provider MAY include a requirement that token requests
717 include token scope information identifying the Relying Party where the token will be used. The
718 requirement to submit token scope information MUST be expressed using the following schema element
719 within an Information Card.

720 Syntax:

721

```
<ic:RequireAppliesTo Optional="xs:boolean" xmlns:ic="..." /> ?
```

722 The following describes the attributes and elements listed in the schema outlined above:

723 *.../ic:RequireAppliesTo*

724 This optional element indicates a requirement for a token requester to submit token scope
725 information in the request. Absence of this element in an Information Card means that the token
726 requester MUST NOT submit any token scope information.

727 *.../ic:RequireAppliesTo/@Optional*

728 This optional attribute indicates whether the token scope information is required or is optional by
729 the Identity Provider. An attribute value of “true” indicates that the token scope information is not
730 required, but will be accepted by the Identity Provider if submitted. An attribute value of “false”
731 (default) indicates that the token scope information is required.

732 The following example illustrates the use of this element.

733 *Example:*

```
<ic:RequireAppliesTo Optional="true" xmlns:ic="..." />
```

735 If token scope information is required by an Identity Provider, an Identity Selector MUST include the
736 Relying Party identity as the content of the `wsp:AppliesTo` element in the token request. The actual
737 behavior of an Identity Selector vis-à-vis the possible requirements that can be expressed by the above
738 element is specified in Section 3.3.3.

739 3.1.1.6 Privacy Policy Location

740 Every Information Card issued by an Identity Provider SHOULD include a pointer to the privacy statement
741 of the Identity Provider. The location of the privacy statement MUST be expressed using the following
742 schema element within an Information Card.

743 **Syntax:**

```
<ic:PrivacyNotice Version="xs:unsignedInt" xmlns:ic="..." /> ?
```

745 The following describes the attributes and elements listed in the schema outlined above:

746 *.../ic:PrivacyNotice*

747 This optional element provides the location of the privacy statement of the Identity Provider.

748 *.../ic:PrivacyNotice/@Version*

749 This optional attribute indicates a version number that tracks changes in the content of the
750 privacy statement. This field MUST have a minimum value of 1 when present.

751 The following example illustrates the use of this element.

752 *Example:*

```
<ic:PrivacyNotice Version="1" xmlns:ic="...">  
754 http://www.contoso.com/privacynotice  
755 </ic:PrivacyNotice>
```

756 An Identity Selector MUST be able to accept a privacy statement location specified as an URL using the
757 [HTTP] scheme (as illustrated above) or the [HTTPS] scheme.

758 3.1.1.7 Prohibiting Use at Relying Parties Not Identified by a Cryptographically 759 Protected Identity

760 Information Cards issuers MAY specify that a card MUST NOT be used at Relying Parties that do not
761 present a cryptographically protected identity, such as an X.509v3 certificate. This would typically be
762 done when the issuer determines that the use of HTTP without Message Security would not provide a
763 sufficiently secure environment for the use of the card.

764 **Syntax:**

```
765 <ic07:RequireStrongRecipientIdentity xmlns:ic07="..." /> ?
```

766 *.../ic07:RequireStrongRecipientIdentity*

767 This optional element informs the Identity Selector that it MUST only allow the card to be used at
768 a Relying Party that presents a cryptographically protected identity, such as an X.509v3
769 certificate.

770 3.1.1.8 Providing Custom Data to Display with the Card

771 Card issuers MAY supply a set of information about the card that MAY be displayed by the Identity
772 Selector user interface.

773 **Syntax:**

```
774 <ic07:IssuerInformation xmlns:ic07="...">  
775 <ic07:IssuerInformationEntry>  
776 <ic07:EntryName> xs:string </ic07:EntryName>  
777 <ic07:EntryValue> xs:string </ic07:EntryValue>  
778 </ic07:IssuerInformationEntry> +  
779 </ic07:IssuerInformation>
```

780 The following describes the attributes and elements listed in the schema outlined above:

781 *.../ic07:IssuerInformation*

782 This optional element provides a set of information from the card issuer about the card that can
783 be displayed by the Identity Selector user interface.

784 *.../ic07:IssuerInformation/IssuerInformationEntry*

785 This required element provides one item of information about the card.

786 *.../ic07:IssuerInformation/IssuerInformationEntry/EntryName*

787 This required element provides the name of one item of information about the card.

788 *.../ic07:IssuerInformation/IssuerInformationEntry/EntryValue*

789 This required element provides the value of one item of information about the card.

790 The following example illustrates the use of this feature.

791 *Example:*

```
792 <ic07:IssuerInformation xmlns:ic07="...">  
793 <ic07:IssuerInformationEntry>  
794 <ic07:EntryName>Customer Service</ic07:EntryName>  
795 <ic07:EntryValue>+1-800-CONTOSO</ic07:EntryValue>  
796 </ic07:IssuerInformationEntry>  
797 <ic07:IssuerInformationEntry>  
798 <ic07:EntryName>E-mail Contact</ic07:EntryName>  
799 <ic07:EntryValue>cardhelp@contoso.com</ic07:EntryValue>  
800 </ic07:IssuerInformationEntry>  
801 </ic07:IssuerInformation>
```

802 3.1.2 Issuing Information Cards

803 An Identity Provider can issue Information Cards to its users using any out-of-band mechanism that is
804 mutually suitable.

805 In order to provide the assurance that an Information Card is indeed issued by the Identity Provider
806 expected by the user, the Information Card MUST be carried inside a digitally signed envelope that is
807 signed by the Identity Provider. For this, the “enveloping signature” construct (see [XMLDSIG]) MUST be
808 used where the Information Card is included in the `ds:Object` element. The signature on the digitally

809 signed envelope provides data origin authentication assuring the user that it came from the right Identity
810 Provider.

811 The specific profile of XML digital signatures [XMLDSIG] that is RECOMMENDED for signing the
812 envelope carrying the Information Card is as follows. Usage of other algorithms is not described.

- 813 • Use *enveloping signature* format when signing the Information Card XML document.
- 814 • Use a single `ds:Object` element within the signature to hold the `ic:InformationCard`
815 element that represents the issued Information Card. The `ds:Object/@Id` attribute provides a
816 convenient way for referencing the Information Card from the `ds:SignedInfo/ds:Reference`
817 element within the signature.
- 818 • Use RSA signing and verification with the algorithm identifier given by the URI
819 `http://www.w3.org/2000/09/xmldsig#rsa-sha1`.
- 820 • Use exclusive canonicalization with the algorithm identifier given by the URI
821 `http://www.w3.org/2001/10/xml-exc-c14n#`.
- 822 • Use SHA1 digest method for the data elements being signed with the algorithm identifier
823 `http://www.w3.org/2000/09/xmldsig#sha1`.
- 824 • There MUST NOT be any other transforms used in the enveloping signature for the Information
825 Card other than the ones listed above.
- 826 • The `ds:KeyInfo` element MUST be present in the signature carrying the signing key information
827 in the form of an X.509 v3 certificate or a X.509 v3 certificate chain specified as one or more
828 `ds:X509Certificate` elements within a `ds:X509Data` element.

829 The following example shows an enveloping signature carrying an Information Card that is signed by the
830 Identity Provider using the format outlined above. Note that whitespace (newline and space character) is
831 included in the example only to improve readability; they might not be present in an actual
832 implementation.

833 *Example:*

```
834 <Signature xmlns="http://www.w3.org/2000/09/xmldsig#">
835   <SignedInfo>
836     <CanonicalizationMethod
837       Algorithm="http://www.w3.org/2001/10/xml-exc-c14n#" />
838     <SignatureMethod
839       Algorithm="http://www.w3.org/2000/09/xmldsig#rsa-sha1" />
840     <Reference URI="#_Object_InformationCard">
841       <Transforms>
842         <Transform Algorithm="http://www.w3.org/2001/10/xml-exc-c14n#" />
843       </Transforms>
844       <DigestMethod Algorithm="http://www.w3.org/2000/09/xmldsig#sha1" />
845       <DigestValue> ... </DigestValue>
846     </Reference>
847   </SignedInfo>
848   <SignatureValue> ... </SignatureValue>
849   <KeyInfo>
850     <X509Data>
851       <X509Certificate> ... </X509Certificate>
852     </X509Data>
853   </KeyInfo>
854   <Object Id="_Object_InformationCard">
855     <ic:InformationCard
856       xmlns:ic="http://schemas.xmlsoap.org/ws/2005/05/identity"
857       xml:lang="en-us">
858       [Information Card content]
859     </ic:InformationCard>
860   </Object>
861 </Signature>
```

862 An Identity Selector MUST verify the enveloping signature. The `ic:InformationCard` element can
863 then be extracted and stored in the Information Card collection.

864 3.2 Identity Provider Policy

865 This section specifies additional policy elements and requirements introduced by this profile for an IP/STS
866 policy metadata.

867 3.2.1 Require Information Card Provisioning

868 In the Information Card Model, an Identity Provider requires provisioning in the form of an Information
869 Card issued by it which represents the provisioned identity of the user. In order to enable an Identity
870 Selector to learn that such pre-provisioning is necessary before token requests can be made, the Identity
871 Provider MUST provide an indication in its policy.

872 An Identity Provider issuing Information Cards MUST specify this provisioning requirement in its policy
873 using the following schema element.

874 Syntax:

```
875 <ic:RequireFederatedIdentityProvisioning xmlns:ic="..." />
```

876 The following describes the attributes and elements listed in the schema outlined above:

877 *.../ic:RequireFederatedIdentityProvisioning*

878 This element indicates a requirement that one or more Information Cards, representing identities
879 that can be federated, MUST be pre-provisioned before token requests can be made to the
880 Identity Provider.

881 The following example illustrates the use of this policy element.

882 Example:

```
883 <wsp:Policy xmlns:wsp="..." xmlns:ic="..." xmlns:sp="...">  
884   ...  
885   <ic:RequireFederatedIdentityProvisioning />  
886   <sp:SymmetricBinding>  
887     ...  
888   </sp:SymmetricBinding>  
889   ...  
890 </wsp:Policy>
```

891 3.2.2 Policy Metadata Location

892 In the Information Card Model, an Identity Provider MUST make the Security Policy metadata for its
893 IP/STS endpoints available. If a metadata location is used for this purpose, the location URL MUST use
894 the [HTTPS] scheme. An Identity Selector MAY retrieve the Security Policy it will use to communicate with
895 the IP/STS from that metadata location using the mechanism specified in [WS-MetadataExchange].

896 3.3 Token Request and Response

897 For any given Information Card, an Identity Selector can obtain a Security Token from the IP/STS for that
898 Information Card. Tokens MUST be requested using the “Issuance Binding” mechanism described in
899 [WS-Trust 1.2] and [WS-Trust 1.3]. This section specifies additional constraints and extensions to the
900 token request and response messages between the Identity Selector and the IP/STS.

901 The WS-Trust protocol requires that a token request be submitted by using the
902 `wst:RequestSecurityToken` element in the request message, and that a token response be sent
903 using the `wst:RequestSecurityTokenResponse` element in the response message. This profile
904 refers to the “Request Security Token” message as RST and the “Request Security Token Response”
905 message as RSTR in short.

906 The WS-Trust protocol allows for a token response to provide multiple tokens by using the
 907 `wst:RequestSecurityTokenResponseCollection` element in the response message. This profile,
 908 however, requires that an Identity Provider **MUST NOT** use the
 909 `wst:RequestSecurityTokenResponseCollection` element in the response. The token response
 910 **MUST** consist of a single `wst:RequestSecurityTokenResponse` element.

911 3.3.1 Information Card Reference

912 When requesting a Security Token from the IP/STS, an Identity Selector **MUST** include the Information
 913 Card reference in the body of the RST message as a top-level element information item. The
 914 `ic:InformationCardReference` element in the Information Card, including all of its [children],
 915 [attributes] and [in-scope namespaces], **MUST** be copied as an immediate child of the RST element in the
 916 message as follows.

917 The following example illustrates the Information Card reference included in a RST message.

918 *Example:*

```
919 <wst:RequestSecurityToken xmlns:wst="..." xmlns:ic="...">
920   ...
921   <ic:InformationCardReference>
922     <ic:CardId>http://xyz.com/CardId/d795621fa01d454285f9</ic:CardId>
923     <ic:CardVersion>1</ic:CardVersion>
924   </ic:InformationCardReference>
925   ...
926 </wst:RequestSecurityToken>
```

927 The IP/STS **MAY** fault with `ic:InformationCardRefreshRequired` to signal to the Service
 928 Requester that the Information Card needs to be refreshed.

929 3.3.2 Claims and Other Token Parameters

930 A Relying Party's requirements of claims and other token parameters are expressed in its policy using the
 931 `sp:RequestSecurityTokenTemplate` parameter within the `sp:IssuedToken` policy assertion (see
 932 Section 2.1). If all token parameters are acceptable to the Identity Selector, it **MUST** copy the content of
 933 this element (i.e. all of its [children] elements) into the body of the RST message as top-level element
 934 information items. However, if optional claims are requested by the Relying Party, requests for optional
 935 claims not selected by the user **MUST NOT** be copied into the RST message.

936 3.3.3 Token Scope

937 The WS-Trust protocol allows a token requester to indicate the target where the issued token will be used
 938 (i.e., token scope) by using the optional element `wsp:AppliesTo` in the RST message. By default, an
 939 Identity Selector **SHOULD NOT** send token scope information to the Identity Provider in token requests to
 940 protect user privacy. In other words, the element `wsp:AppliesTo` is absent in the RST message.

941 However, if the Identity Provider requires it (see the modes of the `ic:RequireAppliesTo` element
 942 described in Section 3.1.1.5), or if the Relying Party's token policy includes the `wsp:AppliesTo` element
 943 in the `sp:RequestSecurityTokenTemplate` parameter, then an Identity Selector **MUST** include token
 944 scope information in its token request as per the behavior summarized in the following table.

<i><RequireAppliesTo> mode in Information Card</i>	<i><AppliesTo> element present in RP policy</i>	<i>Resulting behavior of Identity Selector</i>
Mandatory	Yes	Send <AppliesTo> value from RP policy in token request to IP.
Mandatory	No	Send the RP endpoint to which token will be sent as the value of

		<AppliesTo> in token request to IP.
Optional	Yes	Send <AppliesTo> value from RP policy in token request to IP.
Optional	No	Do not send <AppliesTo> in token request to IP.
Not present	Yes	Fail
Not present	No	Do not send <AppliesTo> in token request to IP.

945 The following example illustrates the token scope information included in a RST message when it is sent
946 to the Identity Provider.

947 *Example:*

```

948 <wst:RequestSecurityToken xmlns:wst="..." xmlns:wsp="..." xmlns:wsa="..."
949     xmlns:wsai="..." xmlns:ds="...">
950   <wsp:AppliesTo>
951     <wsa:EndpointReference>
952       <wsa:Address>http://ip.fabrikam.com</wsa:Address>
953       <wsai:Identity>
954         <ds:KeyInfo>
955           <ds:X509Data>
956             <ds:X509Certificate>...</ds:X509Certificate>
957           </ds:X509Data>
958         </ds:KeyInfo>
959       </wsai:Identity>
960     </wsa:EndpointReference>
961   </wsp:AppliesTo>
962   ...
963 </wst:RequestSecurityToken>

```

964 3.3.4 Client Pseudonym

965 A private personal identifier (PPID) claim, defined in Section 7.5.14, identifies a Subject to a Relying Party
966 in a way such that a Subject's PPID at one Relying Party cannot be correlated with the Subject's PPID at
967 another Relying Party. If an Identity Provider offers the PPID claim type then it **MUST** generate values for
968 the claim that have this prescribed privacy characteristic using data present in the RST request.

969 When a Relying Party requests a PPID claim, an Identity Selector **MUST** provide a Client Pseudonym
970 value via an `ic:PPID` element in the RST request that can be used by the IP/STS as input when
971 computing the PPID claim value in the issued token. The Client Pseudonym **SHOULD** be produced as
972 described in Section 3.3.4.1. It is **RECOMMENDED** that the IP/STS combine this Client Pseudonym
973 value with information specific to the entity to which the card was issued as well as a secret known only
974 by the IP/STS and pass the combination through a cryptographically non-invertible function, such as a
975 cryptographic hash function, to generate the PPID claim value sent in the token. Alternatively, when
976 target scope information is sent in the token request using the `wsp:AppliesTo` element, the IP/STS
977 **MAY** instead choose to use that information to generate an appropriate PPID value.

978 When Client Pseudonym information is included by an Identity Selector in a token request, it **MUST** be
979 sent using the following schema element.

980 **Syntax:**

```

981 <ic:ClientPseudonym xmlns:ic="...">
982   <ic:PPID> xs:base64Binary </ic:PPID>
983 </ic:ClientPseudonym>

```

984 The following describes the attributes and elements listed in the schema outlined above:

985 `.../ic:ClientPseudonym`

986 This optional top-level element contains the Client Pseudonym information item.

987 `.../ic:ClientPseudonym/ic:PPID`

988 This optional element contains the Client Pseudonym value that the client has submitted for use
989 in computing the PPID claim value for the issued token. The IP/STS MAY use this value as the
990 input (a seed) to a custom cryptographically non-invertible function, with the result used as the
991 PPID claim value in the issued token.

992 The following example illustrates the Client Pseudonym information sent in a RST message.

993 *Example:*

```
994 <wst:RequestSecurityToken xmlns:wst="..." xmlns:ic="...">  
995 <ic:ClientPseudonym>  
996 <ic:PPID>MIIEZzCCA9CgAwIBAgIQEmtJZc0=</ic:PPID>  
997 </ic:ClientPseudonym >  
998 ...  
999 </wst:RequestSecurityToken>
```

1000 When the target scope information is not sent in the token request to an IP/STS, the Identity Provider
1001 MUST NOT record any Client Pseudonym values included in the RST message. It likewise MUST NOT
1002 record the PPID claim value that it generates.

1003 3.3.4.1 PPID

1004 When a token request for a PPID claim is sent to an IP/STS, an Identity Selector SHOULD compute the
1005 Client Pseudonym PPID information it sends in the RST message as follows:

- 1006 • Construct the *RP PPID Seed* as described in Section 7.6.1.
- 1007 • Decode the base64 encoded value of the `ic:HashSalt` element of the Information Card (see
1008 Section 6.1) to obtain *SaltBytes*.
- 1009 • Decode the base64 encoded value of the `ic:MasterKey` element of the Information Card (see
1010 Section 6.1) to obtain *MasterKeyBytes*.
- 1011 • Hash the concatenation of *MasterKeyBytes*, *RP PPID Seed*, and *SaltBytes* using the SHA256
1012 hash function to obtain the Client Pseudonym PPID value.
1013 $Client\ Pseudonym\ PPID = SHA256 (MasterKeyBytes + RP\ PPID\ Seed + SaltBytes)$
- 1014 • Convert *Client Pseudonym PPID* to a base64 encoded string and send as the value of the
1015 `ic:PPID` element in the RST request.

1016 3.3.5 Proof Key for Issued Token

1017 An issued token can have a *symmetric* proof key (symmetric key token), an *asymmetric* proof key
1018 (asymmetric key token), or *no* proof key (bearer token). If no key type is specified in the Relying Party
1019 policy, then an Identity Selector SHOULD request an asymmetric key token from the IP/STS by default.

1020 The optional `wst:KeyType` element in the RST request indicates the type of proof key desired in the
1021 issued Security Token. The IP/STS MAY return the proof key and/or entropy towards the proof key in the
1022 RSTR response. This section describes the behaviors for how each proof key type is requested, who
1023 contributes entropy, and how the proof key is computed and returned.

1024 3.3.5.1 Symmetric Proof Key

1025 When requesting a symmetric key token, an Identity Selector MUST submit entropy towards the proof key
1026 by augmenting the RST request message as follows:

- 1027 • The RST SHOULD include a `wst:KeyType` element with one of the two following URI values,
1028 depending upon the version of WS-Trust being used:
1029 `http://schemas.xmlsoap.org/ws/2005/02/trust/SymmetricKey`
1030 `http://docs.oasis-open.org/ws-sx/ws-trust/200512/SymmetricKey`
- 1031 • The RST MUST include a `wst:BinarySecret` element inside a `wst:Entropy` element
1032 containing client-side entropy to be used as partial key material. The entropy is conveyed as raw
1033 base64 encoded bits.

1034 The size of the submitted entropy SHOULD be equal to the key size requested in the Relying Party
1035 policy. If no key size is specified by the Relying Party, then an Identity Selector SHOULD request a key at
1036 least 256-bits in size, and submit an entropy of equal size to the IP/STS.

1037 Following is a sample RST request fragment that illustrates a symmetric key token request.

1038 *Example:*

```
1039 <wst:RequestSecurityToken xmlns:wst="...">
1040   ...
1041   <wst:KeyType>
1042     http://schemas.xmlsoap.org/ws/2005/02/trust/SymmetricKey
1043   </wst:KeyType>
1044   <wst:KeySize>256</wst:KeySize>
1045   <wst:Entropy>
1046     <wst:BinarySecret>mQlxWxEiK0cUfnHgQpylcD7LYSkJplpE=</wst:BinarySecret>
1047   </wst:Entropy>
1048 </wst:RequestSecurityToken>
```

1049 When processing the token request, the IP/STS MAY:

- 1050 a) accept the client entropy as the sole key material for the proof key,
- 1051 b) accept the client entropy as partial key material and contribute additional server-side entropy as
1052 partial key material to compute the proof key as a function of both partial key materials, or
- 1053 c) reject the client-side entropy and use server-side entropy as the sole key material for the proof
1054 key.

