



ACCELERATING ELECTRONIC BUSINESS

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Assertions and Protocol for the OASIS Security Assertion Markup Language (SAML)

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1. Introduction

This specification defines the syntax and semantics for XML-encoded SAML assertions, protocol requests, and protocol responses. These constructs are typically embedded in other structures for transport, such as HTTP form POSTs and XML-encoded SOAP messages. The SAML specification for bindings and profiles [SAMLBind] provides frameworks for this embedding and transport. Files containing just the SAML assertion schema [SAML-XSD] and protocol schema [SAMPL-XSD] are available.

The following sections describe how to understand the rest of this specification.

1.1. Notation

This specification uses schema documents conforming to W3C XML Schema [Schema1] and normative text to describe the syntax and semantics of XML-encoded SAML assertions and protocol messages.

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this specification are to be interpreted as described in IETF RFC 2119 [RFC2119]:

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

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

Listings of SAML schemas appear like this.

Example code listings appear like this.

Conventional XML namespace prefixes are used throughout the listings in this specification to stand for their respective namespaces (see Section 1.2) as follows, whether or not a namespace declaration is present in the example:

?? The prefix saml: stands for the SAML assertion namespace.

?? The prefix samlp: stands for the SAML request-response protocol namespace.

?? The prefix ds: stands for the W3C XML Signature namespace.

?? The prefix xsd: stands for the W3C XML Schema namespace in example listings. In schema listings, this is the default namespace and no prefix is shown.

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

1.2. Schema Organization and Namespaces

The SAML assertion structures are defined in a schema [SAML-XSD] associated with the following XML namespace:

<http://www.oasis-open.org/committees/security/docs/draft-sstc-schema-assertion-27.xsd>

The SAML request-response protocol structures are defined in a schema [SAMPL-XSD] associated with the following XML namespace:

<http://www.oasis-open.org/committees/security/docs/draft-sstc-schema-protocol-27.xsd>

185 **Note:** The SAML namespace names are temporary and will change when
186 SAML 1.0 is finalized.

187 The assertion schema is imported into the protocol schema. Also imported into both schemas is the
188 schema for XML Signature **[XMLSig-XSD]**, which is associated with the following XML namespace:
189 <http://www.w3.org/2000/09/xmldsig#>

190 **1.2.1. Time Values.**

191 All SAML time values have the type **dateTime**, which is built in to the W3C XML Schema Datatypes
192 specification **[Schema2]** and MUST be expressed in UTC form.

193 SAML applications SHOULD NOT rely on other applications supporting time resolution finer than
194 milliseconds. Implementations MUST NOT generate time instants that specify leap seconds.

195 **1.2.2. Comparing SAML values**

196 Unless otherwise noted, all elements in SAML documents that have the XML Schema "string" type,
197 or a type derived from that, MUST be compared using an exact binary comparison. In particular,
198 SAML implementations and deployments MUST NOT depend on case-insensitive string
199 comparisons, normalization or trimming of white space, or conversion of locale-specific formats
200 such as numbers or currency. This requirement is intended to conform to the W3C Requirements
201 for String Identity, Matching, and String Indexing **[W3C-CHAR]**.

202 If an implementation is comparing values that are represented using different character encodings,
203 the implementation MUST use a comparison method that returns the same result as converting
204 both values to the Unicode character encoding (<http://www.unicode.org>), Normalization Form C
205 **[UNICODE-C]** and then performing an exact binary comparison. This requirement is intended to
206 conform to the W3C Character Model for the World Wide Web (**[W3C-CharMod]**), and in particular
207 the rules for Unicode-normalized Text.

208 Applications that compare data received in SAML documents to data from external sources MUST
209 take into account the normalization rules specified for XML. Text contained within elements is
210 normalized so that line endings are represented using linefeed characters (ASCII code 10_{Decimal}), as
211 described in section 2.11 of the XML Recommendation **[XML]**. Attribute values defined as strings
212 (or types derived from strings) are normalized as described in section 3.3.3 **[XML]** all white space
213 characters are replaced with blanks (ASCII code 32_{Decimal}).

214 The SAML specification does not define collation or sorting order for attribute or element values.
215 SAML implementations MUST NOT depend on specific sorting orders for values, because these
216 may differ depending on the locale settings of the hosts involved.

217 **1.3. SAML Concepts (Non-Normative)**

218 This section is informative only and is superseded by any contradicting information in the normative
219 text in Sections 1.2 and following. A glossary of SAML terms and concepts **[SAMLGloss]** is
220 available.

221 **1.3.1. Overview**

222 The Security Assertion Markup Language (SAML) is an XML-based framework for exchanging
223 security information. This security information is expressed in the form of assertions about subjects,
224 where a subject is an entity (either human or computer) that has an identity in some security
225 domain. A typical example of a subject is a person, identified by his or her email address in a
226 particular Internet DNS domain.

227 Assertions can convey information about authentication acts performed by subjects, attributes of
228 subjects, and authorization decisions about whether subjects are allowed to access certain
229 resources. Assertions are represented as XML constructs and have a nested structure, whereby a
230 single assertion might contain several different internal statements about authentication,
231 authorization, and attributes. Note that authentication assertions merely describe acts of
232 authentication that happened previously.

233 Assertions are issued by SAML authorities, namely, authentication authorities, attribute authorities,
234 and policy decision points. SAML defines a protocol by which clients can request assertions from
235 SAML authorities and get a response from them. This protocol, consisting of XML-based request
236 and response message formats, can be bound to many different underlying communications and
237 transport protocols; SAML currently defines one binding, to SOAP over HTTP.

238 SAML authorities can use various sources of information, such as external policy stores and
239 assertions that were received as input in requests, in creating their responses. Thus, while clients
240 always consume assertions, SAML authorities can be both producers and consumers of assertions.

241 The following model is conceptual only; for example, it does not account for real-world information
242 flow or the possibility of combining of authorities into a single system.

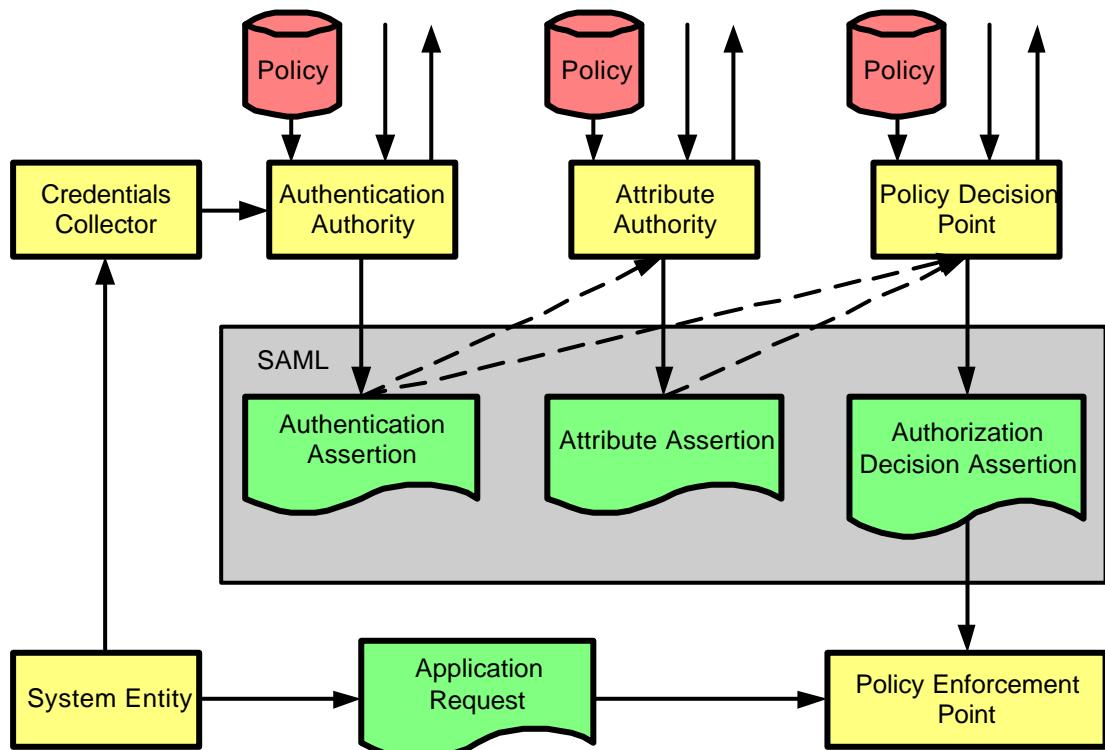


Figure 1 The SAML Domain Model

One major design goal for SAML is Single Sign-On (SSO), the ability of a user to authenticate in one domain and use resources in other domains without re-authenticating. However, SAML can be used in various configurations to support additional scenarios as well. Several profiles of SAML are defined that support different styles of SSO and the securing of SOAP payloads.

249 The assertion and protocol data formats are defined in this specification. The bindings and profiles
250 are defined in a separate specification [**SAMLBind**]. A conformance program for SAML is defined
251 in the conformance specification [**SAMLConform**]. Security issues are discussed in a separate
252 security and privacy considerations specification [**SAMLSecure**].

253 **1.3.2. SAML and URI-Based Identifiers**

254 SAML defines some identifiers to manage references to well-known concepts and sets of values.
255 For example, the SAML-defined identifier for the Kerberos subject confirmation method is as
256 follows:

257 **urn:ietf:rfc:1510**

258 For another example, the SAML-defined identifier for the set of possible actions on a resource
259 consisting of Read/Write/Execute/Delete/Control is as follows:

260 **<http://www.oasis-open.org/committees/security/docs/draft-sstc-core-26#rwedc>**

261 These identifiers are defined as Uniform Resource Identifiers (URIs), but they are not necessarily
262 able to be resolved to some Web resource. At times SAML authorities need to use identifier strings
263 of their own design, for example, for assertion IDs or additional kinds of confirmation methods not
264 covered by SAML-defined identifiers. In these cases, using a URI form is not required; if it is used, it
265 is not required to be resolvable to some Web resource. However, using URIs – particularly URLs
266 based on the `http:` scheme – is likely to mitigate problems with clashing identifiers to some
267 extent.

268 The Read/Write/Execute/Delete/Control identifier above is an example of a namespace (not in the
269 sense of an XML namespace). SAML uses this namespace mechanism to manage the universe of
270 possible types of actions and possible names of attributes.

271 See section 7 for a list of SAML-defined identifiers.

272 **1.3.3. SAML and Extensibility**

273 The XML formats for SAML assertions and protocol messages have been designed to be
274 extensible.

275 However, it is possible that the use of extensions will harm interoperability and therefore the use of
276 extensions SHOULD be carefully considered.

277 2. SAML Assertions

278 An assertion is a package of information that supplies one or more statements made by an issuer.
279 SAML allows issuers to make three different kinds of assertion statement:

- 280 ?? **Authentication:** The specified subject was authenticated by a particular means at a
281 particular time.
- 282 ?? **Authorization Decision:** A request to allow the specified subject to access the specified
283 resource has been granted or denied.
- 284 ?? **Attribute:** The specified subject is associated with the supplied attributes.

285 Assertions have a nested structure. A series of inner elements representing authentication
286 statements, authorization decision statements, and attribute statements contain the specifics, while
287 an outer generic assertion element provides information that is common to all of the statements.

288 2.1. Schema Header and Namespace Declarations

289 The following schema fragment defines the XML namespaces and other header information for the
290 assertion schema:

```
291 <schema
292   targetNamespace="http://www.oasis-open.org/committees/security/docs/draft-
293   sstc-schema-assertion-27.xsd"
294   xmlns:ds="http://www.w3.org/2000/09/xmldsig#"
295   xmlns:saml="http://www.oasis-open.org/committees/security/docs/draft-sstc-
296   schema-assertion-27.xsd"
297   xmlns="http://www.w3.org/2001/XMLSchema"
298   elementFormDefault="unqualified">
299   <import namespace="http://www.w3.org/2000/09/xmldsig#"
300     schemaLocation="xmldsig-core-schema.xsd"/>
301   <annotation>
302     <documentation>draft-sstc-schema-assertion-27.xsd</documentation>
303   </annotation>
304 ...
305 </schema>
```

306 2.2. Simple Types

307 The following sections define the SAML assertion-related simple types.

308 2.2.1. Simple Types **IDType** and **IDReferenceType**

309 The **IDType** simple type is used to declare identifiers to assertions, requests, and responses. The
310 **IDReferenceType** is used to reference identifiers of type **IDType**.

311 Values declared to be of type **IDType** MUST satisfy the following properties:

- 312 ?? Any party that assigns an identifier MUST ensure that there is negligible probability that that
313 party or any other party will accidentally assign the same identifier to a different data object.
- 314 ?? Where a data object declares that it has a particular identifier, there MUST be exactly one
315 such declaration.