1055 For each of the cases above, the IP/STS MUST compute and return the proof key by augmenting the
1056 RSTR response message as follows.

1057 **For case (a) where IP/STS accepts client entropy as the sole key material:**

- 1058 • The RSTR MUST NOT include a `wst:RequestedProofToken` element. The proof key is
1059 implied and an Identity Selector MUST use the client-side entropy as the proof key.

1060 **For case (b) where IP/STS accepts client entropy and contributes additional server entropy:**

- 1061 • The RSTR MUST include a `wst:BinarySecret` element inside a `wst:Entropy` element
1062 containing the server-side entropy to be used as partial key material. The entropy is conveyed as
1063 raw base64 encoded bits.
- 1064 • The partial key material from the IP/STS MUST be combined (by each party) with the partial key
1065 material from the client to determine the resulting proof key.
- 1066 • The RSTR MUST include a `wst:RequestedProofToken` element containing a
1067 `wst:ComputedKey` element to indicate how the proof key is to be computed. It is
1068 RECOMMENDED that an Identity Selector support the P_SHA1 computed key mechanism
1069 defined in [WS-Trust 1.2] or [WS-Trust 1.3] with the particulars below. Usage of other algorithms
1070 is not described.

<i>ComputedKey Value</i>	<i>Meaning</i>
--------------------------	----------------

http://schemas.xmlsoap.org/ws/2005/02/trust/CK/PSHA1 or http://docs.oasis-open.org/ws-sx/ws-trust/200512/CK/PSHA1	The key is computed using P_SHA1 from the TLS specification to generate a bit stream using entropy from both sides. The exact form is: $key = P_SHA1(Entropy_{REQ}, Entropy_{RES})$
---	---

1071 Following is a sample RSTR response fragment that illustrates a token response with partial key material
 1072 from the IP/STS and a computed proof key.

1073 *Example:*

```

1074 <wst:RequestSecurityTokenResponse xmlns:wst="...">
1075   ...
1076   <wst:Entropy>
1077     <wst:BinarySecret>mQlxWxEiKOCUfnHgQpylcD7LYSkJplpE=</wst:BinarySecret>
1078   </wst:Entropy>
1079   <wst:RequestedProofToken>
1080     <wst:ComputedKey>
1081       http://schemas.xmlsoap.org/ws/2005/02/trust/CK/PSHA1
1082     </wst:ComputedKey>
1083   </wst:RequestedProofToken>
1084 </wst:RequestSecurityTokenResponse>
  
```

1085 **For case (c) where IP/STS contributes server entropy as the sole key material:**

- 1086 • The RSTR MUST include a `wst:BinarySecret` element inside a
 1087 `wst:RequestedProofToken` element containing the specific proof key to be used. The proof
 1088 key is conveyed as raw base64 encoded bits.

1089 Following is a sample RSTR response fragment that illustrates a token response with fully specified proof
 1090 key from the IP/STS.

1091 *Example:*

```

1092 <wst:RequestSecurityTokenResponse xmlns:wst="...">
1093   ...
1094   <wst:RequestedProofToken>
1095     <wst:BinarySecret>
1096       mQlxWxEiKOCUfnHgQpylcDKOCUfnHg7LYSkJplpE=
1097     </wst:BinarySecret>
1098   </wst:RequestedProofToken>
1099 </wst:RequestSecurityTokenResponse>
  
```

1100 The following table summarizes the symmetric proof key computation rules to be used by an Identity
 1101 Selector:

<i>Token Requester (Identity Selector)</i>	<i>Token Issuer (IP/STS)</i>	<i>Results</i>
Provides entropy	Uses requester entropy as proof key	No <code><wst:RequestedProofToken></code> element present in RSTR. Proof key is implied.
Provides entropy	Uses requester entropy and provides additional entropy of its own	<p><code><wst:Entropy></code> element present in RSTR containing issuer supplied entropy.</p> <p><code><wst:RequestedProofToken></code> element present in RSTR containing computed key mechanism.</p> <p>Requestor and Issuer compute proof key by combining both entropies using the specified computed key</p>

		mechanism.
Provides entropy	Uses own entropy as proof key (rejects requester entropy)	<wst:RequestedProofToken> element present in RSTR containing the proof key.

1102 3.3.5.2 Asymmetric Proof Key

1103 When requesting an asymmetric key token, it is RECOMMENDED that an Identity Selector generate an
 1104 ephemeral RSA key pair. Usage of other algorithms is not described. The generated RSA key pair
 1105 MUST be at least 1024-bits in size for use as the proof key. It MUST submit the public key to the IP/STS
 1106 by augmenting the RST request as follows:

- 1107 • The RST MUST include a `wst:KeyType` element with one of the two following URI values,
 1108 depending upon the version of WS-Trust being used:
 1109 <http://schemas.xmlsoap.org/ws/2005/02/trust/PublicKey>
 1110 <http://docs.oasis-open.org/ws-sx/ws-trust/200512/PublicKey>
- 1111 • The RST SOAP body MUST include a `wst:UseKey` element containing the public key to be used
 1112 as proof key in the returned token. The public key is present as a raw RSA key in the form of a
 1113 `ds:RSAKeyValue` element inside a `ds:KeyValue` element.
- 1114 • The RST SOAP security header SHOULD include a supporting signature to prove ownership of
 1115 the corresponding private key. The `ds:KeyInfo` element within the signature, if present, MUST
 1116 include the same public key as in the `wst:UseKey` element in the SOAP body.
- 1117 • The supporting signature, if present, MUST be placed in the SOAP security header where the
 1118 signature for an endorsing supporting token would be placed as per the security header layout
 1119 specified in WS-SecurityPolicy.

1120 Following is a sample RST request fragment that illustrates an asymmetric key based token request
 1121 containing the public key and proof of ownership of the corresponding private key.

1122 *Example:*

```

1123 <s:Envelope xmlns:s="..." xmlns:wsse="..." xmlns:ds="..." xmlns:wst="..."
1124   ... >
1125   <s:Header>
1126     ...
1127     <wsse:Security>
1128       ...
1129       <ds:Signature Id="_proofSignature">
1130         <!-- signature proving possession of submitted proof key -->
1131         ...
1132         <!-- KeyInfo in signature contains the submitted proof key -->
1133         <ds:KeyInfo>
1134           <ds:KeyValue>
1135             <ds:RSAKeyValue>
1136               <ds:Modulus>...</ds:Modulus>
1137               <ds:Exponent>...</ds:Exponent>
1138             </ds:RSAKeyValue>
1139           </ds:KeyValue>
1140         </ds:KeyInfo>
1141       </ds:Signature>
1142     </wsse:Security>
1143   </s:Header>
1144   <s:Body wsu:Id="req">
1145     <wst:RequestSecurityToken>
1146       ...
1147       <wst:KeyType>
1148         http://schemas.xmlsoap.org/ws/2005/02/trust/PublicKey
1149       </wst:KeyType>
  
```

```

1150 <wst:UseKey Sig="#_proofSignature">
1151   <ds:KeyInfo>
1152     <ds:KeyValue>
1153       <ds:RSAKeyValue>
1154         <ds:Modulus>...</ds:Modulus>
1155         <ds:Exponent>...</ds:Exponent>
1156       </ds:RSAKeyValue>
1157     </ds:KeyValue>
1158   </ds:KeyInfo>
1159 </wst:UseKey>
1160 </wst:RequestSecurityToken>
1161 </s:Body>
1162 </s:Envelope>

```

1163 If a supporting signature for the submitted proof key is not present in the token request, the IP/STS MAY
 1164 fail the request. If a supporting signature is present, the IP/STS MUST verify the signature and MUST
 1165 ensure that the public key included in the `wst:UseKey` element and in the supporting signature are the
 1166 same. If verification succeeds and the IP/STS accepts the submitted public key for use in the issued
 1167 token, then the token response MUST NOT include a `wst:RequestedProofToken` element. The proof
 1168 key is implied and an Identity Selector MUST use the public key it submitted as the proof key.

1169 The following table summarizes the asymmetric proof key rules used by an Identity Selector:

<i>Token Requester (Identity Selector)</i>	<i>Token Issuer (IP/STS)</i>	<i>Results</i>
Provides ephemeral public key for use as proof key	Uses requester supplied proof key	No <code><wst:RequestedProofToken></code> element present in RSTR. Proof key is implied.

1170 3.3.5.3 No Proof Key

1171 When requesting a token with no proof key, an Identity Selector MUST augment the RST request
 1172 message as follows:

- 1173 • The RST MUST include a `wst:KeyType` element with the following URI value if [WS-Trust 1.2] is
 1174 being used:

1175 `http://schemas.xmlsoap.org/ws/2005/05/identity/NoProofKey`

- 1176 or the RST MUST include a `wst:KeyType` element with the following URI value if [WS-Trust 1.3] is
 1177 being used:

1178 `http://docs.oasis-open.org/ws-sx/wstrust/200512/Bearer`

1179 Following is a sample RST request fragment that illustrates a bearer token request.

1180 *Example:*

```

1181 <wst:RequestSecurityToken xmlns:wst="...">
1182   ...
1183   <wst:KeyType>
1184     http://schemas.xmlsoap.org/ws/2005/05/identity/NoProofKey
1185   </wst:KeyType>
1186 </wst:RequestSecurityToken>

```

1187 When processing the token request, if the IP/STS issues a SAML v1.1 bearer token then:

- 1188 • It MUST specify “urn:oasis:names:tc:SAML:1.0:cm:bearer” as the subject confirmation method in
 1189 the token.
- 1190 • It SHOULD include a `saml:AudienceRestrictionCondition` element restricting the token
 1191 to the target site URL submitted in the token request.

1192 3.3.6 Display Token

1193 An Identity Selector MAY request a Display Token – a representation of the claims carried in the issued
1194 Security Token that can be displayed in an user interface – from an IP/STS as part of the token request.
1195 To request a Display Token, the following element MUST be included in the RST message as a top-level
1196 element information item.

1197 **Syntax:**

```
1198 <ic:RequestDisplayToken xmlns:lang="xs:language"? xmlns:ic="..." ... />
```

1199 The following describes the attributes and elements listed in the schema outlined above:

1200 */ic:RequestDisplayToken*

1201 This optional element is used to request an Identity Provider to return a Display Token
1202 corresponding to the issued token.

1203 */ic:RequestDisplayToken/@xml:lang*

1204 This optional attribute indicates a language identifier, using the language codes specified in [RFC
1205 3066], in which the Display Token content SHOULD be localized.

1206 An IP/STS MAY respond to a Display Token request. If it does, it MUST use the following element to
1207 return a Display Token for the issued Security Token in the RSTR message.

1208 **Syntax:**

```
1209 <ic:RequestedDisplayToken xmlns:ic="..." ...>  
1210 <ic:DisplayToken xml:lang="xs:language" ... >  
1211 [ <ic:DisplayClaim Uri="xs:anyURI" ...>  
1212 <ic:DisplayTag> xs:string </ic:DisplayTag> ?  
1213 <ic:Description> xs:string </ic:Description> ?  
1214 <ic:DisplayValue> xs:string </ic:DisplayValue> ?  
1215 </ic:DisplayClaim> ] +  
1216 |  
1217 [ <ic:DisplayTokenText MimeType="xs:string">  
1218 xs:string  
1219 </ic:DisplayTokenText> ]  
1220 ...  
1221 </ic:DisplayToken>  
1222 </ic:RequestedDisplayToken>
```

1223 The following describes the attributes and elements listed in the schema outlined above:

1224 */ic:RequestedDisplayToken*

1225 This optional element is used to return a Display Token for the Security Token returned in the
1226 response.

1227 */ic:RequestedDisplayToken/ic:DisplayToken*

1228 The returned Display Token.

1229 */ic:RequestedDisplayToken/ic:DisplayToken/@xml:lang*

1230 This required attribute indicates a language identifier, using the language codes specified in [RFC
1231 3066], in which the Display Token content is localized.

1232 */ic:RequestedDisplayToken/ic:DisplayToken/ic:DisplayClaim*

1233 This required element indicates an individual claim returned in the Security Token.

1234 */ic:RequestedDisplayToken/ic:DisplayToken/ic:DisplayClaim/@Uri*

1235 This required attribute provides the unique identifier (URI) of the individual claim returned in the
1236 Security Token.

- 1237 */ic:RequestedDisplayToken/ic:DisplayToken/ic:DisplayClaim/ic:DisplayTag*
 1238 This optional element provides a friendly name for the claim returned in the Security Token.
- 1239 */ic:RequestedDisplayToken/ic:DisplayToken/ic:DisplayClaim/ic:Description*
 1240 This optional element provides a description of the semantics for the claim returned in the
 1241 Security Token.
- 1242 */ic:RequestedDisplayToken/ic:DisplayToken/ic:DisplayClaim/ic:DisplayValue*
 1243 This optional element provides the displayable value for the claim returned in the Security Token.
- 1244 */ic:RequestedDisplayToken/ic:DisplayToken/ic:DisplayTokenText*
 1245 This optional element provides an alternative textual representation of the entire token as a whole
 1246 when the token content is not suitable for display as individual claims.
- 1247 */ic:RequestedDisplayToken/ic:DisplayToken/ic:DisplayTokenText/@MimeType*
 1248 This required attribute provides a MIME type specifying the format of the Display Token content
 1249 (e.g., "text/plain").

1250 The following example illustrates a returned Display Token corresponding to a Security Token with two
 1251 claims.

1252 *Example:*

```

1253 <ic:RequestedDisplayToken xmlns:ic="...">
1254   <ic:DisplayToken xml:lang="en-us">
1255     <ic:DisplayClaim Uri="http://.../ws/2005/05/identity/claims/givenname">
1256       <ic:DisplayTag>Given Name</ic:DisplayTag>
1257       <ic:DisplayValue>John</ic:DisplayValue>
1258     </ic:DisplayClaim>
1259     <ic:DisplayClaim Uri="http://.../ws/2005/05/identity/claims/surname">
1260       <ic:DisplayTag>Last Name</ic:DisplayTag>
1261       <ic:DisplayValue>Doe</ic:DisplayValue>
1262     </ic:DisplayClaim>
1263   </ic:DisplayToken>
1264 </ic:RequestedDisplayToken>
  
```

1265 3.3.7 Token References

1266 When an IP/STS returns the token requested by an Identity Selector, it MUST also include an attached
 1267 and an un-attached token reference for the issued security token using the
 1268 `wst:RequestedAttachedReference` and `wst:RequestedUnattachedReference` elements,
 1269 respectively, in the RSTR response message.

1270 An Identity Selector is truly a conduit for the security tokens issued by an IP/STS and requested by an
 1271 RP, and it should remain agnostic of the type of the security token passing through it. Furthermore, a
 1272 security token issued by an IP/STS MAY be encrypted directly for the RP, thus preventing visibility into
 1273 the token by the Identity Selector. However, an Identity Selector (or a client application) needs to be able
 1274 to use the issued security token to perform security operations (such as signature or encryption) on a
 1275 message sent to an RP and thus needs a way to reference the token both when it is attached to a
 1276 message and when it is not. The attached and unattached token references returned by an IP/STS in the
 1277 RSTR message provide the necessary references that can be used for this purpose.

1278 4 Authenticating to Identity Provider

1279 The Information Card schema includes the element content necessary for an Identity Provider to express
 1280 what credential the user must use in order to authenticate to the IP/STS when requesting tokens. This
 1281 section defines the schema used to express the credential descriptor for each supported credential type.

1282 4.1 Username and Password Credential

1283 When the Identity Provider requires a *username* and *password* as the credential type, the following
1284 credential descriptor format MUST be used in the Information Card to specify the required credential.

1285 Syntax:

```
1286 <ic:UserCredential xmlns:ic="...">  
1287   <ic:UsernamePasswordCredential>  
1288     <ic:Username> xs:string </ic:Username> ?  
1289   </ic:UsernamePasswordCredential>  
1290 </ic:UserCredential>
```

1291 The following describes the attributes and elements listed in the schema outlined above:

1292 *.../ic:UsernamePasswordCredential*

1293 This element indicates that a username/password credential is needed.

1294 *.../ic:UsernamePasswordCredential/ic:Username*

1295 This optional element provides the username part of the credential for convenience. An Identity
1296 Selector MUST prompt the user for the password. If the username is specified, then its value
1297 MUST be copied into the username token used to authenticate to the IP/STS; else an Identity
1298 Selector MUST prompt the user for the username as well.

1299 Furthermore, the actual Security Policy of the IP/STS (expressed in its WSDL) MUST include the
1300 *sp:UsernameToken* assertion requiring a username and password value.

1301 4.2 Kerberos v5 Credential

1302 When the Identity Provider requires a *Kerberos v5 service ticket* for the IP/STS as the credential type, the
1303 following credential descriptor format MUST be used in the Information Card to specify the required
1304 credential.

1305 Syntax:

```
1306 <ic:UserCredential xmlns:ic="...">  
1307   <ic:KerberosV5Credential />  
1308 </ic:UserCredential>
```

1309 The following describes the attributes and elements listed in the schema outlined above:

1310 *.../ic:KerberosV5Credential*

1311 This element indicates that a Kerberos v5 credential is needed.

1312 To enable the Service Requester to obtain a Kerberos v5 service ticket for the IP/STS, the endpoint
1313 reference of the IP/STS in the Information Card or in the metadata retrieved from it MUST include a
1314 "service principal name" identity claim (i.e. a *wsai:Spn* element) under the *wsai:Identity* tag as
1315 defined in Section 12.

1316 Furthermore, the actual Security Policy of the IP/STS (expressed in its WSDL) MUST include the
1317 *sp:KerberosToken* assertion requiring a Kerberos service ticket.

1318 4.3 X.509v3 Certificate Credential

1319 When the Identity Provider requires an *X.509 v3 certificate* for the user as the credential type, where the
1320 certificate and keys are in a hardware-based smart card or a software-based certificate, the following
1321 credential descriptor format MUST be used in the Information Card to specify the required credential.

1322 Syntax:

```
1323 <ic:UserCredential xmlns:ic="..." xmlns:ds="..." xmlns:wss="...">  
1324   <ic:DisplayCredentialHint> xs:string </ic:DisplayCredentialHint>  
1325   <ic:X509V3Credential>
```

```

1326     <ds:X509Data>
1327         <wsse:KeyIdentifier
1328             ValueType="http://docs.oasisopen.org/wss/oasiswss-soap-
1329 messagesecurity-1.1#ThumbPrintSHA1"
1330             EncodingType="http://docs.oasis-open.org/wss/2004/01/oasis200401-wss-
1331 soap-message-security-1.0#Base64Binary">
1332             xs:base64binary
1333         </wsse:KeyIdentifier>
1334     </ds:X509Data>
1335 </ic:X509V3Credential>
1336 </ic:UserCredential>

```

1337 The following describes the attributes and elements listed in the schema outlined above:

1338 *.../ic:DisplayCredentialHint*

1339 This optional element provides a user hint string which can be used to prompt the user, for
1340 example, to insert the appropriate smart card into the reader.

1341 *.../ic:X509V3Credential*

1342 This element indicates that a X.509 certificate credential is needed.

1343 *.../ic:X509V3Credential/ds:X509Data/wsse:KeyIdentifier*

1344 This element provides a key identifier for the X.509 certificate based on the SHA1 hash of the
1345 entire certificate content expressed as a "thumbprint." Note that the extensibility point in the
1346 ds:X509Data element is used to add wsse:KeyIdentifier as a child element.

1347 Furthermore, the actual Security Policy of the IP/STS, expressed in its WSDL, MUST include the
1348 sp:X509Token assertion requiring an X.509v3 certificate.

1349 4.4 Self-issued Token Credential

1350 When the Identity Provider requires a *self-issued token* as the credential type, the following credential
1351 descriptor format MUST be used in the Information Card to specify the required credential.

1352 **Syntax:**

```

1353 <ic:UserCredential xmlns:ic="...">
1354     <ic:SelfIssuedCredential>
1355         <ic:PrivatePersonalIdentifier>
1356             xs:base64Binary
1357         </ic:PrivatePersonalIdentifier>
1358     </ic:SelfIssuedCredential>
1359 </ic:UserCredential>

```

1360 The following describes the attributes and elements listed in the schema outlined above:

1361 *.../ic:SelfIssuedCredential*

1362 This element indicates that a self-issued token credential is needed.

1363 *.../ic:SelfIssuedCredential/ic:PrivatePersonalIdentifier*

1364 This required element provides the value of the PPID claim asserted in the self-issued token
1365 used previously to register with the IP/STS (see Section 7.5.14).

1366 Furthermore, the actual Security Policy of the IP/STS (expressed in its WSDL) MUST include the
1367 sp:IssuedToken assertion requiring a self-issued token with exactly one claim, namely, the PPID.

1368 5 Faults

1369 In addition to the standard faults described in WS-Addressing, WS-Security and WS-Trust, this profile
1370 defines the following additional faults that MAY occur when interacting with an RP or an IP. The binding of
1371 the fault properties (listed below) to a SOAP 1.1 or SOAP 1.2 fault message is described in [WS-

1372 [Addressing](#). If the optional **[Detail]** property for a fault includes any specified content, then the
1373 corresponding schema fragment is included in the listing below.

1374 5.1 Relying Party

1375 The following faults MAY occur when submitting Security Tokens to an RP per its Security Policy.

[action]	http://www.w3.org/2005/08/addressing/soap/fault
[Code]	S:Sender
[Subcode]	ic:RequiredClaimMissing
[Reason]	A required claim is missing from the Security Token.
[Detail]	[URI of missing claim] <ic:ClaimType Uri="[Claim URI]" />

1376

[action]	http://www.w3.org/2005/08/addressing/soap/fault
[Code]	S:Sender
[Subcode]	ic:InvalidClaimValue
[Reason]	A claim value asserted in the Security Token is invalid.
[Detail]	[URI of invalid claim] <ic:ClaimType Uri="[Claim URI]" />

1377 5.2 Identity Provider

1378 The following faults MAY occur when requesting Security Tokens from an IP using Information Cards.

[action]	http://www.w3.org/2005/08/addressing/soap/fault
[Code]	S:Sender
[Subcode]	ic:MissingAppliesTo
[Reason]	The request is missing Relying Party identity information.
[Detail]	(None defined.)

1379

[action]	http://www.w3.org/2005/08/addressing/soap/fault
[Code]	S:Sender
[Subcode]	ic:InvalidProofKey
[Reason]	Invalid proof key specified in request.
[Detail]	(None defined.)

1380

[action]	http://www.w3.org/2005/08/addressing/soap/fault
[Code]	S:Sender
[Subcode]	ic:UnknownInformationCardReference
[Reason]	Unknown Information Card reference specified in request.
[Detail]	[Unknown Information Card reference] <ic:InformationCardReference> <ic:CardId>[card ID]</ic:CardId> <ic:CardVersion>[version]</ic:CardVersion> </ic:InformationCardReference>

1381

[action]	http://www.w3.org/2005/08/addressing/soap/fault
[Code]	S:Sender
[Subcode]	ic:FailedRequiredClaims
[Reason]	Could not satisfy required claims in request; construction of token failed
[Detail]	[URIs of claims that could not be satisfied] <ic:ClaimType Uri="[Claim URI]" /> ...

1382

[action]	http://www.w3.org/2005/08/addressing/soap/fault
[Code]	S:Sender
[Subcode]	ic:InformationCardRefreshRequired
[Reason]	Stale Information Card reference specified in request; Information Card SHOULD be refreshed
[Detail]	[Information Card reference that needs refreshing] <ic:InformationCardReference> <ic:CardId>[card ID]</ic:CardId> <ic:CardVersion>[version]</ic:CardVersion> </ic:InformationCardReference>

1383 5.2.1 Identity Provider Custom Error Messages

1384 Identity Providers MAY return custom error messages to Identity Selectors via SOAP faults that can be
1385 displayed by the Identity Selector user interface. The error message MUST be communicated as an
1386 S:Text element within the S:Reason element of a SOAP fault message. Multiple S:Text elements
1387 MAY be returned with different xml:lang values and the Identity Selector SHOULD use the one
1388 matching the user's locale, if possible.

1389 *Example:*

```
1390 <s:Envelope xmlns:wsa="http://www.w3.org/2005/08/addressing"
1391   xmlns:s="http://www.w3.org/2003/05/soap-envelope">
1392   <s:Header>
1393     <wsa:Action s:mustUnderstand="1">
```

```

1394     http://www.w3.org/2005/08/addressing/soap/fault
1395     </wsa:Action>
1396 </s:Header>
1397 <s:Body>
1398     <s:Fault>
1399         <s:Code>
1400             <s:Value>s:Sender</s:Value>
1401         </s:Code>
1402         <s:Reason>
1403             <s:Text xml:lang="en">Message in English ...</s:Text>
1404             <s:Text xml:lang="es-ES">Message in the Spanish of Spain ...</s:Text>
1405         </s:Reason>
1406     </s:Fault>
1407 </s:Body>
1408 </s:Envelope>

```

1409 6 Information Cards Transfer Format

1410 This section defines how collections of Information Cards are transferred between Identity Selectors. The
1411 cards collection is always transferred after encrypting it with a key derived from a user specified
1412 password. Section 6.1 describes the transfer format of the collection in the clear, whereas Section 6.1.2
1413 describes the transfer format after the necessary encryption is applied.

1414 6.1 Pre-Encryption Transfer Format

1415 Each Information Card in the transfer stream will contain metadata and key material maintained by the
1416 originating Identity Selector in addition to the original Information Card metadata. If an Identity Selector
1417 includes a co-resident Self-issued Identity Provider (described in Section 7), an exported self-issued card
1418 MAY also contain any associated claims information.

1419 The XML schema used for the transfer format is defined below:

1420 Syntax:

```

1421 <ic:RoamingStore xmlns:ic="...">
1422     <ic:RoamingInformationCard> +
1423     <ic:InformationCardMetaData>
1424         [Information Card]
1425         <ic:IsSelfIssued> xs:boolean </ic:IsSelfIssued>
1426         <ic:PinDigest> xs:base64Binary </ic:PinDigest> ?
1427         <ic:HashSalt> xs:base64Binary </ic:HashSalt>
1428         <ic:TimeLastUpdated> xs:dateTime </ic:TimeLastUpdated>
1429         <ic:IssuerId> xs:base64Binary </ic:IssuerId>
1430         <ic:IssuerName> xs:string </ic:IssuerName>
1431         <ic:BackgroundColor> xs:int </ic:BackgroundColor>
1432     </ic:InformationCardMetaData>
1433     <ic:InformationCardPrivateData> ?
1434     <ic:MasterKey> xs:base64Binary </ic:MasterKey>
1435     <ic:ClaimValueList> ?
1436         <ic:ClaimValue Uri="xs:anyURI" ...> +
1437             <ic:Value> xs:string </ic:Value>
1438         </ic:ClaimValue>
1439     </ic:ClaimValueList>
1440 </ic:InformationCardPrivateData>
1441     ...
1442 </ic:RoamingInformationCard>
1443     ...
1444 </ic:RoamingStore>

```

1445 The following describes the attributes and elements listed in the schema outlined above:

1446 */ic:RoamingStore*

1447 The collection of Information Cards selected for transfer.

1448 */ic:RoamingStore/ic:RoamingInformationCard* (one or more)

1449 An individual Information Card within the transfer stream.

1450 For brevity, the prefix string */ic:RoamingStore/ic:RoamingInformationCard* in the element names below
1451 is shortened to "...".

1452 *.../ic:InformationCardMetaData*

1453 This required element contains the metadata for an Information Card.

1454 *.../ic:InformationCardMetaData/[Information Card]*

1455 The original content of the Information Card as issued by the Identity Provider (described in
1456 Section 3.1.1).

1457 *.../ic:InformationCardMetaData/ic:IsSelfIssued*

1458 This required element indicates if the card is self-issued ("true") or not ("false").

1459 *.../ic:InformationCardMetaData/ic:PinDigest*

1460 This optional element contains a digest of the user-specified PIN information if the card is PIN-
1461 protected. The digest contains the base64 encoded bytes of the SHA1 hash of the bytes of the
1462 user-specified PIN represented using Unicode encoding UTF-16LE with no byte order mark.
1463 Usage of other algorithms is not described.

1464 *.../ic:InformationCardMetaData/ic:HashSalt*

1465 This optional element contains a random per-card entropy value used for computing the Relying
1466 Party specific PPID claim when the card is used at a Relying Party and for computing the Client
1467 Pseudonym PPID value sent an Identity Provider.

1468 *.../ic:InformationCardMetaData/ic:TimeLastUpdated*

1469 This required element contains the date and time when the card was last updated.

1470 *.../ic:InformationCardMetaData/ic:IssuerId*

1471 This required element contains an identifier for the Identity Provider with which a self-issued
1472 credential descriptor in a card issued by that Identity Provider can be resolved to the correct self-
1473 issued card. The element content SHOULD be the empty string for self-issued cards.

1474 *.../ic:InformationCardMetaData/ic:IssuerName*

1475 This required element contains a friendly name of the card issuer.

1476 *.../ic:InformationCardMetaData/ic:BackgroundColor*

1477 This required element contains the background color used to display the card image. This value
1478 is a 3-byte RGB color value in the sRGB color space used by HTML.

1479 *.../ic:InformationCardMetaData/{any}*

1480 This is an extensibility point to allow additional metadata to be included.

1481 *.../ic:InformationCardPrivateData*

1482 This required element contains the private data for an Information Card.

1483 *.../ic:InformationCardPrivateData/ic:MasterKey*

1484 This required element contains a base64 encoded 256-bit random number that provides a "secret
1485 key" for the Information Card. This key is used for computing the Relying Party specific PPID
1486 claim when the card is used at a Relying Party and for computing the Client Pseudonym PPID
1487 value sent to an Identity Provider. This element is present both for self-issued and managed
1488 Information Cards.

1489 *.../ic:InformationCardPrivateData/ic:ClaimValueList*

1490 This optional element is a container for the set of claim types and their corresponding values
1491 embodied by a self-issued card.

- 1492 *.../ic:InformationCardPrivateData/ic:ClaimValueList/ic:ClaimValue* (one or more)
- 1493 This required element is a container for an individual claim, *i.e.*, a claim type and its
- 1494 corresponding value.
- 1495 *.../ic:InformationCardPrivateData/ic:ClaimValueList/ic:ClaimValue/@Uri*
- 1496 This required attribute contains a URI that identifies the specific claim type.
- 1497 *.../ic:InformationCardPrivateData/ic:ClaimValueList/ic:ClaimValue/ic:Value*
- 1498 This required element contains the value for an individual claim type.
- 1499 *.../@{any}*
- 1500 This is an extensibility point to allow additional attributes to be specified. While an Identity
- 1501 Selector MAY ignore any extensions it does not recognize it SHOULD preserve those that it does
- 1502 not recognize and emit them in the respective
- 1503 *ic:RoamingStore/ic:RoamingInformationCard* element when updating information using
- 1504 the Information Cards Transfer Format.
- 1505 *.../{any}*
- 1506 This is an extensibility point to allow additional metadata elements to be specified. While an
- 1507 Identity Selector MAY ignore any extensions it does not recognize it SHOULD preserve those that
- 1508 it does not recognize and emit them in the respective
- 1509 *ic:RoamingStore/ic:RoamingInformationCard* element when updating information using
- 1510 the Information Cards Transfer Format.
- 1511 */ic:RoamingStore/@{any}*
- 1512 This is an extensibility point to allow additional attributes to be specified. While an Identity
- 1513 Selector MAY ignore any extensions it does not recognize it SHOULD preserve those that it does
- 1514 not recognize and emit them in the respective *ic:RoamingStore* element when updating
- 1515 information using the Information Cards Transfer Format.
- 1516 */ic:RoamingStore/{any}*
- 1517 This is an extensibility point to allow additional metadata elements to be specified. While an
- 1518 Identity Selector MAY ignore any extensions it does not recognize it SHOULD preserve those that
- 1519 it does not recognize and emit them in the respective *ic:RoamingStore* element when
- 1520 updating information using the Information Cards Transfer Format.
- 1521 **6.1.1 PIN Protected Card**
- 1522 When an Information Card is PIN protected, in addition to storing a digest of the PIN in the card data, the
- 1523 master key and claim values associated with the card MUST also be encrypted with a key derived from
- 1524 the user-specified PIN.
- 1525 It is RECOMMENDED that the PKCS-5 based key derivation method be used with the input parameters
- 1526 summarized in the table below for deriving the encryption key from the PIN. Usage of other algorithms is
- 1527 not described.

<i>Key derivation method</i>	PBKDF1 per [RFC 2898] (Section 5.1)
<i>Input parameters:</i>	
<i>Password</i>	UTF-8 encoded octets of PIN
<i>Salt</i>	16-byte random number (actual value stored along with master key)
<i>Iteration count</i>	1000 (actual value stored along with master key)
<i>Key length</i>	32 octets
<i>Hash function</i>	SHA-256

1528 The encryption method and the corresponding parameters that MUST be used are summarized in the
1529 table below.

<i>Encryption method</i>	AES-256
<i>Parameters:</i>	
<i>Padding</i>	As per PKCS-7 standard
<i>Mode</i>	CBC
<i>Block size</i>	16 bytes (as REQUIRED by AES)

1530 In a PIN-protected card, the encrypted content of the master key and the claim value fields are described
1531 below.

1532 *.../ic:InformationCardPrivateData/ic:MasterKey*

1533 This element MUST contain a base64 encoded byte array comprised of the encryption
1534 parameters and the encrypted master key serialized as per the binary structure summarized in
1535 the table below.

<i>Field</i>	<i>Offset</i>	<i>Size (bytes)</i>
Version (for internal use)	0	1
Salt used for key-derivation method	1	16
Iteration count used for key-derivation method	17	4
Initialization Vector (IV) used for encryption	21	16
Encrypted master key	37	master key length

1536 *.../ic:InformationCardPrivateData/ic:ClaimValueList/ic:ClaimValue/ic:Value*

1537 This element MUST contain a base64 encoded byte array comprised of the encrypted claim
1538 value. The encryption parameters used are taken from those serialized into the master key field
1539 and summarized in the table above.

1540 6.1.2 Computing the *ic:IssuerId*

1541 The *ic:IssuerId* value used for a card when representing it in the Information Cards Transfer Format
1542 SHOULD be computed as a function of the *ds:KeyInfo* field of the envelope digitally signed by the
1543 Identity Provider. Specifically:

- 1544 • Compute *IP PPID Seed* in the same manner as *RP PPID Seed* in Section 7.6.1, except that the
1545 certificate from *ds:KeyInfo* is used, rather than the Relying Party's.

1546 Use the *IP PPID Seed* as the `ic:IssuerId` value.

1547 The `ic:IssuerId` value SHOULD be the empty string for self-issued cards.

1548 **6.1.3 Computing the `ic:IssuerName`**

1549 The `ic:IssuerName` value used for a card when representing it in the Information Cards Transfer
1550 Format SHOULD be computed as a function of the `ds:KeyInfo` field of the envelope digitally signed by
1551 the Identity Provider. Specifically, if the certificate from `ds:KeyInfo` is an extended validation (EV)
1552 certificate [EV Cert], then set `ic:IssuerName` to the `organizationName (O)` field value from the
1553 certificate, otherwise set `ic:IssuerName` to the `commonName (CN)` field value from the certificate.

1554 **6.1.4 Creating the `ic:HashSalt`**

1555 A random `ic:HashSalt` value for a card SHOULD be created by the Identity Selector when that card is
1556 created from the `ic:InformationCard` data provided by an Identity Provider.

1557 **6.2 Post-Encryption Transfer Format**

1558 The transfer stream MUST be encrypted with a key derived from a user specified password. The XML
1559 schema used for the encrypted transfer stream is defined below:

1560 **Syntax:**

```
1561 Byte-order-mark  
1562 <?xml version="1.0" encoding="utf-8"?>  
1563 <ic:EncryptedStore xmlns:ic="..." xmlns:xenc="...">  
1564   <ic:StoreSalt xs:base64Binary </ic:StoreSalt>  
1565   <xenc:EncryptedData>  
1566     <xenc:CipherData>  
1567       <xenc:CipherValue> ... </xenc:CipherValue>  
1568     </xenc:CipherData>  
1569   </xenc:EncryptedData>  
1570 </ic:EncryptedStore>  
1571 ...
```

1572 The following describes the elements listed in the XML schema outlined above:

1573 *Byte-order-mark*

1574 The first three bytes in the stream containing the values {0xEF, 0xBB, 0xBF} constitutes a “byte
1575 order mark”.

1576 */ic:EncryptedStore*

1577 The top-level container element for the encrypted transfer stream.

1578 */ic:EncryptedStore/ic:StoreSalt*

1579 This required element contains the random salt used as a parameter for the key derivation
1580 function to derive the encryption key from a user-specified password.

1581 */ic:EncryptedStore/xenc:EncryptedData/xenc:CipherData/xenc:CipherValue*

1582 This element contains a base64 encoded byte array containing the ciphertext corresponding to
1583 the clear text transfer stream described in Section 6.1.

1584 *@{any}*

1585 This is an extensibility point to allow additional attributes to be specified. While an Identity
1586 Selector MAY ignore any extensions it does not recognize it SHOULD preserve those that it does
1587 not recognize and emit them when updating information using the Information Cards Transfer
1588 Format.

1589 {any}

1590 This is an extensibility point to allow additional metadata elements to be specified. While an
1591 Identity Selector MAY ignore any extensions it does not recognize it SHOULD preserve those that
1592 it does not recognize and emit them when updating information using the Information Cards
1593 Transfer Format.

1594 The remainder of this section describes the element content of the *xenc:CipherValue* element in the
1595 schema outline above. Specifically, it describes the encryption method used and the format of the
1596 encrypted content.

1597 The following table defines two symbolic constants, namely *EncryptionKeySalt* and *IntegrityKeySalt*, and
1598 their corresponding values used by the key derivation and the encryption methods described below to
1599 encrypt the transfer stream.

<i>EncryptionKeySalt</i>	{ 0xd9, 0x59, 0x7b, 0x26, 0x1e, 0xd8, 0xb3, 0x44, 0x93, 0x23, 0xb3, 0x96, 0x85, 0xde, 0x95, 0xfc }
<i>IntegrityKeySalt</i>	{ 0xc4, 0x01, 0x7b, 0xf1, 0x6b, 0xad, 0x2f, 0x42, 0xaf, 0xf4, 0x97, 0x7d, 0x4, 0x68, 0x3, 0xdb }

1600 The transfer stream content is encrypted with a key derived from a user-specified password. It is
1601 RECOMMENDED that the PKCS-5 based key derivation method be used with the input parameters
1602 summarized in the table below for deriving the key from the password. Usage of other algorithms is not
1603 described.

<i>Key derivation method</i>	PBKDF1 per [RFC 2898] (Section 5.1)
<i>Input parameters:</i>	
<i>Password</i>	UTF-8 encoded octets of user-specified password
<i>Salt</i>	16-byte random number (actual value stored in the <i>ic:StoreSalt</i> field)
<i>Iteration count</i>	1000
<i>Key length</i>	32 octets
<i>Hash function</i>	SHA-256

1604 The PKCS-5 key derived as per the preceding table MUST be further hashed with a 16-byte salt using the
1605 SHA256 hash function, and the resulting value used as the encryption key. The order in which the values
1606 used MUST be hashed is as follows:

1607
$$\text{Encryption Key} = \text{SHA256}(\text{EncryptionKeySalt} + \text{PKCS5-derived-key})$$

1608 Further, to provide an additional integrity check at the time of import, a “hashed integrity code” MUST be
1609 computed as follows and included along with the encrypted transfer stream content.

- 1610 • The PKCS-5 key derived as per the preceding table MUST be further hashed with a 16-byte salt
1611 using the SHA256 hash function, and the resulting value used as the integrity key. The order in
1612 which the values used MUST be hashed is as follows:

1613
$$\text{Integrity Key} = \text{SHA256}(\text{IntegrityKeySalt} + \text{PKCS5-derived-key})$$

- 1614 • The last block of the clear text transfer stream MUST be captured and further hashed with the
1615 *integrity key (IK)* and the *initialization vector (IV)* using the SHA256 hash function, and the
1616 resulting value used as the hashed integrity code. The order in which the values used MUST be
1617 hashed is as follows:

1618 $Hashed\ Integrity\ Code = SHA256(IV + IK + Last\ block\ of\ clear\ text)$
 1619 The encryption method and the corresponding parameters that MUST be used to encrypt the transfer
 1620 stream are summarized in the table below.

<i>Encryption method</i>	AES-256
<i>Parameters:</i>	
<i>Padding</i>	As per PKCS-7 standard
<i>Mode</i>	CBC
<i>Block size</i>	16 bytes (as REQUIRED by AES)

1621 The element content of `xenc:CipherValue` MUST be a base64 encoded byte array comprised of the
 1622 initialization vector used for encryption, the hashed integrity code (as described above), and the
 1623 encrypted transfer stream. It MUST be serialized as per the binary structure summarized in the table
 1624 below.

<i>Field</i>	<i>Offset</i>	<i>Size (bytes)</i>
Initialization Vector (IV) used for encryption	0	16
Hashed integrity code	16	32
Ciphertext of transfer stream	48	Arbitrary

1625 7 Simple Identity Provider Profile

1626 A simple Identity Provider, called the “Self-issued Identity Provider” (SIP), is one which allows users to
 1627 self-assert identity in the form of self-issued tokens. An Identity Selector MAY include a co-resident Self-
 1628 issued Identity Provider that conforms to the Simple Identity Provider Profile defined in this section. This
 1629 profile allows self-issued identities created within one Identity Selector to be used in another Identity
 1630 Selector such that users do not have to reregister at a Relying Party when switching Identity Selectors.
 1631 Because of the co-location there is data and metadata specific to an Identity Provider that need to be
 1632 shareable between Identity Selectors.

1633 7.1 Self-Issued Information Card

1634 The `ic:Issuer` element within an Information Card provides a logical name for the issuer of the
 1635 Information Card. An Information Card issued by a SIP (*i.e.*, a self-issued Information Card) MUST use
 1636 the special URI below as the value of the `ic:Issuer` element in the Information Card.