316 The mechanism by which the application ensures that the identifier is unique is left to the
317 implementation. In the case that a pseudorandom technique is employed, the probability of two
318 randomly chosen identifiers being identical MUST be less than 2^{-128} and SHOULD be less than
319 2^{-160} . This requirement MAY be met by applying Base64 encoding to a randomly chosen value 128
320 or 160 bits in length.

321 It is OPTIONAL for an identifier based on **IDType** to be resolvable in principle to some resource. In
322 the case that the identifier is resolvable in principle (for example, the identifier is in the form of a
323 URI reference), it is OPTIONAL for the identifier to be dereferenceable.

324 The following schema fragment defines the **IDType** and **IDReferenceType** simple types:

```
325 <simpleType name="IDType">  
326   <restriction base="string"/>  
327 </simpleType>  
328 <simpleType name="IDReferenceType">  
329   <restriction base="string"/>  
330 </simpleType>
```

331 2.2.2. Simple Type **DecisionType**

332 The **DecisionType** simple type defines the possible values to be reported as the status of an
333 authorization decision statement.

334 Permit

335 The specified action is permitted.

336 Deny

337 The specified action is denied.

338 Indeterminate

339 No assessment is made as to whether the specified action is permitted or denied.

340 The following schema fragment defines the **DecisionType** simple type:

```
341 <simpleType name="DecisionType">  
342   <restriction base="string">  
343     <enumeration value="Permit"/>  
344     <enumeration value="Deny"/>  
345     <enumeration value="Indeterminate"/>  
346   </restriction>  
347 </simpleType>
```

348 2.3. Assertions

349 The following sections define the SAML constructs that contain assertion information.

350 2.3.1. Element **<AssertionSpecifier>**

351 The **<AssertionSpecifier>** element specifies an assertion either by reference or by value. It
352 contains one of the following elements:

353 **<AssertionIDReference>**

354 Specifies an assertion by reference to the value of the assertion's **AssertionID** attribute.

355 **<Assertion>**

356 Specifies an assertion by value.

357 The following schema fragment defines the **<AssertionSpecifier>** element and its
358 **AssertionSpecifierType** complex type:

```
359 <element name="AssertionSpecifier" type="saml:AssertionSpecifierType" />  
360 <complexType name="AssertionSpecifierType">  
361   <choice>  
362     <element ref="saml:AssertionIDReference" />  
363     <element ref="saml:Assertion" />  
364   </choice>  
365 </complexType>
```

366 **2.3.2. Element <AssertionID>**

367 The <AssertionID> element makes a reference to a SAML assertion by means of the value of
368 the assertion's AssertionID attribute.

369 The following schema fragment defines the <AssertionID> element:

370 `<element name="AssertionIDReference" type="saml:IDReferenceType" />`

371 **2.3.3. Element <Assertion>**

372 The <Assertion> element is of **AssertionType** complex type. This type specifies the basic
373 information that is common to all assertions, including the following elements and attributes:

374 MajorVersion [Required]

375 The major version of this assertion. The identifier for the version of SAML defined in this
376 specification is 1. Processing of this attribute is specified in Section 3.4.4.

377 MinorVersion [Required]

378 The minor version of this assertion. The identifier for the version of SAML defined in this
379 specification is 0. Processing of this attribute is specified in Section 3.4.4.

380 AssertionID [Required]

381 The identifier for this assertion. It is of type **IDType**, and MUST follow the requirements
382 specified by that type for identifier uniqueness.

383 Issuer [Required]

384 The issuer of the assertion. The name of the issuer is provided as a string. The issuer
385 name SHOULD be unambiguous to the intended relying parties. SAML applications may
386 use an identifier such as a URI that is designed to be unambiguous regardless of context.

387 IssueInstant [Required]

388 The time instant of issue in UTC as described in section 1.2.1.

389 <Conditions> [Optional]

390 Conditions that MUST be taken into account in assessing the validity of the assertion.

391 <Advice> [Optional]

392 Additional information related to the assertion that assists processing in certain situations
393 but which MAY be ignored by applications that do not support its use.

394 <Signature> [Optional]

395 An XML Signature that authenticates the assertion, see section 5.

396 One or more of the following statement elements:

397 <Statement>

398 A statement defined in an extension schema.

399 <SubjectStatement>

400 A subject statement defined in an extension schema.

401 <AuthenticationStatement>

402 An authentication statement.

403 <AuthorizationDecisionStatement>

404 An authorization decision statement.

405 <AttributeStatement>

406 An attribute statement.

407 The following schema fragment defines the <Assertion> element and its **AssertionType**
408 complex type:

```

409 <element name="Assertion" type="saml:AssertionType" />
410 <complexType name="AssertionType">
411   <sequence>
412     <element ref="saml:Conditions" minOccurs="0" />
413     <element ref="saml:Advice" minOccurs="0" />
414     <choice maxOccurs="unbounded">
415       <element ref="saml:Statement" />
416       <element ref="saml:SubjectStatement" />
417       <element ref="saml:AuthenticationStatement" />
418       <element ref="saml:AuthorizationDecisionStatement" />
419       <element ref="saml:AttributeStatement" />
420     </choice>
421     <element ref="ds:Signature" minOccurs="0" />
422   </sequence>
423   <attribute name="MajorVersion" type="integer" use="required" />
424   <attribute name="MinorVersion" type="integer" use="required" />
425   <attribute name="AssertionID" type="saml:IDType" use="required" />
426   <attribute name="Issuer" type="string" use="required" />
427   <attribute name="IssueInstant" type="dateTime" use="required" />
428 </complexType>
```

429 2.3.3.1. Element <Conditions>

430 If an assertion contains a <Conditions> element, the validity of the assertion is dependent on the
 431 conditions provided. Each condition evaluates to a status of Valid, Invalid, or
 432 Indeterminate. The validity status of an assertion is the conjunction of the validity status of each
 433 of the conditions it contains, as follows:

- 434 ?? If any condition evaluates to Invalid, the assertion status is Invalid.
- 435 ?? If no condition evaluates to Invalid and one or more conditions evaluate to
 436 Indeterminate, the assertion status is Indeterminate.
- 437 ?? If no conditions are supplied or all the specified conditions evaluate to Valid, the assertion
 438 status is Valid.

439 Note that an assertion that has validity status 'Valid' may not be trustworthy by reasons such as not
 440 being issued by a trustworthy issuer or not being authenticated by a trustworthy signature.

441 The <Conditions> element MAY be extended to contain additional conditions. If an element
 442 contained within a <Conditions> element is encountered that is not understood, the status of the
 443 condition MUST be evaluated to Indeterminate.

444 The <Conditions> element MAY contain the following elements and attributes:

- 445 NotBefore [Optional]
 446 Specifies the earliest time instant at which the assertion is valid. The time value is encoded
 447 in UTC as described in section 1.2.1.
- 448 NotOnOrAfter [Optional]
 449 Specifies the time instant at which the assertion has expired. The time value is encoded in
 450 UTC as described in section 1.2.1.
- 451 <Condition> [Any Number]
 452 Provides an extension point allowing extension schemas to define new conditions.
- 453 <AudienceRestrictionCondition> [Any Number]
 454 Specifies that the assertion is addressed to a particular audience.
- 455 <TargetRestrictionCondition> [Any Number]
 456 The <TargetRestriction> condition is used to limit the use of the assertion to a particular
 457 relying party.

458 The following schema fragment defines the `<Conditions>` element and its **ConditionsType**
459 complex type:

```
460 <element name="Conditions" type="saml:ConditionsType" />
461 <complexType name="ConditionsType">
462   <choice minOccurs="0" maxOccurs="unbounded">
463     <element ref="saml:Condition" />
464     <element ref="saml:AudienceRestrictionCondition" />
465     <element ref="saml:TargetRestrictionCondition" />
466   </choice>
467   <attribute name="NotBefore" type="dateTime" use="optional"/>
468   <attribute name="NotOnOrAfter" type="dateTime" use="optional"/>
469 </complexType>
```

470 **2.3.3.1.1 Attributes NotBefore and NotOnOrAfter**

471 The `NotBefore` and `NotOnOrAfter` attributes specify time limits on the validity of the assertion.

472 The `NotBefore` attribute specifies the time instant at which the validity interval begins. The
473 `NotOnOrAfter` attribute specifies the time instant at which the validity interval has ended.

474 If the value for either `NotBefore` or `NotOnOrAfter` is omitted it is considered unspecified. If the
475 `NotBefore` attribute is unspecified (and if any other conditions that are supplied evaluate to
476 `Valid`), the assertion is valid at any time before the time instant specified by the `NotOnOrAfter`
477 attribute. If the `NotOnOrAfter` attribute is unspecified (and if any other conditions that are supplied
478 evaluate to `Valid`), the assertion is valid from the time instant specified by the `NotBefore`
479 attribute with no expiry. If neither attribute is specified (and if any other conditions that are supplied
480 evaluate to `Valid`), the assertion is valid at any time.

481 The `NotBefore` and `NotOnOrAfter` attributes are defined to have the **dateTime** simple type that
482 is built in to the W3C XML Schema Datatypes specification **[Schema2]**. All time instants are
483 specified in Universal Coordinated Time (UTC) as described in section 1.2.1. Implementations
484 MUST NOT generate time instants that specify leap seconds.

485 **2.3.3.1.2 Element <Condition>**

486 The `<Condition>` element serves as an extension point for new conditions. Its
487 **ConditionAbstractType** complex type is abstract; extension elements MUST use the `xsi:type`
488 attribute to indicate the derived type.

489 The following schema fragment defines the `<Condition>` element and its
490 **ConditionAbstractType** complex type:

```
491 <element name="Condition" type="saml:ConditionAbstractType" />
492 <complexType name="ConditionAbstractType" abstract="true" />
```

493 **2.3.3.1.3 Elements <AudienceRestrictionCondition> and <Audience>**

494 The `<AudienceRestrictionCondition>` element specifies that the assertion is addressed to
495 one or more specific audiences identified by `<Audience>` elements. Although a party that is outside
496 the audiences specified is capable of drawing conclusions from an assertion, the issuer explicitly
497 makes no representation as to accuracy or trustworthiness to such a party. It contains the following
498 elements:

```
499 <Audience>
500   A URI that identifies an intended audience. The URI MAY identify a document that
501   describes the terms and conditions of audience membership.
```

502 The `AudienceRestrictionCondition` evaluates to `Valid` if and only if the relying party is a
503 member of one or more of the audiences specified.

504 The issuer of an assertion cannot prevent a party to whom it is disclosed from making a decision on
505 the basis of the information provided. However, the `<AudienceRestrictionCondition>`
506 element allows the issuer to state explicitly that no warranty is provided to such a party in a
507 machine- and human-readable form. While there can be no guarantee that a court would uphold
508 such a warranty exclusion in every circumstance, the probability of upholding the warranty
509 exclusion is considerably improved.

510 The following schema fragment defines the `<AudienceRestrictionCondition>` element and
511 its **AudienceRestrictionConditionType** complex type:

```
512 <element name="AudienceRestrictionCondition"
513   type="saml:AudienceRestrictionConditionType" />
514 <complexType name="AudienceRestrictionConditionType">
515   <complexContent>
516     <extension base="saml:ConditionAbstractType">
517       <sequence>
518         <element ref="saml:Audience" maxOccurs="unbounded" />
519       </sequence>
520     </extension>
521   </complexContent>
522 </complexType>
523 <element name="Audience" type="anyURI" />
```

524 2.3.3.1.4 Elements `<TargetRestrictionCondition>` and `<Target>`

525 The `<TargetRestrictionCondition>` element is used to limit the use of the assertion to a particular
526 relying party. This is useful to prevent malicious forwarding of assertions to unintended recipients. It
527 contains the following elements:

528 <Target>
529 A URI that identifies an intended relying party.

530 The `TargetRestrictionCondition` evaluates to `Valid` if and only if one or more URIs identify the
531 recipient or a resource managed by the recipient.

532 The following schema fragment defines the `<TargetRestrictionCondition>` element and its
533 **TargetRestrictionConditionType** complex type:

```
534 <element name="TargetRestrictionCondition"
535   type="saml:TargetRestrictionConditionType" />
536 <complexType name="TargetRestrictionConditionType">
537   <complexContent>
538     <extension base="saml:ConditionAbstractType">
539       <sequence>
540         <element ref="saml:Target"
541           minOccurs="1" maxOccurs="unbounded" />
542       </sequence>
543     </extension>
544   </complexContent>
545 </complexType>
546 <element name="Target" type="anyURI" />
```

547 2.3.3.2. Elements `<Advice>` and `<AdviceElement>`

548 The `<Advice>` element contains any additional information that the issuer wishes to provide. This
549 information MAY be ignored by applications without affecting either the semantics or the validity of
550 the assertion.