1637 **URI:**

1638 `http://schemas.xmlsoap.org/ws/2005/05/identity/issuer/self`

1639 7.2 Self-Issued Token Characteristics

1640 The self-issued tokens issued by a SIP MUST have the following characteristics:

- 1641 • The token type of the issued token MUST be SAML 1.1 which MUST be identified by either of the
 1642 following token type URIs:
 - 1643 ○ `urn:oasis:names:tc:SAML:1.0:assertion`, or
 - 1644 ○ `http://docs.oasis-open.org/wss/oasis-wss-saml-token-profile-1.1#SAMLV1.1`.
- 1645 • It is RECOMMENDED that the signature key used in the issued token be a 2048-bit asymmetric
 1646 RSA key which identifies the issuer. Usage of other algorithms is not described.

- 1647
- 1648
- 1649
- The issuer of the token, indicated by the value of the `saml:Issuer` attribute on the `saml:Assertion` root element, MUST be identified by the following URI defined in Section 2.1.1 representing the issuer “self”.

1650 `http://schemas.xmlsoap.org/ws/2005/05/identity/issuer/self`
 - The issued token MUST contain the `saml:Conditions` element specifying:
 - the token validity interval using the `NotBefore` and `NotOnOrAfter` attributes, and
 - the `saml:AudienceRestrictionCondition` element restricting the token to a specific target scope (i.e., a specific recipient of the token).
 - The `saml:NameIdentifier` element SHOULD NOT be used to specify the Subject of the token.
 - The subject confirmation method MUST be specified as one of:
 - `urn:oasis:names:tc:SAML:1.0:cm:holder-of-key`, or
 - `urn:oasis:names:tc:SAML:1.0:cm:bearer` (for Browser based applications).
 - When the subject confirmation method is “holder of key”, the subject confirmation key (also referred to as the *proof key*) MUST be included in the token in the `ds:KeyInfo` child element under the `saml:SubjectConfirmation` element. The proof key MUST be encoded in the token as follows:
 - For *symmetric* key tokens, the proof key is encrypted to the recipient of the token in the form of a `xenc:EncryptedKey` child element. It is RECOMMENDED that an AES key with a default size of 256 bits be used, but a different size MAY be specified by the Relying Party. Usage of other algorithms is not described.
 - For *asymmetric* key tokens, it is RECOMMENDED that the proof key be a public RSA key value specified as a `ds:RSAKeyValue` child element under the `ds:KeyValue` element. The default size of the key is 2048 bits. Usage of other algorithms is not described.
 - The issued token MUST contain a single attribute statement (i.e., a single `saml:AttributeStatement` element) containing the subject confirmation data and the requested claims (called *attributes* in a SAML token).
 - The claim types supported by the self-issued token SHOULD include those listed in Section 7.5.
 - The claims asserted in the `saml:AttributeStatement` element of the issued token MUST be named as follows using the claim type definitions in the XML schema file referenced in Section 7.5. For each claim represented by a `saml:Attribute` element,
 - the `AttributeName` attribute is set to the NCname of the corresponding claim type defined in the XML schema file, and
 - the `AttributeNamespace` attribute is set to the target namespace of the XML schema file, namely

1683 `http://schemas.xmlsoap.org/ws/2005/05/identity/claims`
- 1684 It is RECOMMENDED that the XML digital signature [XMLDSIG] profile used to sign a self-issued token
- 1685 be as follows. Usage of other algorithms is not described.
- Uses the *enveloped signature* format identified by the transform algorithm identifier “`http://www.w3.org/2000/09/xmldsig#enveloped-signature`”. The token signature contains a single `ds:Reference` containing a URI reference to the `AssertionID` attribute value of the root element of the SAML token.

- 1690 • Uses the RSA signature method identified by the algorithm identifier
1691 "http://www.w3.org/2000/09/xmldsig#rsa-sha1".
- 1692 • Uses the exclusive canonicalization method identified by the algorithm identifier
1693 "http://www.w3.org/2001/10/xml-exc-c14n#" for canonicalizing the token content as well as the
1694 signature content.
- 1695 • Uses the SHA1 digest method identified by the algorithm identifier
1696 "http://www.w3.org/2000/09/xmldsig#sha1" for digesting the token content being signed.
- 1697 • No other transforms, other than the ones listed above, are used in the enveloped signature.
- 1698 • The ds:KeyInfo element is always present in the signature carrying the signing RSA public key
1699 in the form of a ds:RSAKeyValue child element.

1700 Following is an example of a self-issued signed Security Token containing three claims.

1701 *Example:*

```

1702 <Assertion xmlns="urn:oasis:names:tc:SAML:1.0:assertion"
1703   AssertionID="urn:uuid:08301dba-d8d5-462f-85db-dec08c5e4e17"
1704   Issuer="http://schemas.xmlsoap.org/ws/2005/05/identity/issuer/self"
1705   IssueInstant="2004-10-06T16:44:20.00Z"
1706   MajorVersion="1" MinorVersion="1">
1707   <Conditions NotBefore="2004-10-06T16:44:20.00Z"
1708     NotOnOrAfter="2004-10-06T16:49:20.00Z">
1709     <AudienceRestrictionCondition>
1710       <Audience>http://www.relying-party.com</Audience>
1711     </AudienceRestrictionCondition>
1712   </Conditions>
1713   <AttributeStatement>
1714     <Subject>
1715     <!-- Content here differs; see examples that follow -->
1716     </Subject>
1717     <Attribute AttributeName="privatepersonalidentifier"
1718   AttributeNamespace="http://schemas.xmlsoap.org/ws/2005/05/identity/claims">
1719       <AttributeValue>
1720         f8301dba-d8d5a904-462f0027-85dbdec0
1721       </AttributeValue>
1722     </Attribute>
1723     <Attribute AttributeName="givenname"
1724   AttributeNamespace="http://schemas.xmlsoap.org/ws/2005/05/identity/claims">
1725       <AttributeValue>dasf</AttributeValue>
1726     </Attribute>
1727     <Attribute AttributeName="emailaddress"
1728   AttributeNamespace="http://schemas.xmlsoap.org/ws/2005/05/identity/claims">
1729       <AttributeValue>dasf@mail.com</AttributeValue>
1730     </Attribute>
1731   </AttributeStatement>
1732   <Signature xmlns="http://www.w3.org/2000/09/xmldsig#">
1733     <SignedInfo>
1734       <CanonicalizationMethod
1735         Algorithm="http://www.w3.org/2001/10/xml-exc-c14n#" />
1736       <SignatureMethod
1737         Algorithm="http://www.w3.org/2000/09/xmldsig#rsa-sha1" />
1738       <Reference URI="urn:uuid:08301dba-d8d5-462f-85db-dec08c5e4e17">
1739         <Transforms>
1740           <Transform
1741             Algorithm="http://.../2000/09/xmldsig#enveloped-signature" />
1742           <Transform
1743             Algorithm="http://www.w3.org/2001/10/xml-exc-c14n#" />
1744         </Transforms>
1745         <DigestMethod
1746           Algorithm="http://www.w3.org/2000/09/xmldsig#sha1" />
1747         <DigestValue>vpnIyEi4R/S4b+lvEH4gwQ9iHsY=</DigestValue>

```

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```
</Reference>
</SignedInfo>
<SignatureValue>...</SignatureValue>
<!-- token signing key -->
<KeyInfo>
  <KeyValue>
    <RSAKeyValue>
      <Modulus>... utnQyEi8R/S4b+lvEH4gwR9ihsV ...</Modulus>
      <Exponent>AQAB</Exponent>
    </RSAKeyValue>
  </KeyValue>
</KeyInfo>
</Signature>
</Assertion>
```

1762 The content of the `saml:Subject` element in the self-issued token differs based on the subject
1763 confirmation method and the type of proof key used. The following examples illustrate each of the three
1764 variations of the content of this element.

1765 The following example illustrates the content of the `saml:Subject` element when subject confirmation
1766 method is “holder of key” using a symmetric proof key.

1767 *Example:*

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```
<Subject xmlns="urn:oasis:names:tc:SAML:1.0:assertion" xmlns:ds="..."
  xmlns:wss="..." xmlns:xenc="...">
  <SubjectConfirmation>
    <ConfirmationMethod>
      urn:oasis:names:tc:SAML:1.0:cm:holder-of-key
    </ConfirmationMethod>
    <ds:KeyInfo>
      <!-- symmetric proof key encrypted to recipient -->
      <xenc:EncryptedKey>
        <xenc:EncryptionMethod
          Algorithm="http://www.w3.org/2001/04/xmlenc#rsa-oaep-mgf1p"/>
        <ds:KeyInfo>
          <ds:X509Data>
            <wsse:KeyIdentifier
              ValueType="http://docs.oasis-open.org/wss/2004/xx/oasis-2004xx-
wss-soap-message-security-1.1#ThumbprintSHA1">
              EdFoIaAeja85201XTzjNMVWy7532jUYtrx=
            </wsse:KeyIdentifier>
          </ds:X509Data>
        </ds:KeyInfo>
      <xenc:CipherData>
        <xenc:CipherValue>
          AuFhiu72+1kaJiAuFhiu72+1kaJi=
        </xenc:CipherValue>
      </xenc:CipherData>
    </xenc:EncryptedKey>
  </ds:KeyInfo>
</SubjectConfirmation>
</Subject>
```

1797 The following example illustrates the content of the `saml:Subject` element when subject confirmation
1798 method is “holder of key” using an asymmetric proof key.

1799 *Example:*

1800
1801
1802
1803
1804
1805

```
<Subject xmlns="urn:oasis:names:tc:SAML:1.0:assertion" xmlns:ds="...">
  <SubjectConfirmation>
    <ConfirmationMethod>
      urn:oasis:names:tc:SAML:1.0:cm:holder-of-key
    </ConfirmationMethod>
    <ds:KeyInfo>
```

```

1806 <!-- asymmetric RSA public key as proof key -->
1807 <ds:KeyValue>
1808   <ds:RSAKeyValue>
1809     <ds:Modulus>... FntQyKi6R/E4b+lvDH4gwS5ihsU ...</ds:Modulus>
1810     <ds:Exponent>AQAB</ds:Exponent>
1811   </ds:RSAKeyValue>
1812 </ds:KeyValue>
1813 </ds:KeyInfo>
1814 </SubjectConfirmation>
1815 </Subject>

```

1816 The following example illustrates the content of the `saml:Subject` element when subject confirmation
 1817 method is “bearer” using no proof key.

1818 *Example:*

```

1819 <Subject xmlns="urn:oasis:names:tc:SAML:1.0:assertion">
1820   <SubjectConfirmation>
1821     <ConfirmationMethod>
1822       urn:oasis:names:tc:SAML:1.0:cm:bearer
1823     </ConfirmationMethod>
1824   </SubjectConfirmation>
1825 </Subject>

```

1826 7.3 Self-Issued Token Encryption

1827 One of the goals of the Information Card Model is to ensure that any claims are exposed only to the
 1828 Relying Party intended by the user. For this reason, the SIP SHOULD encrypt the self-issued token under
 1829 the key of the Relying Party. This guarantees that a token intended for one Relying Party cannot be
 1830 decoded by nor be meaningful to another Relying Party. As described in Section 8.3, when the Relying
 1831 Party is not identified by a certificate, because no key is available for the Relying Party in this case, the
 1832 token can not be encrypted, but SHOULD still be signed.

1833 When a self-issued token is encrypted, the XML encryption [XMLENC] standard MUST be used. The
 1834 encryption construct MUST use encrypting the self-issued token with a randomly generated symmetric
 1835 key which in turn is encrypted to the Relying Party’s public key taken from its X.509 v3 certificate. The
 1836 encrypted symmetric key MUST be placed in an `xenc:EncryptedKey` element within the
 1837 `xenc:EncryptedData` element carrying the encrypted Security Token.

1838 It is RECOMMENDED that the XML encryption [XMLENC] profile that is used for encrypting the key and
 1839 the token be as follows. Usage of other algorithms is not described.

- 1840 • Uses the RSA-OAEP key wrap method identified by the algorithm identifier
 1841 “<http://www.w3.org/2001/04/xmlenc#rsa-oeap-mgf1p>” for encrypting the encryption key.
- 1842 • Uses the AES256 with CBC encryption method identified by the algorithm
 1843 “<http://www.w3.org/2001/04/xmlenc#aes256-cbc>” for encrypting the token. The padding method
 1844 used is as per the PKCS-7 standard in which the number of octets remaining in the last block is
 1845 used as the padding octet value.
- 1846 • The `ds:KeyInfo` element is present in the encrypted key specifying the encryption key
 1847 information in the form of a Security Token reference.

1848 Following is an illustration of a self-issued token encrypted to a Relying Party using the encryption
 1849 structure described above.

1850 *Example:*

```

1851 <xenc:EncryptedData Type="http://www.w3.org/2001/04/xmlenc#Element"
1852   xmlns:xenc="..." xmlns:ds="..." xmlns:wss="...">
1853   <xenc:EncryptionMethod
1854     Algorithm="http://www.w3.org/2001/04/xmlenc#aes256-cbc" />
1855   <ds:KeyInfo>

```

```

1856 <xenc:EncryptedKey>
1857   <xenc:EncryptionMethod
1858     Algorithm="http://www.w3.org/2001/04/xmlenc#rsa-oaep-mgf1p">
1859     <ds:DigestMethod Algorithm="http://www.w3.org/2000/09/xmldsig#sha1"/>
1860   </xenc:EncryptionMethod
1861   <ds:KeyInfo>
1862     <wsse:SecurityTokenReference>
1863       <wsse:KeyIdentifier
1864         ValueType="http://docs.oasis-open.org/wss/2004/xx/oasis-2004xx-
1865 wss-soap-message-security-1.1#ThumbprintSHA1"
1866         EncodingType="http://docs.oasis-open.org/wss/2004/01/oasis200401-
1867 wss-soap-message-security-1.0#Base64Binary">
1868           +PYbznDaB/dlhjIfqCQ458E72wA=
1869         </wsse:KeyIdentifier>
1870       </wsse:SecurityTokenReference>
1871     </ds:KeyInfo>
1872     <xenc:CipherData>
1873       <xenc:CipherValue>...Ukasdj8257Fjwf=</xenc:CipherValue>
1874     </xenc:CipherData>
1875   </xenc:EncryptedKey>
1876 </ds:KeyInfo>
1877 <xenc:CipherData>
1878   <!-- Start encrypted Content
1879   <Assertion xmlns="urn:oasis:names:tc:SAML:1.0:assertion"
1880     AssertionID="urn:uuid:08301dba-d8d5-462f-85db-dec08c5e4e17" ...>
1881     ...
1882   </Assertion>
1883   End encrypted content -->
1884   <xenc:CipherValue>...aKlh4817JerpZoDofy90=</xenc:CipherValue>
1885 </xenc:CipherData>
1886 </xenc:EncryptedData>

```

1887 7.4 Self-Issued Token Signing Key

1888 The key used to sign a self-issued token presented to a Relying Party also represents a unique identifier
1889 for the Subject of the token. In order to prevent the key from becoming a correlation identifier across
1890 relying parties, a SIP SHOULD use a different key to sign a self-issued token for each Relying Party
1891 where the card is used. In other words, the key used to sign the self-issued token is pair-wise unique for a
1892 given Information Card and RP combination. To allow self-issued identities created by a SIP within one
1893 Identity Selector to be used in another, the signing keys used by the two SIPs SHOULD be the same.

1894 It is RECOMMENDED that the signing key be an RSA key. Usage of other algorithms is not described.

1895 This section specifies the “processing rules” that SHOULD be used by a SIP to derive the RSA key used
1896 to sign the self-issued token for a combination of an Information Card and an RP where the card is used.
1897 Each self-issued Information Card contains a 256-bit secret random number, called the “master key” (see
1898 Section 6.1), that is used as the secret entropy in deriving the token signing RSA key. (Managed
1899 Information Cards also have a master key that is used in the Client Pseudonym PPID calculation, as per
1900 Section 3.3.4.1.)

1901 Key derivation is done according to the ANSI X9.31 standard for key generation which starts with
1902 requiring the use of six random values denoted by X_{p1} , X_{p2} , X_{q1} , X_{q2} , X_p , and X_q . The processing rules
1903 described here enunciate how to transform the master key in an Information Card into the six random
1904 inputs for the X9.31 key generation process. The actual key computation algorithm in the X9.31 standard
1905 is *not* reproduced here.

1906 The values X_p and X_q are REQUIRED to be at least 512 bits and each independently carries the full
1907 entropy of any Information Card master key of up to 512 bits in length. The values X_{p1} , X_{p2} , X_{q1} , and X_{q2}
1908 have a length of only 100 to 121 bits and therefore will be shorter than the Information Card master key
1909 and hence cannot each independently carry the full master key entropy. The details of the X9.31 protocol,

1910 however, ensure that for reasonably sized master keys, full entropy will be achieved in the generated
1911 asymmetric key pair.

1912 7.4.1 Processing Rules

1913 This key generation mechanism can be used to generate 1024 or 2048-bit RSA keys.

1914 **Notation:** If H is an n -bit big-endian value, the convention $H[1..p]$ denotes bits 1 through p in the value of
1915 H where $p \leq n$, and bit-1 is the rightmost (least significant) bit whereas bit- n is the leftmost (most
1916 significant) bit in the value of H . Also, the convention $X + Y$ denotes the concatenation of the big-endian
1917 bit value of X followed by the big-endian bit value of Y .

1918 Assume that the master key for the selected Information Card (see Section 6.1) is M and the unique *RP*
1919 *Identifier* (derived as per Section 7.6.1) is T . The following processing rules SHOULD be used to derive
1920 the inputs for the X9.31 key generation process.

1921 1. Define 32-bit DWORD constants C_n as follows:

1922 $C_n = n$, where $n = 0, 1, 2, \dots, 15$

1923 2. Compute SHA-1 hash values H_n as follows:

1924 If the requested key size = 1024 bits, compute

1925 $H_n = \text{SHA1}(M + T + C_n)$ for $n = 0, 1, 2, \dots, 9$

1926 If the requested key size = 2048 bits, compute

1927 $H_n = \text{SHA1}(M + T + C_n)$ for $n = 0, 1, 2, \dots, 15$

1928 3. Extract the random input parameters for the X9.31 protocol as follows:

1929 For all key sizes, compute

1930 X_{p1} [112-bits long] = $H_0[1..112]$

1931 X_{p2} [112-bits long] = $H_1[1..112]$

1932 X_{q1} [112-bits long] = $H_2[1..112]$

1933 X_{q2} [112-bits long] = $H_3[1..112]$

1934 If the requested key size = 1024 bits, compute

1935 X_p [512-bits long] = $H_4[1..160] + H_5[1..160] + H_6[1..160] + H_0[129..160]$

1936 X_q [512-bits long] = $H_7[1..160] + H_8[1..160] + H_9[1..160] + H_1[129..160]$

1937 If the requested key size = 2048 bits, compute

1938 X_p [1024-bits long] = $H_4[1..160] + H_5[1..160] + H_6[1..160] + H_0[129..160] +$

1939 $H_{10}[1..160] + H_{11}[1..160] + H_{12}[1..160] + H_2[129..160]$

1940 X_q [1024-bits long] = $H_7[1..160] + H_8[1..160] + H_9[1..160] + H_1[129..160] +$

1941 $H_{13}[1..160] + H_{14}[1..160] + H_{15}[1..160] + H_3[129..160]$

1942 4. The X9.31 specification (Section 4.1.2) requires that the input values X_{p1} , X_{p2} , X_{q1} , X_{q2} MUST
1943 satisfy the following conditions.

1944 • The large prime factors p_1 , p_2 , q_1 , and q_2 are the first primes greater than their respective
1945 random X_{p1} , X_{p2} , X_{q1} , X_{q2} input values. They are randomly selected from the set of prime
1946 numbers between 2^{100} and 2^{120} , and each SHALL pass at least 27 iterations of Miller-
1947 Rabin.

1948 To ensure that the lower bound of 2^{100} is met, set the 101th bit of X_{p1} , X_{p2} , X_{q1} , X_{q2} to '1' (i.e.
 1949 $X_{p1}[13^{\text{th}} \text{ byte}] = 0x10$, $X_{p2}[13^{\text{th}} \text{ byte}] = 0x10$, $X_{q1}[13^{\text{th}} \text{ byte}] = 0x10$, $X_{q2}[13^{\text{th}} \text{ byte}] = 0x10$).

1950 5. The X9.31 specification (Section 4.1.2) requires that the input values X_p and X_q MUST satisfy the
 1951 following conditions.

1952 • If the requested key size = 1024 bits, then
 1953 $X_p \geq (\sqrt{2})(2^{511})$ and $X_q \geq (\sqrt{2})(2^{511})$

1954 • If the requested key size = 2048 bits, then
 1955 $X_p \geq (\sqrt{2})(2^{1023})$ and $X_q \geq (\sqrt{2})(2^{1023})$

1956 To ensure this condition is met, set the two most significant bits of X_p and X_q to '1' (i.e. $X_p[\text{most}$
 1957 $\text{significant byte}] = 0xC0$, $X_q[\text{most significant byte}] = 0xC0$).

1958 6. Compute 1024 or 2048-bit keys as per the X9.31 protocol using $\{X_{p1}, X_{p2}, X_{q1}, X_{q2}, X_p, X_q\}$ as
 1959 the random input parameters.