551 The `<Advice>` element contains a mixture of zero or more `<AssertionSpecifier>` elements,
552 `<AdviceElement>` elements, and elements in other namespaces, with lax schema validation in
553 effect for these other elements.

554 Following are some potential uses of the `<Advice>` element:

- 555 ?? Include evidence supporting the assertion claims to be cited, either directly (through
 556 incorporating the claims) or indirectly (by reference to the supporting assertions).
 557 ?? State a proof of the assertion claims.
 558 ?? Specify the timing and distribution points for updates to the assertion.

559 The following schema fragment defines the `<Advice>` element and its **AdviceType** complex type,
 560 along with the `<AdviceElement>` element and its **AdviceAbstractType** complex type:

```
561 <element name="Advice" type="saml:AdviceType" />
562 <complexType name="AdviceType">
563
564   <choice minOccurs="0" maxOccurs="unbounded">
565     <element ref="saml:AssertionSpecifier" />
566     <element ref="saml:AdviceElement" />
567     <any namespace="##other" processContents="lax" />
568   </choice>
569
570 </complexType>
571 <element name="AdviceElement" type="saml:AdviceAbstractType" />
572 <complexType name="AdviceAbstractType">
```

573 2.4. Statements

574 The following sections define the SAML constructs that contain statement information.

575 2.4.1. Element <Statement>

576 The `<Statement>` element is an extension point that allows other assertion-based applications to
 577 reuse the SAML assertion framework. Its **StatementAbstractType** complex type is abstract;
 578 extension elements MUST use the `xsi:type` attribute to indicate the derived type.

579 The following schema fragment defines the `<Statement>` element and its
 580 **StatementAbstractType** complex type:

```
581 <element name="Statement" type="saml:StatementAbstractType" />
582 <complexType name="StatementAbstractType" abstract="true" />
```

583 2.4.2. Element <SubjectStatement>

584 The `<SubjectStatement>` element is an extension point that allows other assertion-based
 585 applications to reuse the SAML assertion framework. It contains a `<Subject>` element that allows
 586 an issuer to describe a subject. Its **SubjectStatementAbstractType** complex type, which extends
 587 **StatementAbstractType**, is abstract; extension elements MUST use the `xsi:type` attribute to
 588 indicate the derived type.

589 The following schema fragment defines the `<SubjectStatement>` element and its
 590 **SubjectStatementAbstractType** abstract type:

```
591 <element name="SubjectStatement" type="saml:SubjectStatementAbstractType" />
592 <complexType name="SubjectStatementAbstractType" abstract="true" >
593   <complexContent>
594     <extension base="saml:StatementAbstractType" >
595       <sequence>
596         <element ref="saml:Subject" />
597       </sequence>
598     </extension>
599   </complexContent>
600 </complexType>
```

601 **2.4.2.1. Element <Subject>**

602 The <Subject> element specifies the principal that is the subject of the statement. It contains
603 either or both of the following elements:

604 <NameIdentifier>
605 An identification of a subject by its name and security domain.
606 <SubjectConfirmation>
607 Information that allows the subject to be authenticated.
608 If the <Subject> element contains both a <NameIdentifier> and a
609 <SubjectConfirmation>, the issuer is asserting that if the relying party performs the specified
610 <SubjectConfirmation>, it can be confident that the entity presenting the assertion to the
611 relying party is the entity that the issuer associates with the <NameIdentifier> A <Subject>
612 element SHOULD NOT identify more than one principal.

613 The following schema fragment defines the <Subject> element and its **SubjectType** complex
614 type:

```
615 <element name="Subject" type="saml:SubjectType" />
616 <complexType name="SubjectType">
617   <choice>
618     <sequence>
619       <element ref="saml:NameIdentifier" />
620       <element ref="saml:SubjectConfirmation" minOccurs="0" />
621     </sequence>
622     <element ref="saml:SubjectConfirmation" />
623   </choice>
624 </complexType>
```

625 **2.4.2.2. Element <NameIdentifier>**

626 The <NameIdentifier> element specifies a subject by a combination of a name and a security
627 domain. It has the following attributes:

628 SecurityDomain [Optional]
629 The security domain governing the name of the subject.

630 Name [Required]
631 The name of the subject.

632 The interpretation of the security domain and the name are left to individual implementations,
633 including issues of anonymity, pseudonymity, and the persistence of the identifier with respect to
634 the asserting and relying parties.

635 The following schema fragment defines the <NameIdentifier> element and its
636 **NameIdentifierType** complex type:

```
637 <element name="NameIdentifier" type="saml:NameIdentifierType" />
638 <complexType name="NameIdentifierType">
639   <attribute name="SecurityDomain" type="string" />
640   <attribute name="Name" type="string" use="required" />
641 </complexType>
```

642 **2.4.2.3. Elements <SubjectConfirmation>, <ConfirmationMethod>, and
643 <SubjectConfirmationData>**

644 The <SubjectConfirmation> element specifies a subject by supplying data that allows the
645 subject to be authenticated. It contains the following elements in order:

646 <ConfirmationMethod> [One or more]
647 A URI that identifies a protocol to be used to authenticate the subject. URIs identifying
648 common authentication protocols are listed in Section 7.

649 <SubjectConfirmationData> [Optional]
650 Additional authentication information to be used by a specific authentication protocol.

651 <ds:KeyInfo> [Optional]
652 An XML Signature **[XMLSig]** element that specifies a cryptographic key held by the
653 subject.

654 The following schema fragment defines the <SubjectConfirmation> element and its
655 **SubjectConfirmationType** complex type, along with the <SubjectConfirmationData>
656 element and the <ConfirmationMethod> element:

```
657   <element name="SubjectConfirmation" type="saml:SubjectConfirmationType" />  
658   <complexType name="SubjectConfirmationType">  
659     <sequence>  
660       <element ref="saml:ConfirmationMethod" maxOccurs="unbounded" />  
661       <element ref="saml:SubjectConfirmationData" minOccurs="0" />  
662       <element ref="ds:KeyInfo" minOccurs="0" />  
663     </sequence>  
664   </complexType>  
665   <element name="SubjectConfirmationData" type="string" />  
666   <element name="ConfirmationMethod" type="anyURI" />
```

667 2.4.3. Element <AuthenticationStatement>

668 The <AuthenticationStatement> element supplies a statement by the issuer that its subject
669 was authenticated by a particular means at a particular time. It is of type
670 **AuthenticationStatementType**, which extends **SubjectStatementAbstractType** with the addition
671 of the following element and attributes:

672 AuthenticationMethod [Optional]

673 A URI that specifies the type of authentication that took place. URIs identifying common
674 authentication protocols are listed in Section 7.

675 AuthenticationInstant [Optional]

676 Specifies the time at which the authentication took place. The time value is encoded in UTC
677 as described in section 1.2.1.

678 <AuthenticationLocality> [Optional]

679 Specifies the DNS domain name and IP address for the system entity from which the
680 Subject was apparently authenticated.

681 <AuthorityBinding> [Any Number]

682 Indicates that additional information about the subject of the statement may be available.

683 The following schema fragment defines the <AuthenticationStatement> element and its
684 **AuthenticationStatementType** complex type:

```
685   <element name="AuthenticationStatement"  
686           type="saml:AuthenticationStatementType" />  
687   <complexType name="AuthenticationStatementType">  
688     <complexContent>  
689       <extension base="saml:SubjectStatementAbstractType">  
690         <sequence>  
691           <element ref="saml:AuthenticationLocality" minOccurs="0" />  
692           <element ref="saml:AuthorityBinding"  
693               minOccurs="0" maxOccurs="unbounded" />  
694         </sequence>  
695         <attribute name="AuthenticationMethod" type="anyURI" />  
696         <attribute name="AuthenticationInstant" type="dateTime" />  
697       </extension>  
698     </complexContent>  
699   </complexType>
```

700 **2.4.3.1. Element <AuthenticationLocality>**

701 The <AuthenticationLocality> element specifies the DNS domain name and IP address for
702 the system entity that was authenticated. It has the following attributes:

703 **IPAddress** [Optional]

704 The IP address of the system entity that was authenticated.

705 **DNSAddress** [Optional]

706 The DNS address of the system entity that was authenticated.

707 This element is entirely advisory, since both these fields are quite easily "spoofed" but current
708 practice appears to require its inclusion.

709 The following schema fragment defines the <AuthenticationLocality> element and its
710 **AuthenticationLocalityType** complex type:

```
711   <element name="AuthenticationLocality"  
712        type="saml:AuthenticationLocalityType"/>  
713   <complexType name="AuthenticationLocalityType ">  
714     <attribute name="IPAddress" type="string" use="optional" />  
715     <attribute name="DNSAddress" type="string" use="optional" />  
716   </complexType>
```

717 **2.4.3.2. Element <AuthorityBinding>**

718 The <AuthorityBinding> element may be used to indicate to a relying party receiving an
719 AuthenticationStatement that a SAML authority may be available to provide additional information
720 about the subject of the statement. A single SAML authority may advertise its presence over
721 multiple protocol bindings, at multiple locations, and as more than one kind of authority by sending
722 multiple elements as needed.

723 **AuthorityKind** [Required]

724 The type of SAML authority (Authentication, Attribute, or Authorization Decision) advertised
725 by the element. The kind of authority corresponds to the derived type of `SubjectQuery` that
726 the authority expects to receive (and is likely to be able to successfully answer) at the
727 location being advertised. For example, a value of "attribute" means that an
728 <AttributeQuery> is expected.

729 **Location** [Required]

730 A URI describing how to locate and communicate with the authority, the exact syntax of
731 which depends on the protocol binding in use. For example, a binding based on HTTP will
732 be a web URL, while a binding based on SMTP might use the "mailto" scheme.

733 **Binding** [Required]

734 A URI identifying the SAML protocol binding to use in communicating with the authority. All
735 SAML protocol bindings will have an assigned URI.

736 The following schema fragment defines the <AuthorityBinding> element and its
737 **AuthorityBindingType** complex type and **AuthorityKindType** simple type:

```
738   <element name="AuthorityBinding" type="saml:AuthorityBindingType"/>  
739   <complexType name="AuthorityBindingType">  
740     <attribute name="AuthorityKind" type="saml:AuthorityKindType"  
741        use="required"/>/>  
742     <attribute name="Location" type="anyURI" use="required"/>  
743     <attribute name="Binding" type="anyURI" use="required"/>  
744   </complexType>  
745   <simpleType name="AuthorityKindType">  
746     <restriction base="string">  
747       <enumeration value="authentication" />  
748       <enumeration value="attribute" />  
749       <enumeration value="authorization" />
```

```
750      </restriction>
751  </simpleType>
```

752 2.4.4. Element <AuthorizationDecisionStatement>

753 The <AuthorizationDecisionStatement> element supplies a statement by the issuer that the
754 request for access by the specified subject to the specified resource has resulted in the specified
755 decision on the basis of some optionally specified evidence.

756 The resource is identified by means of a URI. In order for the assertion to be interpreted correctly
757 and securely the issuer and relying party MUST interpret each URI in a consistent manner. Failure
758 to achieve a consistent URI interpretation can result in different authorization decisions depending
759 on the encoding of the resource URI. Rules for normalizing URIs are to be found in [RFC 2396]§6

760 *In general, the rules for equivalence and definition of a normal form, if any, are scheme
761 dependent. When a scheme uses elements of the common syntax, it will also use the common
762 syntax equivalence rules, namely that the scheme and hostname are case insensitive and a
763 URL with an explicit ":port", where the port is the default for the scheme, is equivalent to one
764 where the port is elided.*

765 To avoid ambiguity resulting from variations in URI encoding SAML applications SHOULD employ
766 the URI normalized form wherever possible as follows:

767 ?? The assertion issuer SHOULD encode all resource URIs in normalized form.

768 ?? Relying parties SHOULD convert resource URIs to normalized form prior to processing.

769 Inconsistent URI interpretation can also result from differences between the URI syntax and the
770 semantics of an underlying file system. Particular care is required if URIs are employed to specify
771 an access control policy language. The following security conditions should be satisfied by the
772 system which employs SAML assertions:

773 ?? Parts of the URI syntax are case sensitive. If the underlying file system is case insensitive a
774 requestor SHOULD NOT be able to gain access to a denied resource by changing the case
775 of a part of the resource URI.

776 ?? Many file systems support mechanisms such as logical paths and symbolic links which
777 allow users to establish logical equivalences between file system entries. A requestor
778 SHOULD NOT be able to gain access to a denied resource by creating such an
779 equivalence.

780 The <AuthorizationDecisionStatement> element is of type
781 **AuthorizationDecisionStatementType**, which extends **SubjectStatementAbstractType** with the
782 addition of the following elements (in order) and attributes:

783 Resource [Required]

784 A URI identifying the resource to which access authorization is sought.

785 Decision [Required]

786 The decision rendered by the issuer with respect to the specified resource. The value is of
787 the **DecisionType** simple type.

788 <Actions> [Required]

789 The set of actions authorized to be performed on the specified resource.

790 <Evidence> [Any Number]

791 A set of assertions that the issuer relied on in making the decision.

792 The following schema fragment defines the <AuthorizationDecisionStatement> element
793 and its **AuthorizationDecisionStatementType** complex type:

```
794  <element name="AuthorizationDecisionStatement"
795    type="saml:AuthorizationDecisionStatementType" />
```

```

796 <complexType name="AuthorizationDecisionStatementType">
797   <complexContent>
798     <extension base="saml:SubjectStatementAbstractType">
799       <sequence>
800         <element ref="saml:Actions"/>
801         <element ref="saml:Evidence" minOccurs="0"
802                 maxOccurs="unbounded"/>
803       </sequence>
804       <attribute name="Resource" type="anyURI" use="required" />
805       <attribute name="Decision" type="saml:DecisionType"
806                 use="required" />
807     </extension>
808   </complexContent>
809 </complexType>
```

810 2.4.4.1. Elements <Actions> and <Action>

811 The <Actions> element specifies the set of actions on the specified resource for which permission
 812 is sought. It has the following element and attribute:

813 Namespace [Optional]

814 A URI representing the namespace in which the names of specified actions are to be
 815 interpreted. If this element is absent, the namespace [http://www.oasis-](http://www.oasis-open.org/committees/security/docs/draft-sstc-core-26#rwedc-negation)
 816 open.org/committees/security/docs/draft-sstc-core-26#rwedc-negation specified in section
 817 7.2.2 is in effect.

818 <Action> [One or more]

819 An action sought to be performed on the specified resource.

820 The following schema fragment defines the <Actions> element, its **ActionsType** complex type,
 821 and the <Action> element:

```

822   <element name="Actions" type="saml:ActionsType" />
823   <complexType name="ActionsType">
824     <sequence>
825       <element ref="saml:Action" maxOccurs="unbounded" />
826     </sequence>
827     <attribute name="Namespace" type="anyURI" use="optional" />
828   </complexType>
829   <element name="Action" type="string" />
```

830 2.4.4.2. Element <Evidence>

831 The <Evidence> element contains an assertion that the issuer relied on in issuing the
 832 authorization decision. It has the **AssertionSpecifierType** complex type.

833 The provision of an assertion as evidence MAY affect the reliance agreement between the
 834 requestor and the Authorization Authority. For example, in the case that the requestor presented an
 835 assertion to the Authorization Authority in a request, the Authorization Authority MAY use that
 836 assertion as evidence in making its response without endorsing the assertion as valid either to the
 837 requestor or any third party.

838 The following schema fragment defines the <Evidence> element:

```
<element name="Evidence" type="saml:AssertionSpecifierType" />
```

840 2.4.5. Element <AttributeStatement>

841 The <AttributeStatement> element supplies a statement by the issuer that the specified
 842 subject is associated with the specified attributes. It is of type **AttributeStatementType**, which
 843 extends **SubjectStatementAbstractType** with the addition of the following element:

844 <Attribute> [One or More]
845 The <Attribute> element specifies an attribute of the subject.

846 The following schema fragment defines the <AttributeStatement> element and its
847 **AttributeStatementType** complex type:

```
848 <element name="AttributeStatement" type="saml:AttributeStatementType" />
849 <complexType name="AttributeStatementType">
850   <complexContent>
851     <extension base="saml:SubjectStatementAbstractType">
852       <sequence>
853         <element ref="saml:Attribute" maxOccurs="unbounded" />
854       </sequence>
855     </extension>
856   </complexContent>
857 </complexType>
```

858 2.4.5.1. Elements <AttributeDesignator> and <Attribute>

859 The <AttributeDesignator> element identifies an attribute name within an attribute
860 namespace. It has the **AttributeDesignatorType** complex type. It is used in an attribute assertion
861 query to request that attribute values within a specific namespace be returned (see 3.3.4 for more
862 information). The <AttributeDesignator> element contains the following XML attributes:

863 AttributeNamespace [Optional]
864 The namespace in which the AttributeName elements are interpreted.

865 AttributeName [Optional]
866 The name of the attribute.

867 The following schema fragment defines the <AttributeDesignator> element and its
868 **AttributeDesignatorType** complex type:

```
869 <element name="AttributeDesignator" type="saml:AttributeDesignatorType" />
870 <complexType name="AttributeDesignatorType">
871   <attribute name="AttributeName" type="string" use="required" />
872   <attribute name="AttributeNamespace" type="anyURI" use="required" />
873 </complexType>
```

874 The <Attribute> element supplies the value for an attribute of an assertion subject. It has the
875 **AttributeType** complex type, which extends **AttributeDesignatorType** with the addition of the
876 following element:

877 <AttributeValue> [Any Number]
878 The value of the attribute.

879 The following schema fragment defines the <Attribute> element and its **AttributeType** complex
880 type:

```
881 <element name="Attribute" type="saml:AttributeType" />
882 <complexType name="AttributeType">
883   <complexContent>
884     <extension base="saml:AttributeDesignatorType" >
885       <sequence>
886         <element ref="saml:AttributeValue" maxOccurs="unbounded" />
887       </sequence>
888     </extension>
889   </complexContent>
890 </complexType>
```

891 2.4.5.1.1 Element <AttributeValue>

892 The <AttributeValue> element supplies the value of a specified attribute. It is of the **anyType**
893 simple type, which allows any well-formed XML to appear as the content of the element.

894 If the data content of an `AttributeValue` element is of a XML Schema simple type (e.g. integer,
895 string, etc) the data type MAY be declared explicitly by means of an `xsi:type` declaration in the
896 `<AttributeValue>` element. If the attribute value contains structured data the necessary data
897 elements may be defined in an extension schema introduced by means of the `xmlns=` mechanism.

898 The following schema fragment defines the `<AttributeValue>` element:

899 `<element name="AttributeValue" type="anyType" />`

900 3. SAML Protocol

901 SAML assertions MAY be generated and exchanged using a variety of protocols. The bindings and
902 profiles specification for SAML [SAMLBind] describes specific means of transporting assertions
903 using existing widely deployed protocols.

904 SAML-aware requestors MAY in addition use the SAML request-response protocol defined by the
905 <Request> and <Response> elements. The requestor sends a <Request> element to a SAML
906 authority, and the authority generates a <Response> element, as shown in Figure 2.



907
908 Figure 2: SAML Request-Response Protocol

909 3.1. Schema Header and Namespace Declarations

910 The following schema fragment defines the XML namespaces and other header information for the
911 protocol schema:

```
912 <schema
913     targetNamespace="http://www.oasis-open.org/committees/security/docs/draft-
914     sstc-schema-protocol-27.xsd"
915     xmlns="http://www.w3.org/2001/XMLSchema"
916     xmlns:samlp="http://www.oasis-open.org/committees/security/docs/draft-sstc-
917     schema-protocol-27.xsd"
918     xmlns:saml="http://www.oasis-open.org/committees/security/docs/draft-sstc-
919     schema-assertion-27.xsd"
920     xmlns:ds="http://www.w3.org/2000/09/xmldsig#"
921     elementFormDefault="unqualified">
922     <import namespace="http://www.oasis-open.org/committees/security/docs/draft-
923     sstc-schema-assertion-27.xsd"
924         schemaLocation="draft-sstc-schema-assertion-27.xsd" />
925     <import namespace="http://www.w3.org/2000/09/xmldsig#"
926         schemaLocation="xmldsig-core-schema.xsd" />
927     <annotation>
928         <documentation>draft-sstc-schema-protocol-27.xsd</documentation>
929     </annotation>
930 ...
931 </schema>
```

932

933 3.2. Requests

934 The following sections define the SAML constructs that contain request information.

935 3.2.1. Complex Type RequestAbstractType

936 All SAML requests are of types that are derived from the abstract **RequestAbstractType** complex
937 type. This type defines common attributes and elements that are associated with all SAML
938 requests:

939 RequestID [Required]

940 An identifier for the request. It is of type **IDType**, and MUST follow the requirements
941 specified by that type for identifier uniqueness. The values of the RequestID attribute in a
942 request and the InResponseTo attribute in the corresponding response MUST match.

```

943 MajorVersion [Required]
944     The major version of this request. The identifier for the version of SAML defined in this
945     specification is 1. Processing of this attribute is specified in Section 3.4.2.
946 MinorVersion [Required]
947     The minor version of this request. The identifier for the version of SAML defined in this
948     specification is 0. Processing of this attribute is specified in Section 3.4.2.
949 IssueInstant [Required]
950     The time instant of issue of the request. The time value is encoded in UTC as described in
951     section 1.2.1.
952 <RespondWith> [Any Number]
953     Each <RespondWith> element specifies a type of response that is acceptable to the
954     requestor.
955 <Signature> [Optional]
956     An XML Signature that authenticates the assertion, see section 5.
957 The following schema fragment defines the RequestAbstractType complex type:
958 <complexType name="RequestAbstractType" abstract="true">
959     <sequence>
960         <element ref = "samlp:RespondWith"
961                 minOccurs="0" maxOccurs="unbounded" />
962         <element ref = "ds:Signature" minOccurs="0" />
963     </sequence>
964     <attribute name="RequestID" type="saml:IDType" use="required" />
965     <attribute name="MajorVersion" type="integer" use="required" />
966     <attribute name="MinorVersion" type="integer" use="required" />
967     <attribute name="IssueInstant" type="dateTime" use="required" />
968 </complexType>

```

969 3.2.1.1. Element <RespondWith>

970 The <RespondWith> element specifies a type of response that is acceptable to the requestor. If
971 no <RespondWith> element is specified the default is SingleStatement.

972 The <RespondWith> element specifies the type(s) of response that is acceptable to the requestor.
973 Multiple <RespondWith> elements MAY be specified to indicate that the requestor is capable of
974 processing multiple requests.

975 <RespondWith> elements are used to inform the responder of the type of assertion statements
976 that the requestor is capable of processing. The Responder MUST use this information to ensure
977 that it generates responses consistent with information found in the <RespondWith> element of
978 the Request.

979 NOTE: Inability to find assertions that meet <RespondWith> criteria should be treated identical to
980 any other query for which no assertions are available. In both cases a status of success would
981 normally be returned in the Response message, but no assertions to be found therein.

982 <RespondWith> element values are URIs. A requestor MAY use an XML schema identifier as a
983 <RespondWith> element value to inform the responder that the specified SAML extension schema
984 is supported. <RespondWith> values defined in this document are specified as URI fragment
985 identifiers, the nominal base for these identifier values being the SAML protocol schema identifier
986 URI.

987 Acceptable values for the <RespondWith> element are:

988 #SingleStatement
989 An assertion carrying exactly one statement element.

```

990 #MultipleStatement
991     An assertion carrying at least one statement element.
992 #AuthenticationStatement
993     An assertion carrying an Authentication statement.
994 #AuthorizationDecisionStatement
995     An assertion carrying an Authorization Decision statement.
996 #AttributeStatement
997     An assertion carrying an Attribute statement.
998 Schema URI
999     An assertion containing additional elements from the specified schema.
1000 The following schema fragment defines the <RespondWith> element:
1001 <element name="RespondWith" type="anyURI" />

```

1002 3.2.2. Element <Request>

1003 The <Request> element specifies a SAML request. It provides either a query or a request for a
 1004 specific assertion identified by <AssertionIDReference> or <AssertionArtifact>. It has
 1005 the complex type **RequestType**, which extends **RequestAbstractType** by adding a choice of one
 1006 of the following elements:

```

1007 <Query>
1008     An extension point that allows extension schemas to define new types of query.
1009 <SubjectQuery>
1010     An extension point that allows extension schemas to define new types of query that specify
1011     a single SAML subject.
1012 <AuthenticationQuery>
1013     Makes a query for authentication information.
1014 <AttributeQuery>
1015     Makes a query for attribute information.
1016 <AuthorizationDecisionQuery>
1017     Makes a query for an authorization decision.
1018 <AssertionIDReference> [One or more]
1019     Requests assertions by reference to its assertion identifier.
1020 <AssertionArtifact> [One or more]
1021     Requests assertions by supplying an assertion artifact that represents it.