1960 7. Use a 32-bit DWORD size *public exponent* value of 65537 for the generated RSA keys.

1961 There are three conditions as follows in the X9.31 specification which, if not met, require that one or more
 1962 of the input parameters MUST be regenerated.

1963 • (Section 4.1.2 of X9.31) $|X_p - X_q| \geq 2^{412}$ (for 1024-bit keys) or $|X_p - X_q| \geq 2^{924}$ (for 2048-bit keys). If
 1964 not true, X_q MUST be regenerated and q recomputed.

1965 • (Section 4.1.2 of X9.31) $|p - q| \geq 2^{412}$ (for 1024-bit keys) or $|p - q| \geq 2^{924}$ (for 2048-bit keys). If not
 1966 true, X_q MUST be regenerated and q recomputed.

1967 • (Section 4.1.3 of X9.31) $d > 2^{512}$ (for 1024-bit keys) or $d > 2^{1024}$ (for 2048-bit keys). If not true,
 1968 X_{q1} , X_{q2} , and X_q MUST be regenerated and key generation process repeated.

1969 When it is necessary to regenerate an input parameter as necessitated by one or more of the conditions
 1970 above, it is essential that the regeneration of the input parameter be deterministic to guarantee that all
 1971 implementations of the key generation mechanism will produce the same results. Furthermore, input
 1972 regeneration is a potentially unlimited process. In other words, it is possible that regeneration MUST be
 1973 performed more than once. In theory, one MAY need to regenerate input parameters many times before
 1974 a key that meets all of the requirements can be generated.

1975 The following processing rules MUST be used for regenerating an input parameter X of length n -bits
 1976 when necessary:

1977 a. Pad the input parameter X on the right, assuming a big-endian representation, with m zero-bits
 1978 where m is the smallest number which satisfies $((n+m) \bmod 128 = 0)$.

1979 b. Encrypt the padded value with the AES-128 (Electronic Code Book mode) algorithm using the 16-
 1980 byte constant below as the encryption key:

<i>Encryption Key</i>	{ 0x8b, 0xe5, 0x61, 0xf5, 0xbc, 0x3e, 0x0c, 0x4e, 0x94, 0x0d, 0x0a, 0x6d, 0xdc, 0x21, 0x9d, 0xfd }
-----------------------	--

1981 c. Use the leftmost n -bits of the result above as the REQUIRED regenerated parameter.

1982 If a regenerated parameter does not satisfy the necessary conditions, then repeat the 3-step process
 1983 above (call it *RegenFunction*) to generate the parameter again by using the output of one iteration as
 1984 input for the next iteration. In other words, if the output of the i^{th} iteration of the regeneration function
 1985 above for an input parameter X is given by X_i then

1986
$$X_{i+1} = \text{RegenFunction}(X_i)$$

1987 7.5 Claim Types

1988 This section specifies a set of claim (attribute) types and the corresponding URIs that is defined by this
1989 profile for some commonly used personal information. These claim types MAY be used by a SIP, in self-
1990 issued tokens, or by other Identity Providers. Note that, wherever possible, the claims included here
1991 reuse and refer to the attribute semantics defined in other established industry standards that deal with
1992 personal information. A SIP SHOULD support these claim types at a minimum. Other Identity Providers
1993 MAY also support these claim types when appropriate. The URIs defined here MAY be used by a Relying
1994 Party to specify requested claims in its policy.

1995 The base XML namespace URI that is used by the claim types defined here is as follows:

1996 `http://schemas.xmlsoap.org/ws/2005/05/identity/claims`

1997 For convenience, an XML Schema for the claim types defined here can be found at:

1998 `http://schemas.xmlsoap.org/ws/2005/05/identity/claims.xsd`

1999 7.5.1 First Name

2000 **URI:** `http://schemas.xmlsoap.org/ws/2005/05/identity/claims/givenname`

2001 **Type:** `xs:string`

2002 **Definition:** (*givenName* in [RFC 2256]) Preferred name or first name of a Subject. According to RFC
2003 2256: "This attribute is used to hold the part of a person's name which is not their surname nor middle
2004 name."

2005 7.5.2 Last Name

2006 **URI:** `http://schemas.xmlsoap.org/ws/2005/05/identity/claims/surname`

2007 **Type:** `xs:string`

2008 **Definition:** (*sn* in [RFC 2256]) Surname or family name of a Subject. According to RFC 2256: "This is the
2009 X.500 surname attribute which contains the family name of a person."

2010 7.5.3 Email Address

2011 **URI:** `http://schemas.xmlsoap.org/ws/2005/05/identity/claims/emailaddress`

2012 **Type:** `xs:string`

2013 **Definition:** (*mail* in *inetOrgPerson*) Preferred address for the "To:" field of email to be sent to the Subject,
2014 usually of the form <user>@<domain>. According to *inetOrgPerson* using [RFC 1274]: "This attribute type
2015 specifies an electronic mailbox attribute following the syntax specified in RFC 822."

2016 7.5.4 Street Address

2017 **URI:** `http://schemas.xmlsoap.org/ws/2005/05/identity/claims/streetaddress`

2018 **Type:** `xs:string`

2019 **Definition:** (*street* in [RFC 2256]) Street address component of a Subject's address information.
2020 According to RFC 2256: "This attribute contains the physical address of the object to which the entry
2021 corresponds, such as an address for package delivery." Its content is arbitrary, but typically given as a PO
2022 Box number or apartment/house number followed by a street name, e.g. 303 Mulberry St.

2023 7.5.5 Locality Name or City

2024 **URI:** `http://schemas.xmlsoap.org/ws/2005/05/identity/claims/locality`

2025 **Type:** `xs:string`

2026 **Definition:** (*l* in [RFC 2256]) Locality component of a Subject's address information. According to RFC
2027 2256: "This attribute contains the name of a locality, such as a city, county or other geographic region."
2028 e.g. Redmond.

2029 **7.5.6 State or Province**

2030 **URI:** <http://schemas.xmlsoap.org/ws/2005/05/identity/claims/stateorprovince>

2031 **Type:** *xs:string*

2032 **Definition:** (*st* in [RFC 2256]) Abbreviation for state or province name of a Subject's address information.
2033 According to RFC 2256: "This attribute contains the full name of a state or province. The values SHOULD
2034 be coordinated on a national level and if well-known shortcuts exist - like the two-letter state abbreviations
2035 in the US – these abbreviations are preferred over longer full names." e.g. WA.

2036 **7.5.7 Postal Code**

2037 **URI:** <http://schemas.xmlsoap.org/ws/2005/05/identity/claims/postalcode>

2038 **Type:** *xs:string*

2039 **Definition:** (*postalCode* in X.500) Postal code or zip code component of a Subject's address information.
2040 According to X.500(2001): "The postal code attribute type specifies the postal code of the named object.
2041 If this attribute value is present, it will be part of the object's postal address - zip code in USA, postal code
2042 for other countries."

2043 **7.5.8 Country**

2044 **URI:** <http://schemas.xmlsoap.org/ws/2005/05/identity/claims/country>

2045 **Type:** *xs:string*

2046 **Definition:** (*c* in [RFC 2256]) Country of a Subject. According to RFC 2256: "This attribute contains a
2047 two-letter ISO 3166 country code."

2048 **7.5.9 Primary or Home Telephone Number**

2049 **URI:** <http://schemas.xmlsoap.org/ws/2005/05/identity/claims/homephone>

2050 **Type:** *xs:string*

2051 **Definition:** (*homePhone* in *inetOrgPerson*) Primary or home telephone number of a Subject. According
2052 to *inetOrgPerson* using [RFC 1274]: "This attribute type specifies a home telephone number associated
2053 with a person." Attribute values SHOULD follow the agreed format for international telephone numbers,
2054 e.g. +44 71 123 4567.

2055 **7.5.10 Secondary or Work Telephone Number**

2056 **URI:** <http://schemas.xmlsoap.org/ws/2005/05/identity/claims/otherphone>

2057 **Type:** *xs:string*

2058 **Definition:** (*telephoneNumber* in X.500 *Person*) Secondary or work telephone number of a Subject.
2059 According to X.500(2001): "This attribute type specifies an office/campus telephone number associated
2060 with a person." Attribute values SHOULD follow the agreed format for international telephone numbers,
2061 e.g. +44 71 123 4567.

2062 **7.5.11 Mobile Telephone Number**

2063 **URI:** <http://schemas.xmlsoap.org/ws/2005/05/identity/claims/mobilephone>

2064 **Type:** *xs:string*

2065 **Definition:** (*mobile* in *inetOrgPerson*) Mobile telephone number of a Subject. According to
2066 *inetOrgPerson* using [RFC 1274]: "This attribute type specifies a mobile telephone number associated

2067 with a person.” Attribute values SHOULD follow the agreed format for international telephone numbers,
2068 e.g. +44 71 123 4567.

2069 **7.5.12 Date of Birth**

2070 **URI:** *http://schemas.xmlsoap.org/ws/2005/05/identity/claims/dateofbirth*

2071 **Type:** *xs:date*

2072 **Definition:** The date of birth of a Subject in a form allowed by the *xs:date* data type.

2073 **7.5.13 Gender**

2074 **URI:** *http://schemas.xmlsoap.org/ws/2005/05/identity/claims/gender*

2075 **Type:** *xs:token*

2076 **Definition:** Gender of a Subject that can have any of these exact string values – ‘0’ (meaning
2077 unspecified), ‘1’ (meaning Male) or ‘2’ (meaning Female). Using these values allows them to be language
2078 neutral.

2079 **7.5.14 Private Personal Identifier**

2080 **URI:** *http://schemas.xmlsoap.org/ws/2005/05/identity/claims/privatepersonalidentifier*

2081 **Type:** *xs:base64binary*

2082 **Definition:** A private personal identifier (PPID) that identifies the Subject to a Relying Party. The word
2083 “private” is used in the sense that the Subject identifier is specific to a given Relying Party and hence
2084 private to that Relying Party. A Subject’s PPID at one Relying Party cannot be correlated with the
2085 Subject’s PPID at another Relying Party. Typically, the PPID SHOULD be generated by an Identity
2086 Provider as a pair-wise pseudonym for a Subject for a given Relying Party. For a self-issued Information
2087 Card, the Self-issued Identity Provider in an Identity Selector system SHOULD generate a PPID for each
2088 Relying Party as a function of the card identifier and the Relying Party’s identity. The processing rules and
2089 encoding of the PPID claim value is specified in Section 7.6.

2090 **Compatibility Note:** Some existing Identity Selectors omit listing the PPID claim as an
2091 `ic:SupportedClaimType` from the `ic:SupportedClaimTypeList` when saving a self-issued
2092 Information Card in the Information Cards Transfer Format defined in Section 6.1, even though the PPID
2093 claim is supported by the card. This behavior is deprecated, as all supported claims SHOULD be listed.
2094 Nonetheless, Identity Selectors MAY choose to recognize this case and support the PPID claim for self-
2095 issued cards not explicitly listing this claim.

2096 **7.5.15 Web Page**

2097 **URI:** *http://schemas.xmlsoap.org/ws/2005/05/identity/claims/webpage*

2098 **Type:** *xs:string*

2099 **Definition:** The Web page of a Subject expressed as a URL.

2100 **7.6 The PPID Claim**

2101 The PPID claim for a Subject user represents a unique identifier for that user at a given Relying Party that
2102 is different from all identifiers for that user at any other Relying Party. In other words, the PPID is a pair-
2103 wise unique identifier for a given user identity and Relying Party combination. Since an Information Card
2104 represents a specific user identity and a Relying Party is the organization behind a Web service or site
2105 that the user interacts with, the PPID claim is logically a function of an Information Card and the
2106 organizational identity of the Relying Party.

2107 This section describes the processing rules that SHOULD be used by a SIP to derive a PPID claim value
2108 for a combination of an Information Card and a Relying Party where it is used.

2109 **7.6.1 Relying Party Identifier and Relying Party PPID Seed**

2110 In order to derive the PPID and Signing Key as functions of the RP's organizational identity, a stable and
2111 unique identifier for the RP, called the *RP Identifier*, is needed. In the Information Card Model, the identity
2112 of a Relying Party (RP) possessing an X.509v3 certificate is presented in the form of that certificate.
2113 Therefore the organizational identity of the RP is obtained by applying a series of transformations to the
2114 identity information carried in the X.509 certificate. (See Section 8 for the specification of how to compute
2115 these values for Relying Parties not possessing a certificate.)

2116 As specified in [RFC 2459], the subject field inside an X.509 certificate identifies the entity associated with
2117 the public key stored in the subject public key field. Where it is non-empty, the subject field MUST contain
2118 an X.500 distinguished name (DN). The DN MUST be unique for each subject entity certified by the one
2119 CA as defined by the issuer name field.

2120 The subject field contains a DN of the form shown below:

2121 `CN=string, [OU=string, ...] O=string, L=string, S=string, C=string`

2122 The Object Identifiers for these attributes from the DN are as follows:

<i>Field Abbreviation</i>	<i>Field Name</i>	<i>Object Identifier</i>
O	organizationName	2.5.4.10
L	localityName	2.5.4.7
S	stateOrProvinceName	2.5.4.8
C	countryName	2.5.4.6
CN	commonName	2.5.4.3

2123 Note that the field names and abbreviations used in this specification may not correspond to those used
2124 by particular software but the underlying Object Identifiers (OIDs) of the attributes are unambiguous.

2125 For an end-entity certificate, the values of the attribute types O (organizationName), L (localityName), S
2126 (stateOrProvinceName) and C (countryName) together uniquely identify the organization to which the
2127 end-entity identified by the certificate belongs. These attribute types are collectively referred to as the
2128 *organizational identifier attributes* here. The *RP Identifier* is constructed using these organizational
2129 identifier attributes as described below.

2130 The *RP Identifier* value is used as an input to the Signing Key computation. A closely related value called
2131 the Relying Party PPID Seed is also computed, which is used as an input to the PPID claim and Client
2132 Pseudonym PPID computations. In many cases these are the same but in one case they differ.

2133 There are four cases of how the *RP Identifier* and *RP PPID Seed* are constructed depending on which
2134 organizational identifier attributes the RP's certificate contains, if it is an extended validation (EV)
2135 certificate [EV Cert] with respect to the organizational identifier attributes, and if it chains to a trusted root
2136 certificate.

2137 **Case 1: RP's certificate is EV for organizational identifier attributes and chains to a trusted root**
2138 **certificate authority**

- 2139 • Convert the organizational identifier attributes in the end-entity certificate into a string, call it
2140 *OrgIdString*, of the following form:

2141 `|O="string"|L="string"|S="string"|C="string|`

2142 The vertical bar character (ASCII 0x7C) is used as a delimiter at the start and end of the string as
2143 well as between the attribute types. Further, the string values of the individual attribute types are
2144 enclosed within double quote characters (ASCII 0x22). If an attribute type is absent in the subject
2145 field of the end-entity certificate, then the corresponding string value is the empty string ("").

2146 Following is an example *OrgIdString* per this convention.

- 2147 |O="Microsoft"|L="Redmond"|S="Washington"|C="US"|
- 2148 • Encode all the characters in *OrgIdString* into a sequence of bytes, call it *OrgIdBytes*, using
2149 Unicode encoding UTF-16LE with no byte order mark.
- 2150 • Hash *OrgIdBytes* using the SHA256 hash function, and use the resulting value as the *RP*
2151 *Identifier* and *RP PPID Seed*.
- 2152
$$RP\ PPID\ Seed = RP\ Identifier = SHA256(OrgIdBytes)$$

2153 **Case 2: RP's certificate is not EV for organizational identifier attributes, has a non-empty**
2154 **organizationName (O) value, and chains to a trusted root certificate authority**

- 2155 • Convert the organizational identifier attributes in the end-entity certificate into a string, call it
2156 *OrgIdString*, in the same manner as employed for Case 1 above.
- 2157 • Let *QualifierString* be the string:
2158 |Non-EV
- 2159 • Let *QualifiedOrgIdString* be the concatenation of *QualifierString* and *OrgIdString*.
2160
$$QualifiedOrgIdString = QualifierString + OrgIdString$$
- 2161 • Encode all the characters in *QualifiedOrgIdString* into a sequence of bytes, call it
2162 *QualifiedOrgIdBytes*, using Unicode encoding UTF-16LE with no byte order mark.
- 2163 • Hash *QualifiedOrgIdBytes* using the SHA256 hash function, and use the resulting value as the
2164 *RP Identifier*.
- 2165
$$RP\ Identifier = SHA256(QualifiedOrgIdBytes)$$
- 2166 • Encode all the characters in *OrgIdString* into a sequence of bytes, call it *OrgIdBytes*, using
2167 Unicode encoding UTF-16LE with no byte order mark.
- 2168 • Hash *OrgIdBytes* using the SHA256 hash function, and use the resulting value as the *Relying*
2169 *Party PPID Seed*.
- 2170
$$RP\ PPID\ Seed = SHA256(OrgIdBytes)$$

2171 **Case 3: RP's certificate has an empty or no organizationName (O) value and has an empty or no**
2172 **commonName (CN) or does not chain to a trusted root certificate authority**

- 2173 • Take the subject public key in the end-entity certificate, call it *PublicKey*, as a byte array.
- 2174 • Hash *PublicKey* using the SHA256 hash function, and use the resulting value as the *RP Identifier*
2175 and *RP PPID Seed*.
- 2176
$$RP\ PPID\ Seed = RP\ Identifier = SHA256(PublicKey)$$

2177 **Case 4: RP's certificate has an empty or no organizationName (O) value but has a non-empty**
2178 **commonName (CN) value and chains to a trusted root certificate authority**

- 2179 • Convert the commonName attribute value in the end-entity certificate into a string, call it
2180 *CnIdString*, of the following form:
2181 |CN="string"|
- 2182 Following is an example *CnIdString* per this convention:
2183 |CN="login.live.com"|
- 2184 • Encode all the characters in *CnIdString* into a sequence of bytes, call it *CnIdBytes*, using Unicode
2185 encoding UTF-16LE with no byte order mark.
- 2186 • Hash *CnIdBytes* using the SHA256 hash function, and use the resulting value as the *RP Identifier*
2187 and *RP PPID Seed*.
- 2188
$$RP\ PPID\ Seed = RP\ Identifier = SHA256(CnIdBytes)$$

2189 **7.6.2 PPID**

2190 The PPID value SHOULD be produced as follows using the card identifier and the *RP PPID Seed*
 2191 (specified in Section 7.6.1):

- 2192 • Encode the value of the *ic:CardId* element of the Information Card into a sequence of bytes,
 2193 call it *CardIdBytes*, using Unicode encoding UTF-16LE with no byte order mark.

- 2194 • Hash *CardIdBytes* using the SHA256 hash function to obtain the canonical card identifier
 2195 *CanonicalCardId*.

2196
$$\text{CanonicalCardId} = \text{SHA256}(\text{CardIdBytes})$$

- 2197 • Hash the concatenation of *RP PPID Seed* and *CanonicalCardId* using the SHA256 hash function
 2198 to obtain the PPID.

2199
$$\text{PPID} = \text{SHA256}(\text{RP PPID Seed} + \text{CanonicalCardId})$$

2200 **7.6.3 Friendly Identifier**

2201 The PPID provides an RP-specific identifier for a Subject that is suitable for programmatic processing, but
 2202 is not a user-friendly identifier. The simple transformation rules specified in this section MAY be used by a
 2203 SIP, or any other Identity Provider supporting the PPID claim, to create a friendly identifier for use within a
 2204 Display Token accompanying a Security Token carrying the PPID claim.

2205 The Friendly Identifier has the following characteristics:

- 2206 • It is encoded as a 10-character alphanumeric string of the form “AAA-AAAA-AAA” grouped into
 2207 three groups separated by the ‘hyphen’ character (e.g., the string “6QR-97A4-WR5”). Note that
 2208 the hyphens are used for punctuation only.
- 2209 • The encoding alphabet does NOT use the numbers ‘0’ and ‘1’, and the letters ‘O’ and ‘I’ to avoid
 2210 confusion stemming from the similar glyphs used for these numbers and characters. This leaves
 2211 8 digits and 24 letters – a total of 32 alphanumeric symbols – as the alphabet for the encoding.

2212 The processing rules used for deriving a Friendly Identifier from a PPID are as follows:

- 2213 • The PPID value is conveyed as a base64 encoded string inside tokens. Start with the base64
 2214 decoded PPID value as input.
- 2215 • Hash the PPID value using the SHA1 hash function to obtain a hashed identifier.

2216
$$\text{HashId} = \text{SHA1}(\text{PPID})$$

- 2217 • Let the Friendly Identifier be the string “ $A_0 A_1 A_2- A_3 A_4 A_5 A_6- A_7 A_8 A_9$ ” where each A_i is an
 2218 alphanumeric character from the encoding alphabet described above.