```

1022 The following schema fragment defines the <Request> element and its **RequestType** complex
 1023 type:

```

1024 <element name="Request" type="samlp:RequestType" />
1025 <complexType name="RequestType">
1026     <complexContent>
1027         <extension base="samlp:RequestAbstractType">
1028             <choice>
1029                 <element ref="samlp:Query" />
1030                 <element ref="samlp:SubjectQuery" />
1031                 <element ref="samlp:AuthenticationQuery" />
1032                 <element ref="samlp:AttributeQuery" />
1033                 <element ref="samlp:AuthorizationDecisionQuery" />
1034                 <element ref="saml:AssertionIDReference" maxOccurs="unbounded" />
1035                 <element ref="samlp:AssertionArtifact" maxOccurs="unbounded" />
1036             </choice>
1037         </extension>

```

```
1038      </complexContent>
1039  </complexType>
```

1040 3.2.3. Element <AssertionArtifact>

1041 The <AssertionArtifact> element is used to specify the assertion artifact that represents an
1042 assertion.

1043 The following schema fragment defines the <AssertionArtifact> element:

```
1044  <element name="AssertionArtifact" type="string" />
```

1045 3.3. Queries

1046 The following sections define the SAML constructs that contain query information.

1047 3.3.1. Element <Query>

1048 The <Query> element is an extension point that allows new SAML queries to be defined. Its
1049 **QueryAbstractType** is abstract; extension elements MUST use the xsi:type attribute to indicate
1050 the derived type. **QueryAbstractType** is the base type from which all SAML query elements are
1051 derived.

1052 The following schema fragment defines the <Query> element and its **QueryAbstractType**
1053 complex type:

```
1054  <element name="Query" type="samlp:QueryAbstractType" />
1055  <complexType name="QueryAbstractType" abstract="true" />
```

1056 3.3.2. Element <SubjectQuery>

1057 The <SubjectQuery> element is an extension point that allows new SAML queries that specify a
1058 single SAML subject. Its **SubjectQueryAbstractType** complex type is abstract; extension elements
1059 MUST use the xsi:type attribute to indicate the derived type. **SubjectQueryAbstractType** adds
1060 the <Subject> element.

1061 The following schema fragment defines the <SubjectQuery> element and its
1062 **SubjectQueryAbstractType** complex type:

```
1063  <element name="SubjectQuery" type="samlp:SubjectQueryAbstractType" />
1064  <complexType name="SubjectQueryAbstractType" abstract="true" >
1065    <complexContent>
1066      <extension base="samlp:QueryAbstractType" >
1067        <sequence>
1068          <element ref="saml:Subject" />
1069        </sequence>
1070      </extension>
1071    </complexContent>
1072  </complexType>
```

1073 3.3.3. Element <AuthenticationQuery>

1074 The <AuthenticationQuery> element is used to make the query “What authentication
1075 assertions are available for this subject?” A successful response will be in the form of assertions
1076 containing authentication statements. This element is of type **AuthenticationQueryType**, which
1077 extends **SubjectQueryAbstractType** with the addition of the following element:

```
1078  <ConfirmationMethod> [Optional]
1079    A filter for possible responses. If it is present, the query made is “What authentication
1080    assertions do you have for this subject with the supplied confirmation method?”
```

1081 In response to an authentication query, a responder returns assertions with authentication
1082 statements as follows: The <Subject> element in the returned assertions MUST be identical to
1083 the <Subject> element of the query. If the <ConfirmationMethod> element is present in the
1084 query, at least one <ConfirmationMethod> element in the response MUST match. It is
1085 OPTIONAL for the complete set of all such matching assertions to be returned in the response.

1086 The following schema fragment defines the <AuthenticationQuery> type and its
1087 **AuthenticationQueryType** complex type:

```
1088 <element name="AuthenticationQuery" type="samlp:AuthenticationQueryType" />
1089 <complexType name="AuthenticationQueryType">
1090   <complexContent>
1091     <extension base="samlp:SubjectQueryAbstractType" >
1092       <sequence>
1093         <element ref="saml:ConfirmationMethod" minOccurs="0 " />
1094       </sequence>
1095     </extension>
1096   </complexContent>
1097 </complexType>
```

1098 3.3.4. Element <AttributeQuery>

1099 The <AttributeQuery> element is used to make the query "Return the requested attributes for
1100 this subject." A successful response will be in the form of assertions containing attribute statements.
1101 This element is of type **AttributeQueryType**, which extends **SubjectQueryAbstractType** with the
1102 addition of the following element and attribute:

1103 Resource [Optional]
1104 The Resource attribute if present specifies that the attribute query is made in response to a
1105 specific authorization decision relating to the resource. The responder MAY use the
1106 resource attribute to establish the scope of the request.
1107 If the resource attribute is specified and the responder does not wish to support resource-
1108 specific attribute queries, or if the resource value provided is invalid or unrecognized, then it
1109 SHOULD respond with a SAML status of "Error.Receiver.ResourceNotRecognized".

1110 <AttributeDesignator> [Any Number] (see Section 2.4.5.1)
1111 Each <AttributeDesignator> element specifies an attribute whose value is to be
1112 returned. If no attributes are specified, the list of desired attributes is implicit and
1113 application-specific.

1114 The following schema fragment defines the <AttributeQuery> element and its
1115 **AttributeQueryType** complex type:

```
1116 <element name="AttributeQuery" type="samlp:AttributeQueryType" />
1117 <complexType name="AttributeQueryType">
1118   <complexContent>
1119     <extension base="samlp:SubjectQueryAbstractType" >
1120       <sequence>
1121         <element ref="saml:AttributeDesignator"
1122           minOccurs="0 " maxOccurs="unbounded " />
1123       </sequence>
1124       <attribute name="Resource" type="anyURI" use="optional" />
1125     </extension>
1126   </complexContent>
1127 </complexType>
```

1128 3.3.5. Element <AuthorizationDecisionQuery>

1129 The <AuthorizationDecisionQuery> element is used to make the query "Should these
1130 actions on this resource be allowed for this subject, given this evidence?" A successful response
1131 will be in the form of assertions containing authorization decision statements. This element is of

1132 type **AuthorizationDecisionQueryType**, which extends **SubjectQueryAbstractType** with the
1133 addition of the following elements and attribute:

1134 Resource [Required]
1135 A URI indicating the resource for which authorization is requested.
1136 <Actions> [Required]
1137 The actions for which authorization is requested.
1138 <Evidence> [Any Number]
1139 An assertion that the responder MAY rely on in making its response.

1140 The following schema fragment defines the `<AuthorizationDecisionQuery>` element and its
1141 **AuthorizationDecisionQueryType** complex type:

```
1142 <element name="AuthorizationDecisionQuery"  
1143 type="samlp:AuthorizationDecisionQueryType"/>  
1144 <complexType name="AuthorizationDecisionQueryType">  
1145   <complexContent>  
1146     <extension base="samlp:SubjectQueryAbstractType">  
1147       <sequence>  
1148         <element ref="saml:Actions" />  
1149         <element ref="saml:Evidence"  
1150           minOccurs="0" maxOccurs="unbounded" />  
1151       </sequence>  
1152       <attribute name="Resource" type="anyURI" use="required" />  
1153     </extension>  
1154   </complexContent>  
1155 </complexType>
```

3.4. Responses

1156 The following sections define the SAML constructs that contain response information.

3.4.1. Complex Type ResponseAbstractType

1159 All SAML responses are of types that are derived from the abstract **ResponseAbstractType**
1160 complex type. This type defines common attributes and elements that are associated with all SAML
1161 responses:

1162 ResponseID [Required]
1163 An identifier for the response. It is of type **IDType**, and MUST follow the requirements
1164 specified by that type for identifier uniqueness.
1165 InResponseTo [Required]
1166 A reference to the identifier of the request to which the response corresponds. The value of
1167 this attribute MUST match the value of the corresponding RequestID attribute.
1168 MajorVersion [Required]
1169 The major version of this response. The identifier for the version of SAML defined in this
1170 specification is 1. Processing of this attribute is specified in Section 3.4.4.
1171 MinorVersion [Required]
1172 The minor version of this response. The identifier for the version of SAML defined in this
1173 specification is 0. Processing of this attribute is specified in Section 3.4.4.
1174 IssueInstant [Optional]
1175 The time instant of issue of the request. The time value is encoded in UTC as described in
1176 section 1.2.1.
1177 <Signature> [Optional]
1178 An XML Signature that authenticates the assertion, see section 5.

1179 The following schema fragment defines the **ResponseAbstractType** complex type:

```
1180 <complexType name="ResponseAbstractType" abstract="true">
1181   <sequence>
1182     <element ref = "ds:Signature" minOccurs="0" />
1183   </sequence>
1184   <attribute name="ResponseID" type="saml:IDType" use="required"/>
1185   <attribute name="InResponseTo" type="saml:IDReferenceType"
1186     use="required"/>
1187   <attribute name="MajorVersion" type="integer" use="required"/>
1188   <attribute name="MinorVersion" type="integer" use="required"/>
1189   <attribute name="IssueInstant" type="dateTime" use="required"/>
1190 </complexType>
```

1191 3.4.2. Element <Response>

1192 The <Response> element specifies the status of the corresponding SAML request and a list of
1193 zero or more assertions that answer the request. It has the complex type **ResponseType**, which
1194 extends **ResponseAbstractType** by adding the following elements (in an unbounded mixture):

```
1195 <Status> [Required] (see Section 3.4.3)
1196   A code representing the status of the corresponding request.
1197 <Assertion> [Any Number] (see Section 2.3.3)
1198   Specifies an assertion by value.
```

1199 The following schema fragment defines the <Response> element and its **ResponseType** complex
1200 type:

```
1201 <element name="Response" type="samlp:ResponseType" />
1202 <complexType name="ResponseType">
1203   <complexContent>
1204     <extension base="samlp:ResponseAbstractType" >
1205       <sequence>
1206         <element ref="samlp:Status" />
1207         <element ref="saml:Assertion"
1208           minOccurs="0" maxOccurs="unbounded" />
1209       </sequence>
1210     </extension>
1211   </complexContent>
1212 </complexType>
```

1213 3.4.3. Element <Status>

1214 The <Status> element :

```
1215 <StatusCode> [Required]
1216   A code representing the status of the corresponding request.
1217 <StatusMessage> [Any Number]
1218   A message which MAY be returned to an operator.
1219 <StatusDetail> [Optional]
1220   Specifies additional information concerning an error condition.
```

1221 The following schema fragment defines the <Status> element and its **StatusType** complex type:

```
1222 <element name="Status" type="samlp:StatusType" />
1223 <complexType name="StatusType">
1224   <sequence>
1225     <element ref="samlp:StatusCode" />
1226     <element ref="samlp:StatusMessage"
1227       minOccurs="0" maxOccurs="unbounded" />
1228     <element ref="samlp:StatusDetail" minOccurs="0" />
```

```
1229      </sequence>
1230  </complexType>
```

1231 3.4.3.1. Element <StatusCode>

1232 The <StatusCode> element specifies a code representing the status of the corresponding request
1233 and an option sub code providing more specific information concerning a particular error status:

1234 Value [Required]

1235 The status code value as defined below.

1236 <SubStatusCode> [Optional]

1237 An optional subordinate status code value that provides more specific information on an
1238 error condition.

1239 The following **StatusCode** values are defined:

1240 Success

1241 The request succeeded.

1242 VersionMismatch

1243 The receiver could not process the request because the version was incorrect.

1244 Receiver

1245 The request could not be performed due to an error at the receiving end.

1246 Sender

1247 The request could not be performed due to an error in the sender or in the request

1248 The following schema fragment defines the <StatusCode> element and its **StatusCodeType**
1249 complex type and the **StatusCodeEnumType** simple type:

```
1250 <element name="StatusCode" type="samlp:StatusCodeType" />
1251 <complexType name="StatusCodeType">
1252   <sequence>
1253     <element ref="samlp:SubStatusCode" minOccurs="0" />
1254   </sequence>
1255   <attribute name="Value" type="samlp:StatusCodeEnumType" use="required" />
1256 </complexType>
1257 <simpleType name="StatusCodeEnumType">
1258   <restriction base="QName">
1259     <enumeration value="samlp:Success" />
1260     <enumeration value="samlp:VersionMismatch" />
1261     <enumeration value="samlp:Receiver" />
1262     <enumeration value="samlp:Sender" />
1263   </restriction>
1264 </simpleType>
```

1265 3.4.3.2. Element <SubStatusCode>

1266 The <SubStatusCode> element specifies an additional code representing the status of the
1267 corresponding request:

1268 Value [Required]

1269 The status code value as defined below.

1270 <SubStatusCode> [Optional]

1271 An optional subordinate status code value that provides an additional level of specific
1272 information on an error condition.