- 2219 • For $i := 0$ to 9 , each A_i is determined as below:

- 2220 ○ Take the i^{th} octet of *HashId* (denoted as *HashId[i]*)
- 2221 ○ Find $\text{RawValue} = \text{HashId}[i] \% 32$ (where % is the remainder operation)
- 2222 ○ $A_i = \text{EncodedSymbol}$ obtained by mapping *RawValue* to *EncodedSymbol* using the table
 2223 below

2224

<i>Raw Value</i>	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
<i>Encoded Symbol</i>	Q	L	2	3	4	5	6	7	8	9	A	B	C	D	E	F

2225

<i>Raw Value</i>	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
<i>Encoded Symbol</i>	G	H	J	K	M	N	P	R	S	T	U	V	W	X	Y	Z

2226

2227

8 Relying Parties without Certificates

2228 While Relying Parties are typically identified by presenting a cryptographically protected identity, such as
 2229 an X.509v3 certificate, the Information Card Model is also applicable in situations in which no Relying
 2230 Party certificate is available. This section specifies how Information Cards are used at Relying Parties
 2231 with no certificate: specifically, Web sites using the [HTTP] scheme. Also see
 2232 `ic07:RequireStrongRecipientIdentity` in Section 3.1.1.7 for a means whereby card issuers can
 2233 prohibit the use of cards at Relying Parties not identified by a certificate.

2234

8.1 Relying Party Identifier and Relying Party PPID Seed

2235 The Relying Party Identifier and Relying Party PPID Seed values for Relying Parties without certificates
 2236 are computed in this manner:

- 2237 • Set the string *OrgIdString* to be the fully qualified DNS host name in lowercase characters
 2238 specified in the URI of the Relying Party, or if a numeric IP address was used, then a string
 2239 representation of the IP address of the server. For IPv4 addresses, this string is the standard 4-
 2240 byte dotted decimal representation of the address with no leading zeros, such as
 2241 `131.107.55.210`. For IPv6 addresses, this string is the hexadecimal representation of the
 2242 address in eight groups of four hex digits each using uppercase for the letters, with each group of
 2243 four digits separated by a colon, all enclosed by square brackets, such as
 2244 `[0000:1234:0000:0000:0000:000A:00BC:0DEF]`.
- 2245 • Encode all the characters in *OrgIdString* into a sequence of bytes, call it *OrgIdBytes*, using the
 2246 Unicode encoding UTF-16LE with no byte order mark.
- 2247 • Hash *OrgIdBytes* using the SHA256 hash function, and use the resulting value as both the *RP*
 2248 *Identifier* and the *RP PPID Seed*.

2249 The *RP Identifier* and *RP PPID Seed* are then used in the same manner as for Relying Parties identified
 2250 by certificates when computing PPID claim and Client Pseudonym PPID values.

2251

8.2 AppliesTo Information

2252 Under the circumstances described in Section 3.3.3 that the RP endpoint to which the token will be sent
 2253 is supplied as the `wsp:AppliesTo` value to the IP, when the RP possesses no certificate, the URL of the
 2254 RP is supplied as that `wsp:AppliesTo` value.

2255 *Example:*

```

2256 <wst:RequestSecurityToken xmlns:wst="..." xmlns:wsp="..." xmlns:wsa="...">
2257   <wsp:AppliesTo>
2258     <wsa:EndpointReference>
2259       <wsa:Address>http://login.contoso.com</wsa:Address>
2260     </wsa:EndpointReference>
2261   </wsp:AppliesTo>
2262   ...
2263 </wst:RequestSecurityToken>
  
```

2264 8.3 Token Signing and Encryption

2265 When the Relying Party is not identified by a certificate, tokens sent from the Self-issued Identity Provider
2266 are not encrypted, although they are still signed in the manner described in Section 7.2. Tokens
2267 generated by Identity Providers for Relying Parties not identified by a certificate are also typically not
2268 encrypted, as no encryption key is available. However, the token MAY still be encrypted if the Identity
2269 Provider has a pre-existing relationship with the Relying Party and they have mutually agreed on the use
2270 of a known encryption key. The token SHOULD still typically be signed, even when not encrypted.

2271 9 Using WS-SecurityPolicy 1.2 and WS-Trust 1.3

2272 Software implementing the Information Card Model SHOULD utilize the OASIS standard versions of WS-
2273 SecurityPolicy and WS-Trust – [WS-SecurityPolicy 1.2] and [WS-Trust 1.3] and MAY utilize the previous
2274 draft versions – [WS-SecurityPolicy 1.1] and [WS-Trust 1.2]. This section describes the differences
2275 between the old and standard versions of these protocols that MAY affect software implementing the
2276 Information Card Model.

2277 9.1 Overview of Differences

2278 The following changes between the protocol versions affect software implementing this specification:

- 2279 • **Namespace changes:**
2280 <http://docs.oasis-open.org/ws-sx/ws-securitypolicy/200702> replaces
2281 <http://schemas.xmlsoap.org/ws/2005/07/securitypolicy>.
2282 <http://docs.oasis-open.org/ws-sx/ws-trust/200512> replaces
2283 <http://schemas.xmlsoap.org/ws/2005/02/trust>.
- 2284 • **Use of RequestSecurityTokenResponseCollection:** A
2285 `wst:RequestSecurityTokenResponseCollection` element encloses the
2286 `wst:RequestSecurityTokenResponse` when WS-Trust 1.3 is used.
- 2287 • **Use of SecondaryParameters:** An Identity Selector sends some information received from the
2288 Relying Party to the Identity Provider in a `wst:SecondaryParameters` element.
- 2289 • **Bearer Token Request Syntax:** The new `wst:KeyType` value [http://docs.oasis-open.org/ws-](http://docs.oasis-open.org/ws-sx/wstrust/200512/Bearer)
2290 [sx/wstrust/200512/Bearer](http://docs.oasis-open.org/ws-sx/wstrust/200512/Bearer) is used to request a bearer token.

2291 9.2 Identity Selector Differences

2292 Identity Selectors MUST determine the WS-Trust versions used by Identity Provider STSs and Relying
2293 Party STSs using their Security Policy.

2294 Identity Selectors supporting WS-Trust 1.3 MUST understand the new WS-Trust 1.3 elements and syntax
2295 such as `wst13:RequestSecurityTokenResponseCollection` and new URIs such as
2296 <http://docs.oasis-open.org/ws-sx/wstrust/200512/Bearer>. They MUST also understand that typical
2297 properties of an RST like Claims and KeyType MAY be either a direct child of the top level
2298 `wst13:RequestSecurityToken` element or contained within a `wst13:SecondaryParameters`
2299 element in the RST.

2300 When constructing an RST for an Identity Provider using WS-Trust 1.3, the Identity Selector SHOULD
2301 send parameters received from the Relying Party in a `wst13:SecondaryParameters` element within
2302 the `wst13:RequestSecurityToken`, with these exceptions:

- 2303 • The user chooses not to send optional claims. In this scenario, no `SecondaryParameters` element
2304 is sent in order to hide this user decision.
- 2305 • No `wsp:AppliesTo` is being sent in the RST. In this scenario, no
2306 `wst13:SecondaryParameters` element is sent so that the Identity Provider does not obtain
2307 any identifying information about the Relying Party.

2308 *Example:*

```
2309 <wst13:RequestSecurityToken Context="ProcessRequestSecurityToken"  
2310   xmlns:wst13="..." xmlns:ic="...">  
2311   <wst13:RequestType>http://docs.oasis-open.org/ws-sx/ws-  
2312   trust/200512/Issue</wst13:RequestType>  
2313   <ic:InformationCardReference>  
2314     ...  
2315   </ic:InformationCardReference>  
2316   <wst13:Claims Dialect="http://schemas.xmlsoap.org/ws/2005/05/identity">  
2317     ...  
2318   </wst13:Claims>  
2319   <wst13:KeyType>http://docs.oasis-open.org/ws-sx/ws-  
2320   trust/200512/SymmetricKey</wst13:KeyType>  
2321   <wst13:SecondaryParameters>  
2322     <wst13:RequestType>http://docs.oasis-open.org/ws-sx/ws-  
2323     trust/200512/Issue</wst13:RequestType>  
2324     <wst13:TokenType>urn:oasis:names:tc:SAML:1.0:assertion</wst13:TokenType>  
2325     <wst13:KeyType>http://docs.oasis-open.org/ws-sx/ws-  
2326     trust/200512/SymmetricKey</wst13:KeyType>  
2327     <wst13:KeyWrapAlgorithm>http://www.w3.org/2001/04/xmlenc#rsa-  
2328     mgflp</wst13:KeyWrapAlgorithm>  
2329     ...  
2330   </wst13:SecondaryParameters>  
2331 </wst13:RequestSecurityToken>
```

2332 The `wst13:RequestSecurityTokenResponse` constructed MUST be enclosed within a
2333 `wst13:RequestSecurityTokenResponseCollection` element.

2334 *Example:*

```
2335 <wst13:RequestSecurityTokenResponseCollection xmlns:wst13="...">  
2336   <wst13:RequestSecurityTokenResponse>  
2337     <wst13:TokenType>urn:oasis:names:tc:SAML:1.0:assertion</wst13:TokenType>  
2338     <wst13:RequestedSecurityToken> ... </wst13:RequestedSecurityToken>  
2339     ...  
2340   </wst13:RequestSecurityTokenResponse>  
2341 </wst13:RequestSecurityTokenResponseCollection>
```

2342 9.3 Security Token Service Differences

2343 To utilize WS-Trust 1.3, an Identity Provider STS and Relying Party STSs MUST express their Security
2344 Policy using WS-SecurityPolicy 1.2.

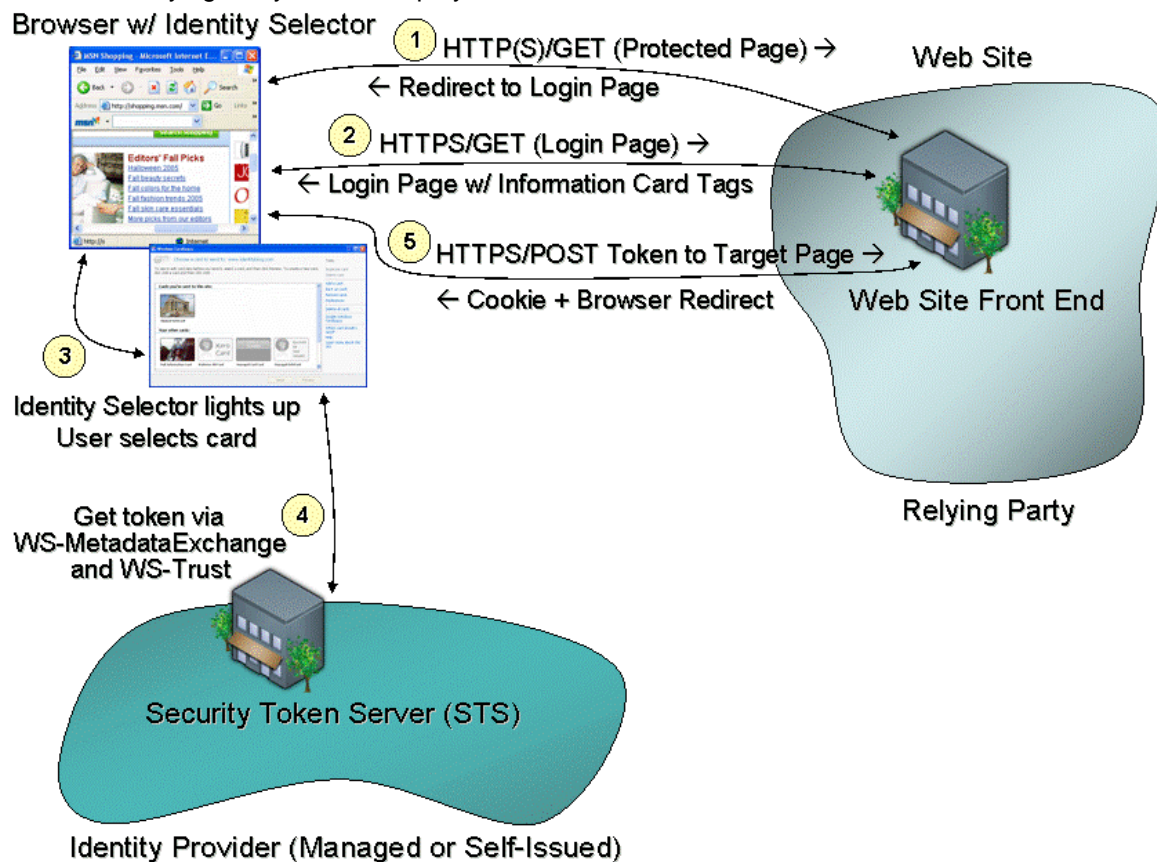
2345 STSs using WS-Trust 1.3 MUST understand the new WS-Trust 1.3 elements and syntax such as
2346 `wst13:RequestSecurityTokenResponseCollection` and new URIs such as [http://docs.oasis-
2347 open.org/ws-sx/wstrust/200512/Bearer](http://docs.oasis-open.org/ws-sx/wstrust/200512/Bearer). They MUST also understand that typical properties of an RST
2348 like `Claims` and `KeyType` MAY be either a direct child of the top level `wst13:RequestSecurityToken`
2349 element or contained within a `wst13:SecondaryParameters` element in the RST.

2350 10 Browser Behavior with Information Cards

2351 This section explains the steps that a Web browser takes when using an Information Card to authenticate
2352 to a Web site. Two cases are described. The basic case is where the Web site provides all the Relying
2353 Party functionality via HTML extensions transported over HTTPS. The second case is where the Relying
2354 Party employs a Relying Party Security Token Service (STS), which it references via HTML extensions
2355 transported over HTTPS.

2356 10.1 Basic Protocol Flow when using an Information Card at a Web 2357 Site

2358 This section explains the protocol flow when using an Information Card to authenticate at a Web site
2359 where no Relying Party STS is employed.



2360 Identity Provider (Managed or Self-Issued)

2361 **Figure 1.** Basic protocol flow when using an Information Card to authenticate at a Web site

2362

2363 Figure 1 gives an example of the basic protocol flow when an Information Card is used to authenticate at
2364 a Web site that employs no Relying Party STS. Steps 1, 2, and 5 are essentially the same as a typical
2365 forms-based login today: (1) The user navigates to a protected page that requires authentication. (2)
2366 The site redirects the browser to a login page, which presents a Web form. (5) The browser posts the
2367 Web form that includes the login credentials supplied by the user back to the login page. The site then
2368 validates the contents of the form including the user credentials, typically writes a client-side browser
2369 cookie to the client for the protected page domain, and redirects the browser back to the protected page.

2370 The key difference between this scenario and today's site login scenarios is that the login page returned
2371 to the browser in step (2) contains an HTML tag that allows the user to choose to use an Information Card
2372 to authenticate to the site. When the user selects this tag, the browser invokes an Identity Selector,
2373 which implements the Information Card user experience and protocols, and triggers steps (3) through (5).
2374 In Step (3), the browser Information Card support code invokes the Identity Selector, passing it parameter
2375 values supplied by the Information Card HTML tag supplied by the site in Step (2). The user then uses
2376 the Identity Selector to choose an Information Card, which represents a Digital Identity that can be used
2377 to authenticate at that site. Step (4) retrieves a Security Token that represents the Digital Identity
2378 selected by the user from the STS at the Identity Provider for that identity.

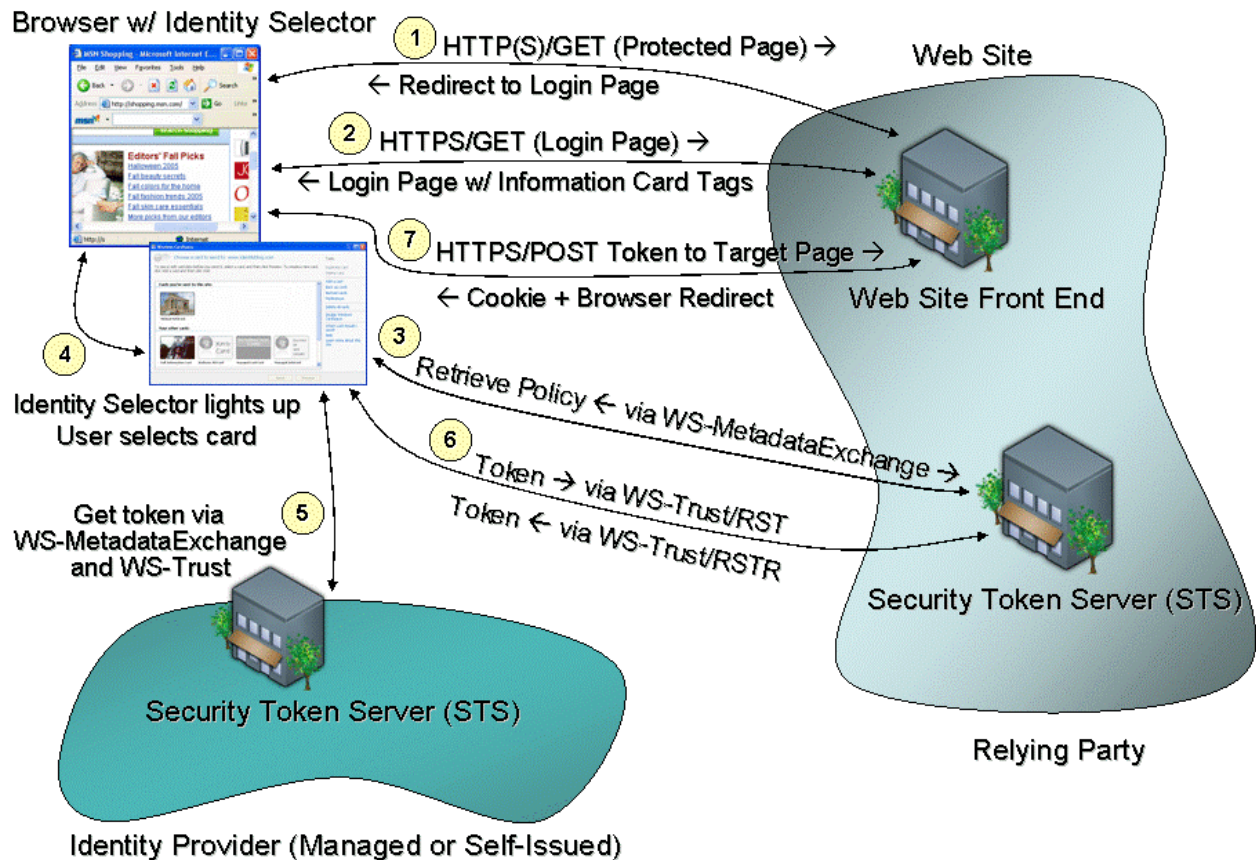
2379 In Step (5), the browser posts the token obtained back to the Web site using a HTTPS/POST. The Web
2380 site validates the token, completing the user's Information Card-based authentication to the Web site.
2381 Following authentication, the Web site typically then writes a client-side browser cookie and redirects the
2382 browser back to the protected page.

2383 It is worth noting that this cookie is likely to be *exactly the same cookie* as the site would have written
2384 back had the user authenticated via other means, such as a forms-based login using
2385 username/password. This is one of the ways that the goal of "minimal impact on Web sites" is achieved.
2386 Other than its authentication subsystem, the bulk of a Web site's code can remain completely unaware
2387 that Information Card-based authentication is even utilized. It just uses the same kinds of cookies as
2388 always.

2389 **10.2 Protocol Flow with Relying Party STS**

2390 In the previous scenario, the Web site communicated with the client Identity Selector using only the HTML
2391 extensions enabling Information Card use, transported over the normal browser HTTPS channel. In this
2392 scenario, the Web site also employs a Relying Party STS to do part of the work of authenticating the user,
2393 passing the result of that authentication on to the login page via HTTPS POST.

2394 There are several reasons that a site might factor its solution this way. One is that the same Relying
2395 Party STS can be used to do the authentication work for both browser-based applications and smart
2396 client applications that are using Web services. Second, it allows the bulk of the authentication work to be
2397 done on servers dedicated to this purpose, rather than on the Web site front-end servers. Finally, this
2398 means that the front-end servers can accept site-specific tokens, rather than the potentially more general
2399 or more complicated authentication tokens issued by the Identity Providers.



2400

Identity Provider (Managed or Self-Issued)

2401

Figure 2. Protocol flow when using an Information Card to authenticate at a Web site, where the Web site employs a Relying Party STS

2402

2403

This scenario is similar to the previous one, with the addition of steps (3) and (6). The differences start with the Information Card information supplied to the browser by the Web site in Step (2). In the previous scenario, the site encoded its WS-SecurityPolicy information using Information Card HTML extensions and supplied them to the Information Card-extended browser directly. In this scenario, the site uses different Information Card HTML extensions in the Step (2) reply to specify which Relying Party STS SHOULD be contacted to obtain the WS-SecurityPolicy information.

2409

In Step (3), the Identity Selector contacts the Relying Party STS specified by the Web site and obtains its WS-SecurityPolicy information via WS-MetadataExchange. In Step (4) the Identity Selector user interface is shown and the user selects an Information Card, which represents a Digital Identity to use at the site. In Step (5), the Identity Provider is contacted to obtain a Security Token for the selected Digital Identity. In Step (6), the Security Token is sent to the Web site's Relying Party STS to authenticate the user and a site-specific authentication token is returned to the Identity Selector. Finally, in Step (7), the browser posts the token obtained in Step (6) back to the Web site using HTTPS/POST. The Web site validates the token, completing the user's Information Card-based authentication to the Web site. Following authentication, the Web site typically then writes a client-side browser cookie and redirects the browser back to the protected page.

2419

10.3 User Perspective and Examples

2420

The Information Card user experience at Web sites is intended to be intuitive and natural enough that users' perspective on it will simply be "That's how you log in". Today, Web sites that require authentication typically ask the user to supply a username and password at login time. With Information Cards, they instead ask users to choose an Information Card. Some sites will choose to accept only

2421

2422

2423

2424 Information Cards whereas others will give users the choice of Information Cards or other forms of
2425 authentication.

2426 A site that accepts Information Cards typically has a login screen that contains button with a label such as
2427 **“Sign in with an Information Card”** or **“Log in using an Information Card”**. Upon clicking this button,
2428 the user is presented with a choice of his Information Cards that are accepted at the site, and is asked to
2429 choose one. Once a card is selected and submitted to the site, the user is logged in and continues using
2430 the site, just as they would after submitting a username and password to a site.

2431 Sites that accept both Information Cards and other forms of authentication present users with both an
2432 Information Card login choice and whatever other choices the site supports. For instance, a site login
2433 screen might display both **“Sign in with your username and password”** and **“Sign in with an**
2434 **Information Card”** buttons.

2435 **10.4 Browser Perspective**

2436 Very little additional support is needed from today’s Web browsers to also support Information Cards.
2437 The main addition is that they **MUST** recognize special HTML and/or XHTML tags for invoking the Identity
2438 Selector, pass encoded parameters on to the Identity Selector on the platform, and POST back the token
2439 resulting from the user’s choice of an Information Card.

2440 **10.5 Web Site Perspective**

2441 Web sites that employ Information Card-based authentication **MUST** support two new pieces of
2442 functionality: adding HTML or XHTML tags to their login page to request an Information Card-based login
2443 and code to log the user into the site using the POSTed credentials. In response to the Information Card-
2444 based login, the Web site typically writes the same client-side browser cookie that it would have if the
2445 login had occurred via username/password authentication or other mechanisms, and issue the same
2446 browser redirects. Thus, other than the code directly involved with user authentication, the bulk of a Web
2447 site can remain unchanged and oblivious to the site’s acceptance of Information Cards as a means of
2448 authentication.

2449

11 Invoking an Identity Selector from a Web Page

2450

11.1 Syntax Alternatives: OBJECT and XHTML tags

2451 HTML extensions are used to signal to the browser when to invoke the Identity Selector. However, not all
2452 HTML extensions are supported by all browsers, and some commonly supported HTML extensions are
2453 disabled in browser high security configurations. For example, while the OBJECT tag is widely
2454 supported, it is also disabled by high security settings on some browsers, including Internet Explorer.

2455 An alternative is to use an XHTML syntax that is not disabled by changing browser security settings.
2456 However, not all browsers provide full support for XHTML.

2457 To address this situation, two HTML extension formats are specified. Browsers MAY support one or both
2458 of the extension formats.

11.1.1 OBJECT Syntax Examples

2459 An example of the OBJECT syntax is as follows:

2461

```
<html>
  <head>
    <title>Welcome to Fabrikam</title>
  </head>
  <body>
    <img src='fabrikam.jpg' alt="Fabrikam Logo" />
    <form name="ctl00" id="ctl00" method="post"
      action="https://www.fabrikam.com/InfoCard-Browser/Main.aspx">
      <center>
        <img src='infocard_56x39.png' alt="Information Card Icon"
          onClick='ctl00.submit()' />
        <input type="submit" name="InfoCardSignin" value="Log in"
          id="InfoCardSignin" />
      </center>
      <OBJECT type="application/x-informationCard" name="xmlToken">
        <PARAM Name="tokenType" Value="urn:oasis:names:tc:SAML:1.0:assertion">
        <PARAM Name="issuer" Value=
          "http://schemas.xmlsoap.org/ws/2005/05/identity/issuer/self">
        <PARAM Name="requiredClaims" Value=
          "http://schemas.xmlsoap.org/ws/2005/05/identity/claims/emailaddress
          http://schemas.xmlsoap.org/ws/2005/05/identity/claims/givenname
          http://schemas.xmlsoap.org/ws/2005/05/identity/claims/surname">
      </OBJECT>
    </form>
  </body>
</html>
```

2487 This is an example of a page that requests that the user log in using an Information Card. The key
2488 portion of this page is the OBJECT of type “application/x-informationCard”. Once a card is
2489 selected by the user, the resulting Security Token is included in the resulting POST as the xmlToken
2490 value of the form. [Appendix A](#) shows a sample POST resulting from using a login page similar to the
2491 preceding one. If the user cancels the authentication request, the resulting POST contains an empty
2492 xmlToken value.

2493 Parameters of the Information Card OBJECT are used to encode the necessary WS-SecurityPolicy
2494 information in HTML. In this example, the Relying Party is requesting a SAML 1.0 token from a Self-
2495 issued Identity Provider, supplying the requested claims “emailaddress”, “givenname”, and
2496 “surname”. This example uses the basic protocol described in Section 2.1 (without employing a Relying
2497 Party STS).

2498 A second example of the OBJECT syntax is as follows:

```
2499 <html>
2500 <body>
2501 <form name="ctl01" method="post"
2502     action="https://www.fabrikam.com/InfoCard-Browser-STS/login.aspx"
2503     id="ctl01" onSubmit="fnGetCard();" >
2504 <img src='infocard_56x39.png' alt="Information Card Icon"
2505     onClick='ctl01.submit()' />
2506 <input type="submit" name="InfoCardSignin" value="Log in"
2507     id="InfoCardSignin" />
2508 <OBJECT type="application/x-informationCard" name="xmlToken"
2509     ID="oCard" />
2510 </form>
2511 <script type="text/javascript">
2512 <!--
2513     function fnGetCard(){
2514         oCard.issuer = "http://www.fabrikam.com/sts";
2515         oCard.issuerPolicy = "https://www.fabrikam.com/sts/mex";
2516         oCard.tokenType = "urn:fabricam:custom-token-type";
2517     }
2518     //-->
2519 </script>
2520 </body>
2521 </html>
```

2522 This example uses the enhanced protocol described in Section 2.3, which employs a Relying Party STS.
2523 Note that in this case, the “issuer” points to a Relying Party STS. The “issuerPolicy” points to an endpoint
2524 where the Security Policy of the STS (expressed via WS-SecurityPolicy) is to be obtained using WS-
2525 MetadataExchange. Also, note that the “tokenType” parameter requests a custom token type defined by
2526 the site for its own purposes. The “tokenType” parameter could have been omitted as well, provided that
2527 the Web site is capable of understanding all token types issued by the specified STS or if the STS has
2528 prior knowledge about the token type to issue for the Web site.

2529 The object parameters can be set in normal script code. This is equivalent to setting them using the
2530 “PARAM” declarations in the previous example.

2531 11.1.2 XHTML Syntax Example

2532 An example of the XHTML syntax is as follows:

```
2533 <html xmlns="http://www.w3.org/1999/xhtml"
2534     xmlns:ic="http://schemas.xmlsoap.org/ws/2005/05/identity">
2535 <head>
2536 <title>Welcome to Fabrikam</title>
2537 </head>
2538 <body>
2539 <img src='fabrikam.jpg' alt="Fabrikam Logo" />
2540 <form name="ctl00" id="ctl00" method="post"
2541     action="https://www.fabrikam.com/InfoCard-Browser/Main.aspx">
2542 <ic:informationCard name='xmlToken'
2543     style='behavior:url(#default#informationCard)'
2544     issuer="http://schemas.xmlsoap.org/ws/2005/05/identity/issuer/self"
2545     tokenType="urn:oasis:names:tc:SAML:1.0:assertion">
2546 <ic:add claimType=
2547     "http://schemas.xmlsoap.org/ws/2005/05/identity/claims/emailaddress"
2548     optional="false" />
2549 <ic:add claimType=
2550     "http://schemas.xmlsoap.org/ws/2005/05/identity/claims/givenname"
2551     optional="false" />
2552 <ic:add claimType=
2553     "http://schemas.xmlsoap.org/ws/2005/05/identity/claims/surname"
2554     optional="false" />
2555 </ic:informationCard>
```

2556
2557
2558
2559
2560
2561
2562

```
<center>
  <input type="submit" name="InfoCardSignin" value="Log in"
        id="InfoCardSignin" />
</center>
</form>
</body>
</html>
```

2563 11.2 Identity Selector Invocation Parameters

2564 The parameters to the OBJECT and XHTML Information Card objects are used to encode information in
2565 HTML that is otherwise supplied as WS-SecurityPolicy information via WS-MetadataExchange when an
2566 Identity Selector is used in a Web services context.

2567 11.2.1 issuer

2568 This optional parameter specifies the URL of the STS from which to obtain a token. If omitted, no specific
2569 STS is requested. The special value
2570 “http://schemas.xmlsoap.org/ws/2005/05/identity/issuer/self” specifies that the token
2571 SHOULD come from a Self-issued Identity Provider.

2572 11.2.2 issuerPolicy

2573 This optional parameter specifies the URL of an endpoint from which the STS’s WS-SecurityPolicy can be
2574 retrieved using WS-MetadataExchange. This endpoint MUST use HTTPS.

2575 11.2.3 tokenType

2576 This optional parameter specifies the type of the token to be requested from the STS as a URI. This
2577 parameter can be omitted if the STS and the Web site front-end have a mutual understanding about what
2578 token type will be provided or if the Web site is willing to accept any token type.

2579 11.2.4 requiredClaims

2580 This optional parameter specifies the types of claims that MUST be supplied by the identity. If omitted,
2581 there are no required claims. The value of `requiredClaims` is a space-separated list of URIs, each
2582 specifying a required claim type.

2583 11.2.5 optionalClaims

2584 This optional parameter specifies the types of optional claims that MAY be supplied by the identity. If
2585 omitted, there are no optional claims. The value of `optionalClaims` is a space-separated list of URIs,
2586 each specifying a claim type that can MAY be submitted.

2587 11.2.6 privacyUrl

2588 This optional parameter specifies the URL of the human-readable Privacy Policy of the site, if provided.

2589 11.2.7 privacyVersion

2590 This optional parameter specifies the Privacy Policy version. This MUST be a value greater than 0 if a
2591 `privacyUrl` is specified. If this value changes, the UI notifies the user and allows them review the change
2592 to the Privacy Policy.

2593 11.3 Data Types for Use with Scripting

2594 The object used in the Information Card HTML extensions has the following type signature, allowing it to
2595 be used by normal scripting code:

2596

```
interface IInformationCardSigninHelper
```

```

2597 {
2598     string issuer;           // URI specifying token issuer
2599     string issuerPolicy;    // MetadataExchange endpoint of issuer
2600     string tokenType;       // URI specifying type of token to be requested
2601     string [] requiredClaims; // Array of URIs of required claim types
2602     string [] optionalClaims; // Array of URIs of optional claim types
2603     string privacyUrl;      // URL of the Privacy Policy of the site
2604     string privacyVersion;  // Version number of the Privacy Policy
2605     boolean isInstalled;    // True when an Identity Selector is available
2606                             // to the browser
2607 }

```

2608 11.4 Detecting and Utilizing an Information Card-enabled Browser

2609 Web sites MAY choose to detect browser and Identity Selector support for Information Cards and modify
 2610 their login page contents depending upon whether Information Card support is present, and which of the
 2611 OBJECT and/or XHTML syntaxes are supported by the browser and supported by the Web site. This
 2612 allows Information Card capabilities to be shown when available to the user, and to be not displayed
 2613 otherwise.

2614 Detecting an Information Card-enabled browser may require detecting specific browser and Identity
 2615 Selector versions and being aware of the nature of their Information Card support.

2616 11.5 Behavior within Frames

2617 When the object tag is specified in an embedded frame, the certificate of the frame is compared to that of
 2618 the root frame. For this configuration to work, the scheme, domain, and security zone (for example https,
 2619 microsoft.com, and Intranet) of the URL of the embedded frame MUST be the same as that of the root
 2620 frame. If they do not match, the object tag SHOULD NOT be acted upon. This prevents a form of cross-
 2621 site scripting attacks.

2622 11.6 Invocation Using the Document Object Model (DOM)

2623 In addition to being invocable using static HTML tags and script code, Identity Selectors can be invoked
 2624 from script injected into the page using the Document Object Model [DOM]. Invocation from dynamically
 2625 generated script allows the Web site's requirements to be set dynamically.

2626 11.7 Auditing, Non-Auditing, and Auditing-Optional Cards

- 2627 • **Auditing Card:** When a managed card with an `ic:RequireAppliesTo` element and no
 2628 `Optional` attribute or `Optional=false` attribute is used at a Web site, the Request Security
 2629 Token (RST) sent to the Identity Provider contains a `wsp:AppliesTo` element.
- 2630 • **Non-Auditing Card:** When a managed card with no `ic:RequireAppliesTo` element is used
 2631 at a Web site, the Request Security Token (RST) sent to the Identity Provider contains no
 2632 `wsp:AppliesTo` element.
- 2633 • **Auditing-Optional Card:** When a managed card with an `ic:RequireAppliesTo` element with
 2634 `Optional=true` attribute is used at a Web site, the Request Security Token (RST) sent to the
 2635 Identity Provider contains a `wsp:AppliesTo` element.

2636

12 Endpoint Reference wsai:Identity Property

2637 This section adds the `wsai:Identity` property to an Endpoint Reference [WS-Addressing] and
2638 leverages extensibility of the `wsa:EndpointReferenceType` schema to include a `wsai:Identity`
2639 element as described below:

```
2640 <wsa:EndpointReference xmlns:wsa="..." xmlns:wsai="...">  
2641   ...  
2642   <wsai:Identity>...identity representation...</wsai:Identity>  
2643   ...  
2644 </wsa:EndpointReference>
```

2645 The `wsai:Identity` element inside a `wsa:EndpointReference` can hold any of the identity
2646 representations defined in Section 12.2 below.

2647 12.1 Default Value

2648 If a `wsa:EndpointReference` does not contain a `wsai:Identity` element, a DNS Name
2649 representation can be assumed by extracting the hostname from the Address URI.

2650 If the URI does not have a hostname, it does not have an implicit identity value and can not be verified by
2651 the mechanisms defined in this document.

2652 12.2 Identity Representation

2653 12.2.1 DNS Name

2654 The DNS Name representation implies that the remote principal is trusted to speak for that DNS name.
2655 For instance the DNS Name representation could specify “fabrikam.com”. When challenged, the endpoint
2656 contacted MUST be able to prove its right to speak for “fabrikam.com”. The service could prove its right
2657 by proving ownership of a certificate containing a reference to `fabrikam.com` and signed by a trusted
2658 Certificate Authority. The following element of type `xs:string` can be used to represent a DNS Name
2659 representation within a `wsai:Identity` element.

2660

```
2661 <wsai:Dns xmlns:wsai="...">fabrikam.com</wsai:Dns>
```

2662

2663 12.2.2 Service Principal Name

2664 The SPN representation implies that the remote principal is trusted to speak for that SPN, a mechanism
2665 common in intranet domains. Its format is `<serviceClass>/<host>`. For example, the SPN for a generic
2666 service running on “`server1.fabrikam.com`” would be “`host/server1.fabrikam.com`”. The client could
2667 confidentially speak to the service and verify replies back from the service by obtaining a Kerberos ticket
2668 from the realm’s domain controller. The following element of type `xs:string` can be used to represent
2669 an SPN representation within a `wsai:Identity` element.

2670

```
2671 <wsai:Spn xmlns:wsai="...">host/hrweb</wsai:Spn>
```

2672 12.2.3 User Principal Name

2673 The UPN representation implies that the remote principal is a particular user in a domain. Its format is:
2674 `<user>@<domain>`. For example, the UPN for a user “`someone`” at a domain “`example.com`” would be
2675 “`someone@example.com`”. A service could prove its UPN by providing the password for the user

2676 associated with “someone@example.com”. The following element of type `xs:string` can be used to
2677 represent a UPN representation within a `wsai:Identity` element.

2678

```
2679 <wsai:Upn xmlns:wsai="...">someone@example.com</wsai:Upn>
```

2680 12.2.4 KeyInfo

2681 This identity value is similar to the previous three, but rather than describing an attribute of the target, this
2682 mechanism describes a reference (embedded or external) to key material associated with the target. This
2683 allows confirmation of the target trust identity through encryption. These values can also be used to
2684 compare authenticated identities similar to the basic trust identity values by comparing the hash of the
2685 specified trust identity value with a hash of the authenticated identity of the service. The `ds:KeyInfo`
2686 element defined in [XMLDSIG] can be used.

2687

```
2688 <ds:KeyInfo xmlns:ds="...">...</ds:KeyInfo>
```

2689 12.2.4.1 Example specifying an RSA Public Key

2690 The `PublicKey` representation states the public key of the remote principal. A service could prove its
2691 ownership of the key by signing some data with the private key.

2692

```
2693 <wsai:Identity xmlns:wsai="..." ds:wsai="...">  
2694 <ds:KeyInfo>  
2695 <ds:RSAKeyValue>  
2696 <ds:Modulus>xA7SEU+e0yQH5...</ds:Modulus>  
2697 <ds:Exponent>AQAB</ds:Exponent>  
2698 </ds:RSAKeyValue>  
2699 </ds:KeyInfo>  
2700 </wsai:Identity>
```

2701 12.2.4.2 Example specifying an X509 Certificate

2702 This example shows a certificate of the remote principal being used as the identity value.

2703

```
2704 <wsai:Identity xmlns:wsai="..." xmlns:ds="...">  
2705 <ds:KeyInfo>  
2706 <ds:X509Data>  
2707 <ds:X509Certificate>MIICXTCCA...</ds:X509Certificate>  
2708 </ds:X509Data>  
2709 </ds:KeyInfo>  
2710 </wsai:Identity>
```

2711

2712 12.2.5 Security Token

2713 A security token can be an identity value representing statements about the identity of an endpoint. E.g.:

```
2714 <wsai:Identity xmlns:wsai="..." ds:wsse="...">  
2715 <wsse:BinarySecurityToken ValueType="...#X509v3">  
2716 <!--base64 encoded value of the X509 certificate-->  
2717 </wsse:BinarySecurityToken>  
2718 </wsai:Identity>
```

2719

2720 **12.2.6 Security Token Reference**

2721 Similarly to `ds:KeyInfo`, `wsse:SecurityTokenReference` element can be used within a
2722 `wsai:Identity` element to reference a token representing a collection of statements about the identity
2723 of an endpoint. E.g.:

```
2724 <wsai:Identity xmlns:wsai="..." ds:wsse="...">  
2725   <wsse:SecurityTokenReference>  
2726     <wsse:KeyIdentifier ValueType="...#ThumbprintSHA1">  
2727       <!-- thumbprint of the X509 certificate -->  
2728     </wsse:KeyIdentifier>  
2729   </wsse:SecurityTokenReference>  
2730 </wsai:Identity>
```

2731

2732 **13 Security Considerations**

2733 **13.1 Protection of Information Cards by Identity Selectors**

2734 It is RECOMMENDED that Identity Selectors encrypt or otherwise secure the Information Card data held
2735 by them to help protect cards from being stolen and then used by an attacker. This is particularly
2736 important for self-issued Information Cards, where possession of the unencrypted contents of a card
2737 could enable an attacker to gain access to Relying Parties accounts associated with that card.

2738 **13.2 Relying Parties Without Certificates**

2739 Because claims sent to relying parties without certificates are not encrypted, it is RECOMMENDED that
2740 sensitive claims not be released to these relying parties. Identity Providers holding sensitive user data
2741 that can be released as claim values are encouraged to issue cards containing an
2742 `ic07:RequireStrongRecipientIdentity` element to prevent transmission of sensitive claim values
2743 over an unencrypted channel.

2744 **13.3 Endpoint References**

2745 It is RECOMMENDED that Endpoint Reference elements be signed to prevent tampering.

2746 An Endpoint Reference SHOULD NOT be accepted unless it is signed and have an associated security
2747 token to specify the signer has the right to “speak for” the endpoint. That is, the relying party SHOULD
2748 NOT use an endpoint reference unless the endpoint reference is signed and presented with sufficient
2749 credentials to pass the relying parties acceptance criteria.

2750 It is RECOMMENDED that an endpoint reference be encrypted when it contains claims and other
2751 sensitive information.

2752 When included in a SOAP message, endpoint references are RECOMMENDED to be protected using the
2753 mechanisms described in WS-Security [WS-Security]

2754

14 Conformance

2755 An implementation conforms to this specification if it satisfies all of the MUST or REQUIRED level
2756 requirements defined within this specification for the portions of the specification implemented by that
2757 implementation. Furthermore, when an implementation supports functionality in which there is a
2758 RECOMMENDED algorithm or set of parameter choices, conforming implementations MUST support the
2759 RECOMMENDED algorithm and parameter choices. A SOAP Node MUST NOT use the XML
2760 namespace identifiers for this specification (listed in Section 1.2) within SOAP Envelopes unless it is
2761 compliant with this specification.

2762 This specification references a number of other specifications. In order to comply with this specification,
2763 an implementation MUST implement the portions of referenced specifications necessary to comply with
2764 the required provisions of the portions of this specification that it implements. Additionally, the
2765 implementation of the portions of the referenced specifications that are specifically cited in this
2766 specification MUST comply with the rules for those portions as established in the referenced specification.