1273 The following **SubStatusCode** values are defined, additional codes MAY be defined in future
1274 versions of the SAML specification:

```
1275 RequestVersionTooHigh  
1276     The protocol version specified in the request is a major upgrade from the highest protocol  
1277     version supported by the responder.  
1278 RequestVersionTooLow  
1279     The responder cannot respond to the particular request using the SAML version specified  
1280     in the request because it is too low.  
1281 RequestVersionDeprecated  
1282     The responder does not respond to any requests with the protocol version specified in the  
1283     request.  
1284 TooManyResponses  
1285     The response would contain more elements than the responder will return.
```

1286 The following schema fragment defines the <SubStatusCode> element and its
1287 **SubStatusCodeType** complex type:

```
1288 <element name="SubStatusCode" type="samlp:SubStatusCodeType" />  
1289 <complexType name="SubStatusCodeType">  
1290     <sequence>  
1291         <element ref="samlp:SubStatusCode" minOccurs="0" />  
1292     </sequence>  
1293     <attribute name="Value" type="QName" use="required" />  
1294 </complexType>
```

1295 **3.4.3.3. Element <StatusMessage>**

1296 The <StatusMessage> element specifies a message that MAY be returned to an operator:

1297 The following schema fragment defines the <StatusMessage> element and its
1298 **StatusMessageType** complex type:

```
1299 <element name="StatusMessage" type="string" />
```

1300 **3.4.3.4. Element <StatusDetail>**

1301 The <StatusDetail> element MAY be used to specify additional information concerning an error
1302 condition.

1303 The following schema fragment defines the <StatusDetail> element and its **StatusDetailType**
1304 complex type:

```
1305 <element name="StatusDetail" type="samlp:StatusDetailType" />  
1306 <complexType name="StatusDetailType">  
1307     <sequence>  
1308         <any namespace="##any"  
1309             processContents="lax" minOccurs="0" maxOccurs="unbounded" />  
1310     </sequence>  
1311 </complexType>
```

1312 **3.4.4. Responses to <AuthenticationQuery> and <AttributeQuery>**

1313 Responses to Authentication and Attribute queries are constructed by matching against the
1314 <saml:Subject> element found within the <AuthenticationQuery> or <AttributeQuery>
1315 elements. In response to these queries, every assertion returned by a SAML responder MUST
1316 contain at least one statement whose <saml:Subject> element **strongly matches** the
1317 <saml:Subject> element found in the query.

1318 A <saml:Subject> element S1 strongly matches S2 if and only if:

1319 1 If S2 includes a <saml:NameIdentifier> element, then S1 must include an identical
1320 <saml:NameIdentifier> element.

- 1321 2 If S2 includes a <saml:SubjectConfirmation> element, then S1 must include an
1322 identical <saml:SubjectConfirmation> element.

4. SAML Versioning

- 1323 SAML version information appears in the following elements:
- 1324 ?? <Assertion>
- 1325 ?? <Request>
- 1326 ?? <Response>
- 1327 The version numbering of the SAML assertion is independent of the version number of the SAML request-response protocol. The version information for each consists of a major version number and a minor version number, both of which are integers. In accordance with industry practice a version number SHOULD be presented to the user in the form *Major.Minor*. This document defines SAML Assertions 1.0 and SAML Protocol 1.0.
- 1328 The version number *Major_B.Minor_B* is higher than the version number *Major_A.Minor_A* if and only if:
- 1329 $Major_B > Major_A \text{ ? } ((Major_B = Major_A) \text{ ? } Minor_B > Minor_A)$
- 1330 Each revision of SAML SHALL assign version numbers to assertions, requests, and responses that are the same as or higher than the corresponding version number in the SAML version that immediately preceded it.
- 1331 New versions of SAML SHALL assign new version numbers as follows:
- 1332 ?? **Documentation change:** ($Major_B = Major_A$) ? ($Minor_B > Minor_A$)
1333 If the major and minor version numbers are unchanged, the new version *B* only introduces changes to the documentation that raise no compatibility issues with an implementation of version *A*.
- 1334 ?? **Minor upgrade:** ($Major_B = Major_A$) ? ($Minor_B > Minor_A$)
1335 If the major version number of versions *A* and *B* are the same and the minor version number of *B* is higher than that of *A*, the new SAML version MAY introduce changes to the SAML schema and semantics but any changes that are introduced in *B* SHALL be compatible with version *A*.
- 1336 ?? **Major upgrade:** $Major_B > Major_A$
1337 If the major version of *B* number is higher than the major version of *A*, Version *B* MAY introduce changes to the SAML schema and semantics that are incompatible with *A*.

4.1. Assertion Version

- 1338 A SAML application MUST NOT issue any assertion whose version number is not supported.
- 1339 A SAML application MUST reject any assertion whose major version number is not supported.
- 1340 A SAML application MAY reject any assertion whose version number is higher than the highest supported version.

4.2. Request Version

- 1341 A SAML application SHOULD issue requests that specify the highest SAML version supported by both the sender and recipient.
- 1342 If the SAML application does not know the capabilities of the recipient it should assume that it supports the highest SAML version supported by the sender.

1361 **4.3. Response Version**

- 1362 A SAML application MUST NOT issue responses that specify a higher SAML version number than
1363 the corresponding request.
- 1364 A SAML application MUST NOT issue a response that has a major version number that is lower
1365 than the major version number of the corresponding request except to report the error
1366 RequestVersionTooHigh.
- 1367 Incompatible protocol versions MAY cause the following errors to be reported:
- 1368 RequestVersionTooHigh
1369 The protocol version specified in the request is a major upgrade from the highest protocol
1370 version supported by the responder.
- 1371 RequestVersionTooLow
1372 The responder cannot respond to the particular request using the SAML version specified
1373 in the request because it is too low.
- 1374 RequestVersionDeprecated
1375 The responder does not respond to any requests with the protocol version specified in the
1376 request.

1377 5. SAML & XML-Signature Syntax and 1378 Processing

1379 SAML Assertions, Request and Response messages may be signed, with the following benefits:

1380 ?? An Assertion signed by the issuer (AP). This supports :

1381 (1) Message integrity

1382 (2) Authentication of the issuer to a relying party

1383 (3) If the signature is based on the issuer's public-private key pair, then it also
1384 provides for non-repudiation of origin.

1385 ?? A SAML request or a SAML response message signed by the message originator. This
1386 supports :

1387 (1) Message integrity

1388 (2) Authentication of message origin to a destination

1389 (3) If the signature is based on the originator's public-private key pair, then it also
1390 provides for non-repudiation of origin.

1391 Note :

1392 ?? SAML documents may be the subject of signatures from different packaging contexts.

1393 [XMLSig] provides a framework for signing in XML and is the framework of choice.

1394 However, signing may also take place in the context of S/MIME or Java objects that
1395 contain SAML documents. One goal is to ensure compatibility with this type of "foreign"
1396 digital signing.

1397 ?? It is useful to characterize situations when a digital signature is NOT required in SAML.

1398 Assertions:

1399 The asserting party has provided the assertion to the relying party, authenticated by means
1400 other than digital signature and the channel is secure. In other words, the RP has obtained the
1401 assertion from the AP directly (no intermediaries) through a secure channel and the AP has
1402 authenticated to the RP.

1403 Request/Response messages:

1404 The originator has authenticated to the destination and the destination has obtained the
1405 assertion directly from the originator (no intermediaries) through secure channel(s).

1406 Many different techniques are available for "direct" authentication and secure channel between
1407 two parties. The list includes SSL, HMAC, password-based login etc. Also the security
1408 requirement depends on the communicating applications and the nature of the assertion
1409 transported.

1410 All other contexts require the use of digital signature for assertions and request and response
1411 messages. Specifically:

1412 (1) An assertion obtained by a relying party from an entity other than the asserting party MUST
1413 be signed by the issuer.

1414 (2) A SAML message arriving at a destination from an entity other than the originating site
1415 MUST be signed by the origin site.

1416 5.1. Signing Assertions

1417 All SAML assertions MAY be signed using the XML Signature. This is reflected in the assertion
1418 schema – Section 2.3.

1419 **5.2. Request/Response Signing**

1420 All SAML requests and responses MAY be signed using the XML Signature. This is reflected in the
1421 schema – Section 3.2 & 3.4.

1422 **5.3. Signature Inheritance**

1423 **5.3.1. Rationale**

1424 SAML assertions may be embedded within request or response messages or other XML
1425 messages, which may be signed. Request or response messages may themselves be contained
1426 within other messages that are based on other XML messaging frameworks (e.g., SOAP) and the
1427 composite object may be the subject of a signature. Another possibility is that SAML assertions or
1428 request/response messages are embedded within a non-XML messaging object (e.g., MIME
1429 package) and signed.

1430 In such a case, the SAML sub-message (Assertion, request, response) may be viewed as inheriting
1431 a signature from the "super-signature" over the enclosing object, provided certain constraints are
1432 met.

1433 (1) An assertion may be viewed as inheriting a signature from a super signature, if the super
1434 signature applies all the elements within the assertion.

1435 A SAML request or response may be viewed as inheriting a signature from a super signature, if the
1436 super signature applies to all of the elements within the response.

1437 **5.3.2. Rules for SAML Signature Inheritance**

1438 Signature inheritance occurs when SAML message (assertion/request/response) is not signed but
1439 is enclosed within signed SAML such that the signature applies to all of the elements within the
1440 message. In such a case, the SAML message is said to inherit the signature and may be
1441 considered equivalent to the case where it is explicitly signed. The SAML message inherits the
1442 "closest enclosing signature".

1443 But if SAML messages need to be passed around by themselves, or embedded in other messages,
1444 they would need to be signed as per section 5.1

1445 **5.4. XML Signature Profile**

1446 The XML Signature [XMLSig] specification calls out a general XML syntax for signing data with
1447 many flexibilities and choices. This section details the constraints on these facilities so that SAML
1448 processors do not have to deal with the full generality of XML Signature processing.

1449 **5.4.1. Signing formats**

1450 XML Signature has three ways of representing signature in a document viz: enveloping, enveloped
1451 and detached.

1452 SAML assertions and protocols MUST use the enveloped signatures for signing assertions and
1453 protocols. SAML processors should support use of RSA signing and verification for public key
1454 operations.

1455 **5.4.2. CanonicalizationMethod**

1456 XML Signature REQUIRES the Canonical XML (omits comments)
1457 (<http://www.w3.org/TR/2001/REC-xml-c14n-20010315>). SAML implementations SHOULD use
1458 Canonical XML with no comments.

1459 **5.4.3. Transforms**

1460 [XMLSig] REQUIRES the enveloped signature transform
1461 <http://www.w3.org/2000/09/xmldsig#enveloped-signature>

1462 **5.4.4. KeyInfo**

1463 SAML does not restrict or impose any restrictions in this area. Therefore following [XMLSig]
1464 keyInfo may be absent.

1465 **5.4.5. Binding between statements in a multi-statement assertion**

1466 Use of signing does not affect semantics of statements within assertions in any way, as stated in
1467 this document Sections 1 through 4.

6. SAML Extensions

The SAML schemas support extensibility. An example of an application that extends SAML assertions is the XTAML system for management of embedded trust roots [XTAML]. The following sections explain how to use the extensibility features in SAML to create extension schemas.

Note that elements in the SAML schemas are not blocked from substitution, so that all SAML elements MAY serve as the head element of a substitution group. Also, types are not defined as final, so that all SAML types MAY be extended and restricted. The following sections discuss only elements that have been specifically designed to support extensibility.

6.1. Assertion Schema Extension

The SAML assertion schema is designed to permit separate processing of the assertion package and the statements it contains, if the extension mechanism is used for either part.

The following elements are intended specifically for use as extension points in an extension schema; their types are set to abstract, so that the use of an `xsi:type` attribute with these elements is REQUIRED:

```
?? <Assertion>
?? <Condition>
?? <Statement>
?? <SubjectStatement>
?? <AdviceElement>
```

In addition, the following elements that are directly usable as part of SAML MAY be extended:

```
?? <AuthenticationStatement>
?? <AuthorizationDecisionStatement>
?? <AttributeStatement>
?? <AudienceRestrictionCondition>
```

Finally, the following elements are defined to allow elements from arbitrary namespaces within them, which serves as a built-in extension point without requiring an extension schema:

```
?? <AttributeValue>
?? <Advice>
```

6.2. Protocol Schema Extension

The following elements are intended specifically for use as extension points in an extension schema; their types are set to abstract, so that the use of an `xsi:type` attribute with these elements is REQUIRED:

```
?? <Query>
?? <SubjectQuery>
```

In addition, the following elements that are directly usable as part of SAML MAY be extended:

```
?? <Request>
```

```
1504    ?? <AuthenticationQuery>
1505    ?? <AuthorizationDecisionQuery>
1506    ?? <AttributeQuery>
1507    ?? <Response>
```

1508 6.3. Use of Type Derivation and Substitution Groups

1509 W3C XML Schema [Schema1] provides two principal mechanisms for specifying an element of an
1510 extended type: type derivation and substitution groups.

1511 For example, a `<Statement>` element can be assigned the type **NewStatementType** by means of
1512 the `xsi:type` attribute. For such an element to be schema-valid, **NewStatementType** needs to be
1513 derived from **StatementType**. The following example of a SAML assertion assumes that the
1514 extension schema (represented by the `new:` prefix) has defined this new type:

```
1515 <saml:Assertion ...>
1516   <saml:Statement xsi:type="new:NewStatementType">
1517   ...
1518   </saml:Statement>
1519 </saml:Assertion>
```

1520 Alternatively, the extension schema can define a `<NewStatement>` element that is a member of a
1521 substitution group that has `<Statement>` as a head element. For the substituted element to be
1522 schema-valid, it needs to have a type that matches or is derived from the head element's type. The
1523 following is an example of an extension schema fragment that defines this new element:

```
1524 <xsd:element "NewStatement" type="new:NewStatementType"
1525   substitutionGroup="saml:Statement" />
```

1526 The substitution group declaration allows the `<NewStatement>` element to be used anywhere the
1527 SAML `<Statement>` element can be used. The following is an example of a SAML assertion that
1528 uses the extension element:

```
1529 <saml:Assertion ...>
1530   <new:NewStatement>
1531   ...
1532   </new:NewStatement>
1533 </saml:Assertion>
```

1534 The choice of extension method has no effect on the semantics of the XML document but does
1535 have implications for interoperability.

1536 The advantages of type derivation are as follows:

- 1537 ?? A document can be more fully interpreted by a parser that does not have access to the
1538 extension schema because a “native” SAML element is available.
- 1539 ?? At the time of writing, some W3C XML Schema validators do not support substitution
1540 groups, whereas the `xsi:type` attribute is widely supported.

1541 The advantage of substitution groups is that a document can be explained without the need to
1542 explain the functioning of the `xsi:type` attribute.

1543 7. SAML-Defined Identifiers

1544 The following sections define URI-based identifiers for common authentication protocols and
1545 actions.

1546 Where possible an existing URN is used to specify a protocol. In the case of IETF protocols the
1547 URN of the most current RFC that specifies the protocol is used. URLs created specifically for
1548 SAML have the initial stem:
1549 <http://www.oasis-open.org/committees/security/docs/draft-sstc-core-27>

1550 7.1. Confirmation Method Identifiers

1551 The following identifiers MAY be used in the <ConfirmationMethod> element (see Section
1552 2.4.2.3) to refer to common authentication protocols.

1553 7.1.1. SAML Artifact:

1554 **URI:** <http://www.oasis-open.org/committees/security/docs/draft-sstc-core-26#artifact>
1555 <SubjectConfirmationData>: Base64 (*Artifact*)
1556 The subject of the assertion is the party that can present the SAML Artifact value specified in
1557 <SubjectConfirmationData>.

1558 7.1.2. SAML Artifact (SHA-1):

1559 **URI:** <http://www.oasis-open.org/committees/security/docs/draft-sstc-core-26#artifact-sha1>
1560 <SubjectConfirmationData>: Base64 (SHA1(*Artifact*))
1561 The subject of the assertion is the party that can present a SAML Artifact such that the SHA1 digest
1562 of the specified artifact matches the value specified in <SubjectConfirmationData> .

1563 7.1.3. Holder of Key:

1564 **URI:** <http://www.oasis-open.org/committees/security/docs/draft-sstc-core-26#Holder-Of-Key>
1565 <ds:KeyInfo>: Any cryptographic key
1566 The subject of the assertion is the party that can demonstrate that it is the holder of the private
1567 component of the key specified in <ds:KeyInfo>.

1568 7.1.4. Sender Vouches:

1569 **URI:** <http://www.oasis-open.org/committees/security/docs/draft-sstc-core-26#sender-vouches>
1570 Indicates that no other information is available about the context of use of the assertion. The
1571 Relying party SHOULD utilize other means to determine if it should process the assertion further.

1572 7.1.5. Password (Pass-Through):

1573 **URI:** <http://www.oasis-open.org/committees/security/docs/draft-sstc-core-26#password>
1574 <SubjectConfirmationData>: Base64 (*Password*)

1575 The subject of the assertion is the party that can present the password value specified in
1576 <SubjectConfirmationData>.

1577 The username of the subject is specified by means of the <NameIdentifier> element.

1578 **7.1.6. Password (One-Way-Function SHA-1):**

1579 **URI:** <http://www.oasis-open.org/committees/security/docs/draft-sstc-core-26#password-sha1>
1580 <SubjectConfirmationData>: Base64 (SHA1 (Password))

1581 The subject of the assertion is the party that can present the password such that the SHA1 digest of
1582 the specified password matches the value specified in <SubjectConfirmationData>.

1583 The username of the subject is specified by means of the <NameIdentifier> element.

1584 **7.1.7. Kerberos**

1585 **URI:** urn:ietf:rfc:1510
1586 <SubjectConfirmationData>: A Kerberos Ticket
1587 The subject is authenticated by means of the Kerberos protocol [RFC 1510], an instantiation of the
1588 Needham-Schroeder symmetric key authentication mechanism [Needham78].

1589 **7.1.8. SSL/TLS Certificate Based Client Authentication:**

1590 **URI:** urn:ietf:rfc:2246
1591 <ds:KeyInfo>: Any cryptographic key

1592 **7.1.9. Object Authenticator (SHA-1):**

1593 **URI:** <http://www.oasis-open.org/committees/security/docs/draft-sstc-core-26#object-sha1>
1594 <SubjectConfirmationData>: Base64 (SHA1 (Object))
1595 This authenticator element is the result of computing a digest, using the SHA-1 hash algorithm. It is
1596 used when the subject can be represented as a binary string, for example when it is an XML
1597 document or the disk image of executable code. Any preprocessing of the subject prior to
1598 computation of the digest is out of scope. The name of the subject should be conveyed in an
1599 accompanying Nameldentifier element.

1600 **7.1.10. PKCS#7**

1601 **URI:** urn:ietf:rfc:2315
1602 <SubjectConfirmationData>: Base64 (PKCS#7 (Object))

1603 This authenticator element is signed data in PKCS#7 format [PKCS#7]. The posited identity of the
1604 signer must be conveyed in an accompanying Nameldentifier element. This subject type may be
1605 included in the subject field of an authentication query, in which case the corresponding response
1606 indicates whether the posited signer is, indeed, the signer. It may be included in an attribute query,
1607 in which case, the requested attribute values for the subject authenticated by the signed data are
1608 returned. It may be included in an authorization query, in which case, the access request
1609 represented by the signed data shall be identified by the accompanying object element, and the

1610 corresponding authorization decision assertion indicates whether the signer is authorized for the
1611 access request represented by the object element.

7.1.11. Cryptographic Message Syntax

URI: urn:ietf:rfc:2630

<SubjectConfirmationData>: Base64 (CMS (Object))

This authenticator element is signed data in CMS format [CMS]. See also 7.1.10

7.1.12. XML Digital Signature

URI: urn:ietf:rfc:3075

<SubjectConfirmationData>: Base64 (XML-SIG (Object))

<ds:KeyInfo>: A cryptographic signing key

This authenticator element is signed data in XML Signature format. See also 7.1.10

7.2. Action Namespace Identifiers

The following identifiers MAY be used in the ActionNamespace attribute (see Section 2.4.4.1) to refer to common sets of actions to perform on resources.

7.2.1. Read/Write/Execute/Delete/Control:

URI: <http://www.oasis-open.org/committees/security/docs/draft-sstc-core-26#rwedc>

Defined actions:

Read Write Execute Delete Control

These actions are interpreted in the normal manner, i.e.

Read

The subject may read the resource

Write

The subject may modify the resource

Execute

The subject may execute the resource

Delete

The subject may delete the resource

Control

The subject may specify the access control policy for the resource

7.2.2. Read/Write/Execute/Delete/Control with Negation:

URI: <http://www.oasis-open.org/committees/security/docs/draft-sstc-core-26#rwedc-negation>

Defined actions:

Read Write Execute Delete Control ~Read ~Write ~Execute ~Delete ~Control

1643 The actions specified in section 7.2.1 are interpreted in the same manner described there. Actions
1644 prefixed with a tilde ~ are negated permissions and are used to affirmatively specify that the stated
1645 permission is denied. Thus a subject described as being authorized to perform the action ~Read is
1646 affirmatively denied read permission.

1647 An application MUST NOT authorize both an action and its negated form.

1648 **7.2.3. Get/Head/Put/Post:**

1649 **URI:** <http://www.oasis-open.org/committees/security/docs/draft-sstc-core-26#ghpp>

1650 Defined actions:

1651 GET HEAD PUT POST

1652 These actions bind to the corresponding HTTP operations. For example a subject authorized to
1653 perform the GET action on a resource is authorized to retrieve it.

1654 The GET and HEAD actions loosely correspond to the conventional read permission and the PUT
1655 and POST actions to the write permission. The correspondence is not exact however since a HTTP
1656 GET operation may cause data to be modified and a POST operation may cause modification to a
1657 resource other than the one specified in the request. For this reason a separate Action URI
1658 specifier is provided.

1659 **7.2.4. UNIX File Permissions:**

1660 **URI:** <http://www.oasis-open.org/committees/security/docs/draft-sstc-core-26#unix>

1661 The defined actions are the set of UNIX file access permissions expressed in the numeric (octal)
1662 notation.

1663 The action string is a four digit numeric code:

1664 *extended user group world*

1665 Where the *extended* access permission has the value

1666 +2 if sgid is set

1667 +4 if suid is set

1668 The *user group* and *world* access permissions have the value

1669 +1 if execute permission is granted

1670 +2 if write permission is granted

1671 +4 if read permission is granted

1672 For example 0754 denotes the UNIX file access permission: user read, write and execute, group
1673 read and execute and world read.