2767 Additionally, normative text within this specification takes precedence over normative outlines (as
2768 described in Section 1.1), which in turn take precedence over the XML Schema [XML Schema Part 1,
2769 Part 2] and WSDL [WSDL 1.1] descriptions. That is, the normative text in this specification further
2770 constrains the schemas and/or WSDL that are part of this specification; and this specification contains
2771 further constraints on the elements defined in referenced schemas.

2772 If an OPTIONAL message is not supported, then the implementation SHOULD Fault just as it would for
2773 any other unrecognized/unsupported message. If an OPTIONAL message is supported, then the
2774 implementation MUST satisfy all of the MUST and REQUIRED sections of the message.

A. HTTPS POST Sample Contents

2776 The contents of an HTTPS POST generated by a page like the first example in Section 4.1.1 follow:

```

2777 POST /test/s/TokenPage.aspx HTTP/1.1
2778 Cache-Control: no-cache
2779 Connection: Keep-Alive
2780 Content-Length: 6478
2781 Content-Type: application/x-www-form-urlencoded
2782 Accept: image/gif, image/x-xbitmap, image/jpeg, image/pjpeg, application/x-shockwave-flash, */*
2783 Accept-Encoding: gzip, deflate
2784 Accept-Language: en-us
2785 Host: calebb-tst
2786 Referer: https://localhost/test/s/
2787 User-Agent: Mozilla/4.0 (compatible; MSIE 7.0; Windows NT 5.1; .NET CLR 2.0.50727; .NET CLR 3.0.04506.30)
2788 UA-CPU: x86

2791 InfoCardSignin=Log+in&xmlToken=%3Cenc%3AEncryptedData+Type%3D%22http%3A%2F%2Fwww.w3.org%2F2001%2F04%2Fxmllenc%23Element%22+xmlns%3Aenc%3D%22http%3A%2F%2Fwww.w3.org%2F2001%2F04%2Fxmllenc%23%22%3E%3Cenc%3AEncryptionMethod+Algorithm%3D%22http%3A%2F%2Fwww.w3.org%2F2001%2F04%2Fxmllenc%23aes256-cbc%22+%2F%3E%3CKeyInfo+xmlns%3D%22http%3A%2F%2Fwww.w3.org%2F2000%2F09%2Fxmldsig%23%22%3E%3Cenc%3AEncryptedKey+xmlns%3Ae%3D%22http%3A%2F%2Fwww.w3.org%2F2001%2F04%2Fxmllenc%23%22%3E%3C%3AEncryptionMethod+Algorithm%3D%22http%3A%2F%2Fwww.w3.org%2F2001%2F04%2Fxmllenc%23rsa-oaep-mgf1p%22%3E%3CDigestMethod+Algorithm%3D%22http%3A%2F%2Fwww.w3.org%2F2000%2F09%2Fxmldsig%23sha1%22+%2F%3E%3C%2F%3AEncryptionMethod%3E%3CKeyInfo%3E%3C%3ASecurityTokenReference+xmlns%3Ao%3D%22http%3A%2F%2Fdocs.oasis-open.org%2Fwss%2F2004%2F01%2Foasis-200401-wss-wssecurity-secext-1.0.xsd%22%3E%3C%3AKeyIdentifier+ValueType%3D%22http%3A%2F%2Fdocs.oasis-open.org%2Fwss%2Foasis-wss-soap-message-security-1.1%23ThumbprintSHA1%22+EncodingType%3D%22http%3A%2F%2Fdocs.oasis-open.org%2Fwss%2F2004%2F01%2Foasis-200401-wss-soap-message-security-1.0%23Base64Binary%22%3E%2BPybnzDaB%2FdlhjIfcQ458E72wA%3D%3C%2Fo%3AKeyIdentifier%3E%3C%2Fo%3ASecurityTokenReference%3E%3C%2FKeyInfo%3E%3Ce%3ACipherData%3E%3Ce%3ACipherValue%3EEq9UHAJ8C9K514Mr3qmgX0XnyL1ChKs2PqMj0Sk6snw%2FIRNtXqLzmgbj2Vd3vFA4Vx1hileSTYqclKAsskqpqBc4bMHT61w1f0NxU10HDor0D1NVcVDm%2FAfLcyLqEP%2Boh05B%2B5ntVIJzL8Ro3typF0eSm3S6UnINOHijHaVWyg%3D%3C%2Fe%3ACipherValue%3E%3C%2Fe%3ACipherData%3E%3C%2Fe%3AEncryptedKey%3E%3C%2FKeyInfo%3E%3Cenc%3ACipherData%3E%3Cenc%3ACipherValue%3ErBvpZydiyDzJtzl1%2FjUFUX9XAZo1mORq0yPLjh%2FBagXcfZeYwWD57v4Jvn1QwGajadcASCisazswnlskdkwgm4IUWJpPMRH7es9zY0UvnS4ccsakgDcmscq3pDYTrxbSBfhdvzrjDiHC2XctowOveoHeB51C5N8Uabff18IxCNTkWO8y3wLHVgDvwaDOSakK%2FK%2Fv1UgXIc51%2FtYvjeFGeGbbSNxo8DTqeDnAMQ%2B4Y%2B1aUGhI%2FtbSrEyJECkDgtztcxhumbupKO%2BogWKUTTpSt851xjOfxAMiVaPZ%2FAM8V8H3ZLsR087sX%2FJ%2BnbRqze%2BfbUwimN5pNoJdMnF%2BEDLass1dPsvhL4EXZuIp5deGBaqAIOaOMEUW7ssuh1PtwkEMeqw1OzOhu%2FHtwP1qh3D02U59MtyQnJMD5UwIw07sZJl6%2BPg6Zp9HHtKKUMnkguvFmhyXS4BFSZVxP118i%2BOMLO1um5dejeFfd4nwGO%2FmNw6yEI8DdGVjXcYOT6JhPz9rHNh9%2F%2F0j5snJfL6j2sg0EvIYoRs%2BhT4sdH295tGaiwMwT6cFOXbAQZUbYTr1ZOC6XPsfL2CFwITM3mI%2Blco4Hc%2F7IakIA8jwAJdtnd2mGuV67ZbY1mzibM1LUApixZj59E183ixctSQbV7iyywQ4IYN2CAq%2BCLMdlR%2BDHfgEe803IVaGBDUEcd2MYimEiA7Yw3NIDrC14SbLzNvU702HpVJMeYv9q6S9xIVGApSrARswRFXYmbkMDP5WIQaJEXon7qLcsZONpdlX9bCcmairkdpxmCeyS638te%2FhGBLmYJSQ0stf7BhA6E0kwDRgdwsAa88bODiWHeK0vDhAN4H1XFZ%2BCxp53L9Mmvy%2FCAOI%2B90kPL2yxS22yjWQxom%2FyZuawsK98JHVShsIVmmbKvRM6xJwvHDSzuBAOlQKS%2FMHcFzn8vHZR41Mhm5nL3F%2B%2BumMKh02vMuKk6JiCqG9OEj996bVIkLzESU5Z5vT611K9rBrdx8ckDElipdH3x54WVfaItHJTYU%2BsxIR1T25fi9k%2FOc%2FMX7Q%2B6NSDs4nGqkn4rzqez9BUWNZw7caVOrDeao85f%2FiDCGymt10A3JaSZdTKfzHLGmUfSkCaLVeisdvB6R7uBw8tR%2BZlgLIGS28wppFlnUYvSK7DnPrzId%2BGfHwLfl6WA%2FEzBMMgppb5Vi%2BauHq%2BHxpCam1krcUkzagbwNkGV8TfafkqUvRwJbxRwNVPI%2F%2Fxs%2FpLculdh6eKcmU00%2FNx0zNOScd9XoeEU3zsv78PgvPIBT4EDugdV4bMR6dExXvZB1%2F84b1gOmHKZRplF8t6EAc4LCct01ht7VOVNz25ntP27ct9QPrDjc%2F0xiht4Df6NV314v1Tnu%2B%2BzVB%2BHJAxNkiO9gx3uLUJM9XEZCDzZKihaBk2y%2F3RhsJpABVneUd%2B3sCrBQXhgKYNBHZyRAUGpMDLhLqpjof9x%2FNvUujQ5DBLJafxxzNVshG52jRz%2BikhCNhJDDbeA5MQ8Q7QsYcKDC0DBFseWtWaA%2

```

2834 FsKx13JU6hyTotnFS%2FoS2EzboSvn25qZuBERsZ3w%2B5WMkRzfQadyIYOSv2Df1Yo1jubDKy119
 2835 St%2FbCIBGxbVIZKYtQ%2BlyepxxFjrN7cWo2aYfnB6YLurg4USJwhXzcGcvA3%2BR5dRT6Fr37U6
 2836 OcHc%2Fz2MaZmnlcQWiDGNxHtRVxEvirBclx47hWfSRjrKzf3orL5Lzgm1Yc7Iwclw2rbeWljCqOb
 2837 oV3d71ez%2FvNz1pxEMi4w8yUAQL8p%2FRCZ%2BpzvsgORu4RWKWiSwbl7AN0J3jiWShyZgDmxd20
 2838 DDYffXjNiuH1mQWnDtKJX1lig8mqjhOYJEal0W6L0ErwrRIy29tOiAvXZANC8ka1HexulH0e38x8E
 2839 IOaVaJtNz9mqrnmp4GdZ38txv%2BCUeWHOZaHLf4xkdtRxAu%2FbzQ03YmUOhgxqkTfNzV6Ymne
 2840 v2nv5VsyQGJaQsNjb0M4yOe6kX2qNTwKBN2%2Bp%2Fz3f15i8KuGCgBcfP%2BP9xBizBeo7FbFtyo
 2841 2pfFhzBPmZeSOJ6kEbFlYQKHQAT5iZ4SyTIffqmwGxsQpWMstx3qJF8aW8WFzU1qXcC1LmgClg19
 2842 rx9NYFaQshX4f729B9Ue5MX7gTrMgwanlXty9BsoP7nzGbr3HSXy8pR%2BimuAFW3c2NaQsbjSH5Z
 2843 FOr7PZdLHsNVJzFIaufAwr0CAEtv1PJUt7%2B%2FE5MQsMsVqMoXFmefgdxbvY1Ue6MX1wtuJYY1
 2844 PAX7MHTyRUR3RfJDO054EoflVTwNE1fmocUXUh5rtFFuzy2T%2F2Y6pLAARXzo8uslAuH67VkuXv%
 2845 2BEMc7e3ogbf5%2BROsgJirZS6qkcYpFEUwqHiQYLnSIP4bt%2BWI5j1bxs7yzcSCKNZ2rd%2FHW
 2846 A41AyGMfYzqxfGcrOaxHsds3JUcByB5Zw17W58GBC32Iusqa69BFTPagEapM0Fb5CbTqXnWTNNB5J
 2847 t40BVzVlv3u5oy%2BBRaMKXZhnbt2WUTp0Ebsn17xvte52B%2BLMLSWJn96N15thd%2Ft1D7P1WA
 2848 sUvpJAd0UHPizCkY8VIhcXTrsSyEwer2J2I9TQTUosmssFjop8Lx9qMfXo0eGVmneV8kVBtu4J7N1
 2849 QmWfV%2B%2FK8vGbCwW3Gm%2FEU1004ZbbK39y0JgNQ7fshxHr5Hdt%2F6S%2FQkb6NPVDwn7Srh
 2850 Y0diWujXz5Q1IYBSN7vDfMun3yF%2BGbmMEXZ8MkOthuYkgMS9qiFoJGUXGyELsJfxbzdcRE9iyJn
 2851 p88L4%2BCtc03l2JxIhMAGxOzX42RfAiDV1Gbp4f%2F0urmWQ2VK7uZ%2F1ViVrGAJ2kpH0EfwYE
 2852 Mb2YtT8FFjogqEpDSJX48BLIh1TE4nMbqQVG1cksCGDC0XyGKaF5Z7Ikw493Xz0JQ0BZvaf2Kceb7
 2853 MUZlsU1DShcQQ9X%2Bxu9RcgUePJEE9BgCmpZ5Kr6r43qyk79noBSgrsSkDhT5sg%2F20RHQB8OX
 2854 %2BC4r3XGQFWF2m2j0xtc%2Boy14xqUmSB2qJtuWGOXDJspejDRP1GIffnqDFdqSO3%2FkV9AC5Ee
 2855 39iJGv8I%2B5nErtQao645bCytn4B2bJah8R2fxLs8Dd4%2BC2ykvVrLxTUmJaGqd2RK%2F6t1E47
 2856 l%2B90Vp4WEzC0CFXXt9XNqdVjo2bZsXbfKQgO2z2T2q2qCsgwbxVzIF5y39R%2BrkSkX16uuz3q6w
 2857 n3I5RI9M8Hn3DCzZv6Ms4rYxYuiqxaIcb7DgJ2fklbdiRjSxzcPhpK6CwJBD8DPQYdkqGr%2Bs
 2858 oWeSvHvPLMSDxEPzwnaxysRXzKphHUEua2CCqcpagux2mbKkwHSXemX9I3V3AhPePp5XI5eCRiy3
 2859 D4%2BcBXOydie94Nz9DIhW749hPiVD9CioAgyqgAzFwCxEEUCXKTzu9xXX4DXg9b3CUfGzWERTY7x
 2860 TGT2y%2F9i7r5Xs0lrKi9ftws4JO5v%2Be3WuAETw0w%2FVKCl1WwTbV9xtx%2B4RZQ3%2Fewvv%
 2861 2F0GqiiSrhiVBGuCdaQs7stWqfKf3vFgGXmmODGTikIxxYm2fzCEfq4A6LRp5RkYyJyUTf87c56tn
 2862 Qa%2Bo3xeiX5WRJybpabrRou09vyWldlkhcUaBELGWB7iYUJ9bClTByEdNZnuDV%2FXlfnmDARKp8
 2863 RVN028czIk57wQmuizgWrM6S9Ku20noDmLgbT554UBf7FnjRWOb%2FF90JuPpUcARBPrfuqTcOsBq
 2864 tZr7AJl3zz%2F53mpyn9rgzw5gBLGkvrdbciaBJOaccTDEB5kEzCLuprC3S1VedhgY%2BMQ5%2F
 2865 xgN%2Faf3TtJiBKfVb1V37BlbXXGosnPFcoH8I0XbqW5FSsxmcpng48poJcB7j5eHq7Y%2F01RLb4
 2866 iMmZnaf4%2BFg2F3LrwoI0Wk7ueIjgFd5KJliTdalivGU%2Fchr9aTnPM5HiLb2fdW0pZ%2FFBjC4
 2867 XxpT9eNY%2FpVj5pnTW2ubpPue1PQTLci1EOxbl33wnhUIfnG1VWJdrls2j3GwGqOnrYUHP%2FX
 2868 tNjJqIucnMYGqPbcGIF2QRuid%2FiTRMvCRCmdCsYE%2FaXjOMhskX7KYC%2B9iG%2FT1wQRbfHsk
 2869 WD%2Fpv450OVDsfclAdq6FCr1LesDNTew%2FF8Z3SiHnWS76OVsNM2SB%2FhMP67iu5UWVkb3%2FQ
 2870 qCN0aosOPs2QX0XBCZFMn6p3FhFnXpAbaGz9y6KzUiUxCO3U0fZcToKl4y%2Bw0P4IvxpjVt4t8b
 2871 84Q9hiBxd5xu1%2BRE973a%2FyIWO%2Fit1MdUSmxWakxWuGxDnQxwNcN7ekL%2FQ%2B6FItm86b
 2872 w9cc%2FmiI7q2fK7y7YAZm3tmamhF1%2FWJNj11h0vh%2BhNehJ1Ll1b4Z%2F9ZtxMWV4LVtyrFaF1
 2873 zyCEqKUTk0jc%2FXDwyKZc%2Fsv9EOoPk2fVnmz3Wka74GB%2BwtjdvQjSnnJYtPkMNsikHw%2B
 2874 RyBlhTkybn3iQ6BUiJ0v97j7MVZHXCa1KS3t2gx8H7ts6Tfy5i189xVUdiZwfj0w06g199q1AqUMZ
 2875 EWxh0%3D%3C%2Fenc%3ACipherValue%3E%3C%2Fenc%3ACipherData%3E%3C%2Fenc%3AEncryp
 2876 tedData%3E

2877 An un-escaped and reformatted version of the preceding xmlToken value, with the encrypted value
 2878 elided, is as follows:

```

2879 <enc:EncryptedData Type="http://www.w3.org/2001/04/xmlenc#Element" xmlns:enc=
2880 "http://www.w3.org/2001/04/xmlenc#">
2881 <enc:EncryptionMethod Algorithm="http://www.w3.org/2001/04/xmlenc#aes256-cbc"
2882 />
2883 <KeyInfo xmlns="http://www.w3.org/2000/09/xmldsig#">
2884 <e:EncryptedKey xmlns:e="http://www.w3.org/2001/04/xmlenc#">
2885 <e:EncryptionMethod Algorithm="http://www.w3.org/2001/04/xmlenc#rsa-oaep-mgf1
2886 p">
2887 <DigestMethod Algorithm="http://www.w3.org/2000/09/xmldsig#sha1" />
2888 </e:EncryptionMethod>
2889 <KeyInfo>
2890 <o:SecurityTokenReference xmlns:o="http://docs.oasis-open.org/wss/2004/01/oas
2891 is-200401-wss-wssecurity-secext-1.0.xsd">
2892 <o:KeyIdentifier ValueType="http://docs.oasis-open.org/wss/oasis-wss-soap-mes
2893 sage-security-1.1#ThumbprintSHA1" EncodingType="http://docs.oasis-open.org/ws
2894 s/2004/01/oasis-200401-wss-soap-message-security-1.0#Base64Binary">
2895 +PYbnZdaB/dlhjIfqCQ458E72wA=
  
```

```
2896 </o:KeyIdentifier>
2897 </o:SecurityTokenReference>
2898 </KeyInfo>
2899 <e:CipherData>
2900 <e:CipherValue>
2901 Eq9UhAJ8C9K5l4Mr3qmgX0XnyL1ChKs2PqMj0Sk6snw/IRNtXqLzmgbj2Vd3vFA4Vx1hileSTyqc1
2902 kAsskqpqBc4bMHT6lwl1f0NxU10HDor0DlNVcVDm/AfLcyLqEP+oh05B+5ntVIJzL8Ro3typF0eoSm
2903 3S6UnINOHijHaVWyg=
2904 </e:CipherValue>
2905 </e:CipherData>
2906 </e:EncryptedKey>
2907 </KeyInfo>
2908 <enc:CipherData>
2909 <enc:CipherValue>
2910 ...=
2911 </enc:CipherValue>
2912 </enc:CipherData>
2913 </enc:EncryptedData>
```

2914

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C. Revision History

Revision	Date	Editor	Changes Made
ed-10	2009-05-03	Michael B. Jones	Added missing words "claim type" (IMI-19). Clarified that an IP/STS ends the STS chain (IMI-20). Added reference to PPID definition in RP/STS section (IMI-21). Added certificate definition to terminology section (IMI-22). Always spell organizationName and commonName consistently with the table of names introduced for IMI-17.
ed-09	2009-04-28	Michael B. Jones	Specified string representations for numeric IPv4 and IPv6 addresses used in RP Identifier computation (IMI-16). Specified OID values for certificate fields using in RP Identifier computations (IMI-17). Clarified Unicode encodings used where unspecified (IMI-18). Added xmlns declarations to examples so XML is well-formed (IMI-6). As part of this edit, changed uses of wsid to wsai, except where ic was meant. Referenced identity2007.xsd (IMI-7). More refinement of 2119 term usage (IMI-2).
ed-08	2009-04-15	Michael B. Jones	Changed "RSA key" to "public key" (IMI-1). Refinement of 2119 term usage (IMI-2). Enumerated image MIME types (IMI-8). Defined color space for BackgroundColor (IMI-10). Changed from "claim" to "representation" where "claim" was not meant (IMI-11). Changed "array of claims" to "array of claim type URIs" (IMI-12).
ed-07	2009-03-17	Marc Goodner and Michael B. Jones	Consistency pass to use RFC 2119 terms (SHOULD, MUST, MAY, etc.) in the prescribed manner.
cd-02	2009-02-19	Michael B. Jones	Added conformance statement about RECOMMENDED algorithms. Updated IP/STS PPID calculation recommendation. Corrected ic:IssuerId computation description.
ed-06	2009-02-16	Michael B. Jones	Changed crypto algorithm language statements from MUST to RECOMMENDED, to potentially allow alternative algorithms to be used in the future. Usage of other algorithms is not described.
ed-05	2009-02-04	Michael B. Jones	Document capability to retrieve metadata with HTTPS GET. First drafts of complete Security Considerations and Conformance sections.
ed-04	2009-01-12	Michael B. Jones	Use OASIS-format namespace URI. Added clarifications about the use of ClientPseudonym in PPID computations, support for the ic:IssuerId element, and self-issued card support for the PPID claim. Added participant names.
cd-01	2008-11-10	Michael B. Jones	Created first committee draft from ed-03.
ed-03	2008-11-07	Michael B. Jones	Rationalized namespace prefixes and references. Clarified that cards have a 3:2 aspect ratio and a

			recommended size of 120x80.
ed-02	2008-10-24	Michael B. Jones	Rationalized content from the different input documents.
ed-01	2008-10-15	Marc Goodner	Initial conversion of input documents to OASIS format.

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