1674 8. SAML Schema Listings

1675 The following sections contain complete listings of the assertion and protocol schemas for SAML.

1676 8.1. Assertion Schema

1677 Following is a complete listing of the SAML assertion schema [SAML-XSD].

```
<?xml version="1.0" encoding="UTF-8"?>
<!-- edited with XML Spy v3.5 NT (http://www.xmlspy.com) by Phill Hallam-Baker
(VeriSign Inc.) -->
<schema
    targetNamespace="http://www.oasis-open.org/committees/security/docs/draft-
sstc-schema-assertion-27.xsd"
    xmlns="http://www.w3.org/2001/XMLSchema" xmlns:saml="http://www.oasis-
open.org/committees/security/docs/draft-sstc-schema-assertion-27.xsd"
    xmlns:ds="http://www.w3.org/2000/09/xmldsig#"
    elementFormDefault="unqualified">
    <import namespace="http://www.w3.org/2000/09/xmldsig#"
        schemaLocation="xmldsig-core-schema.xsd"/>
    <annotation>
        <documentation>draft-sstc-schema-assertion-27.xsd</documentation>
    </annotation>
    <simpleType name="IDType">
        <restriction base="string"/>
    </simpleType>
    <simpleType name="IDReferenceType">
        <restriction base="string"/>
    </simpleType>
    <simpleType name="DecisionType">
        <restriction base="string">
            <enumeration value="Permit"/>
            <enumeration value="Deny"/>
            <enumeration value="Indeterminate"/>
        </restriction>
    </simpleType>
    <element name="AssertionSpecifier" type="saml:AssertionSpecifierType" />
    <complexType name="AssertionSpecifierType">
        <choice>
            <element ref="saml:AssertionIDReference" />
            <element ref="saml:Assertion" />
        </choice>
    </complexType>
    <element name="AssertionIDReference" type="saml:IDReferenceType" />
    <element name="Assertion" type="saml:AssertionType" />
    <complexType name="AssertionType">
        <sequence>
            <element ref="saml:Conditions" minOccurs="0" />
            <element ref="saml:Advice" minOccurs="0" />
            <choice maxOccurs="unbounded">
                <element ref="saml:Statement" />
                <element ref="saml:SubjectStatement" />
                <element ref="saml:AuthenticationStatement" />
                <element ref="saml:AuthorizationDecisionStatement" />
                <element ref="saml:AttributeStatement" />
            </choice>
            <element ref = "ds:Signature" minOccurs="0" />
        </sequence>
        <attribute name="MajorVersion" type="integer" use="required" />
        <attribute name="MinorVersion" type="integer" use="required" />
        <attribute name="AssertionID" type="saml:IDType" use="required" />
```

```

1731      <attribute name="Issuer" type="string" use="required"/>
1732      <attribute name="IssueInstant" type="dateTime" use="required"/>
1733  </complexType>
1734  <element name="Conditions" type="saml:ConditionsType" />
1735  <complexType name="ConditionsType">
1736      <choice minOccurs="0" maxOccurs="unbounded">
1737          <element ref="saml:Condition" />
1738          <element ref="saml:AudienceRestrictionCondition" />
1739      </choice>
1740      <attribute name="NotBefore" type="dateTime" use="optional"/>
1741      <attribute name="NotOnOrAfter" type="dateTime" use="optional"/>
1742  </complexType>
1743  <element name="Condition" type="saml:ConditionAbstractType" />
1744  <complexType name="ConditionAbstractType" abstract="true" />
1745  <element name="AudienceRestrictionCondition" type="saml:AudienceRestrictionConditionType" />
1746  <complexType name="AudienceRestrictionConditionType" >
1747      <complexContent>
1748          <extension base="saml:ConditionAbstractType" >
1749              <sequence>
1750                  <element ref="saml:Audience" maxOccurs="unbounded" />
1751              </sequence>
1752          </extension>
1753      </complexContent>
1754  </complexType>
1755  <element name="Audience" type="anyURI" />
1756  <element name="TargetRestrictionCondition" type="saml:TargetRestrictionConditionType" />
1757  <complexType name="TargetRestrictionConditionType" >
1758      <complexContent>
1759          <extension base="saml:ConditionAbstractType" >
1760              <sequence>
1761                  <element ref="saml:Target" minOccurs="1" maxOccurs="unbounded" />
1762              </sequence>
1763          </extension>
1764      </complexContent>
1765  </complexType>
1766  <element name="Target" type="anyURI" />
1767  <element name="Advice" type="saml:AdviceType" />
1768  <complexType name="AdviceType" >
1769      <choice minOccurs="0" maxOccurs="unbounded" >
1770          <element ref="saml:AssertionSpecifier" />
1771          <element ref="saml:AdviceElement" />
1772          <any namespace="##other" processContents="lax" />
1773      </choice>
1774  </complexType>
1775  <element name="AdviceElement" type="saml:AdviceAbstractType" />
1776  <complexType name="AdviceAbstractType" />
1777  <element name="Statement" type="saml:StatementAbstractType" />
1778  <complexType name="StatementAbstractType" abstract="true" />
1779  <element name="SubjectStatement" type="saml:SubjectStatementAbstractType" />
1780  <complexType name="SubjectStatementAbstractType" abstract="true" >
1781      <complexContent>
1782          <extension base="saml:StatementAbstractType" >
1783              <sequence>
1784                  <element ref="saml:Subject" />
1785              </sequence>
1786          </extension>
1787      </complexContent>
1788  </complexType>
1789  <element name="Subject" type="saml:SubjectType" />
1790  <complexType name="SubjectType" />
1791  </complexType>
1792  </complexType>
1793
```

```

1794 <element name="Subject" type="saml:SubjectType" />
1795 <complexType name="SubjectType">
1796   <choice>
1797     <sequence>
1798       <element ref="saml:NameIdentifier" />
1799       <element ref="saml:SubjectConfirmation" minOccurs="0" />
1800     </sequence>
1801     <element ref="saml:SubjectConfirmation" />
1802   </choice>
1803 </complexType>
1804 <element name="NameIdentifier" type="saml:NameIdentifierType" />
1805 <complexType name="NameIdentifierType">
1806   <attribute name="SecurityDomain" type="string" />
1807   <attribute name="Name" type="string" use="required" />
1808 </complexType>
1809 <element name="SubjectConfirmation" type="saml:SubjectConfirmationType" />
1810 <complexType name="SubjectConfirmationType">
1811   <sequence>
1812     <element ref="saml:ConfirmationMethod" maxOccurs="unbounded" />
1813     <element ref="saml:SubjectConfirmationData" minOccurs="0" />
1814     <element ref="ds:KeyInfo" minOccurs="0" />
1815   </sequence>
1816 </complexType>
1817 <element name="SubjectConfirmationData" type="string" />
1818 <element name="ConfirmationMethod" type="anyURI" />
1819 <element name="AuthenticationStatement"
1820   type="saml:AuthenticationStatementType" />
1821 <complexType name="AuthenticationStatementType">
1822   <complexContent>
1823     <extension base="saml:SubjectStatementAbstractType" >
1824       <sequence>
1825         <element ref="saml:AuthenticationLocality" minOccurs="0" />
1826         <element ref="saml:AuthorityBinding"
1827           minOccurs="0" maxOccurs="unbounded" />
1828       </sequence>
1829       <attribute name="AuthenticationMethod" type="anyURI" />
1830       <attribute name="AuthenticationInstant" type="dateTime" />
1831     </extension>
1832   </complexContent>
1833 </complexType>
1834 <element name="AuthenticationLocality"
1835   type="saml:AuthenticationLocalityType" />
1836 <complexType name="AuthenticationLocalityType" >
1837   <attribute name="IPAddress" type="string" use="optional" />
1838   <attribute name="DNSAddress" type="string" use="optional" />
1839 </complexType>
1840 <element name="AuthorityBinding" type="saml:AuthorityBindingType" />
1841 <complexType name="AuthorityBindingType">
1842   <attribute name="AuthorityKind" type="saml:AuthorityKindType"
1843     use="required" />
1844   <attribute name="Location" type="anyURI" use="required" />
1845   <attribute name="Binding" type="anyURI" use="required" />
1846 </complexType>
1847 <simpleType name="AuthorityKindType" >
1848   <restriction base="string" >
1849     <enumeration value="authentication" />
1850     <enumeration value="attribute" />
1851     <enumeration value="authorization" />
1852   </restriction>
1853 </simpleType>
1854 <element name="AuthorizationDecisionStatement"
1855   type="saml:AuthorizationDecisionStatementType" />
1856 <complexType name="AuthorizationDecisionStatementType" >
```

```

1857 <complexContent>
1858   <extension base="saml:SubjectStatementAbstractType">
1859     <sequence>
1860       <element ref="saml:Actions"/>
1861       <element ref="saml:Evidence"
1862         minOccurs="0" maxOccurs="unbounded"/>
1863     </sequence>
1864     <attribute name="Resource" type="anyURI" use="required"/>
1865     <attribute name="Decision"
1866       type="saml:DecisionType" use="required"/>
1867   </extension>
1868 </complexContent>
1869 </complexType>
1870 <element name="Actions" type="saml:ActionsType" />
1871 <complexType name="ActionsType">
1872   <sequence>
1873     <element ref="saml:Action" maxOccurs="unbounded"/>
1874   </sequence>
1875   <attribute name="Namespace" type="anyURI" use="optional" />
1876 </complexType>
1877 <element name="Action" type="string" />
1878 <element name="Evidence" type="saml:AssertionSpecifierType" />
1879 <element name="AttributeStatement" type="saml:AttributeStatementType" />
1880 <complexType name="AttributeStatementType">
1881   <complexContent>
1882     <extension base="saml:SubjectStatementAbstractType">
1883       <sequence>
1884         <element ref="saml:Attribute" maxOccurs="unbounded" />
1885       </sequence>
1886     </extension>
1887   </complexContent>
1888 </complexType>
1889 <element name="AttributeDesignator" type="saml:AttributeDesignatorType" />
1890 <complexType name="AttributeDesignatorType">
1891   <attribute name="AttributeName" type="string" use="required" />
1892   <attribute name="AttributeNamespace" type="anyURI" use="required" />
1893 </complexType>
1894 <element name="Attribute" type="saml:AttributeType" />
1895 <complexType name="AttributeType">
1896   <complexContent>
1897     <extension base="saml:AttributeDesignatorType">
1898       <sequence>
1899         <element ref="saml:AttributeValue" maxOccurs="unbounded" />
1900       </sequence>
1901     </extension>
1902   </complexContent>
1903 </complexType>
1904 <element name="AttributeValue" type="saml:anyType" />
1905 </schema>
```

1906 8.2. Protocol Schema

1907 Following is a complete listing of the SAML protocol schema [**SAMLP-XSD**].

```

1908 <?xml version="1.0" encoding="UTF-8"?>
1909 <!-- edited with XML Spy v3.5 NT (http://www.xmlspy.com) by Phill Hallam-Baker
1910 (VeriSign Inc.) -->
1911 <schema
1912   targetNamespace="http://www.oasis-open.org/committees/security/docs/draft-sstc-schema-protocol-27.xsd"
1913   xmlns:ds="http://www.w3.org/2000/09/xmldsig#"
1914   xmlns:saml="http://www.oasis-open.org/committees/security/docs/draft-sstc-schema-assertion-27.xsd"
```

```

1917     xmlns:samlp="http://www.oasis-open.org/committees/security/docs/draft-sstc-
1918 schema-protocol-27.xsd"
1919     xmlns="http://www.w3.org/2001/XMLSchema" elementFormDefault="unqualified">
1920     <import
1921         namespace="http://www.oasis-open.org/committees/security/docs/draft-sstc-
1922 schema-assertion-27.xsd"
1923         schemaLocation="draft-sstc-schema-assertion-27.xsd" />
1924     <import namespace="http://www.w3.org/2000/09/xmldsig#"
1925         schemaLocation="xmldsig-core-schema.xsd"/>
1926     <annotation>
1927         <documentation>draft-sstc-schema-protocol-27.xsd</documentation>
1928     </annotation>
1929     <complexType name="RequestAbstractType" abstract="true">
1930         <sequence>
1931             <element ref="samlp:RespondWith"
1932                 minOccurs="0" maxOccurs="unbounded" />
1933             <element ref = "ds:Signature" minOccurs="0" />
1934         </sequence>
1935         <attribute name="RequestID" type="saml:IDType" use="required" />
1936         <attribute name="MajorVersion" type="integer" use="required" />
1937         <attribute name="MinorVersion" type="integer" use="required" />
1938         <attribute name="IssueInstant" type="dateTime" use="required" />
1939     </complexType>
1940     <element name="RespondWith" type="anyURI" />
1941     <element name="Request" type="samlp:RequestType" />
1942     <complexType name="RequestType">
1943         <complexContent>
1944             <extension base="samlp:RequestAbstractType">
1945                 <choice>
1946                     <element ref="samlp:Query" />
1947                     <element ref="samlp:SubjectQuery" />
1948                     <element ref="samlp:AuthenticationQuery" />
1949                     <element ref="samlp:AttributeQuery" />
1950                     <element ref="samlp:AuthorizationDecisionQuery" />
1951                     <element ref="saml:AssertionID" maxOccurs="unbounded" />
1952                     <element ref="samlp:AssertionArtifact" maxOccurs="unbounded" />
1953                 </choice>
1954             </extension>
1955         </complexContent>
1956     </complexType>
1957     <element name="AssertionArtifact" type="string" />
1958     <element name="Query" type="samlp:QueryAbstractType" />
1959     <complexType name="QueryAbstractType" abstract="true" />
1960     <element name="SubjectQuery" type="samlp:SubjectQueryAbstractType" />
1961     <complexType name="SubjectQueryAbstractType" abstract="true" >
1962         <complexContent>
1963             <extension base="samlp:QueryAbstractType">
1964                 <sequence>
1965                     <element ref="saml:Subject" />
1966                 </sequence>
1967             </extension>
1968         </complexContent>
1969     </complexType>
1970     <element name="AuthenticationQuery" type="samlp:AuthenticationQueryType" />
1971     <complexType name="AuthenticationQueryType">
1972         <complexContent>
1973             <extension base="samlp:SubjectQueryAbstractType" >
1974                 <sequence>
1975                     <element ref="saml:ConfirmationMethod" minOccurs="0" />
1976                 </sequence>
1977             </extension>
1978         </complexContent>
1979     </complexType>

```

```

1980 <element name="AttributeQuery" type="samlp:AttributeQueryType" />
1981 <complexType name="AttributeQueryType">
1982   <complexContent>
1983     <extension base="samlp:SubjectQueryAbstractType">
1984       <sequence>
1985         <element ref="saml:AttributeDesignator"
1986           minOccurs="0" maxOccurs="unbounded"/>
1987       </sequence>
1988       <attribute name="Resource" type="anyURI" use="optional"/>
1989     </extension>
1990   </complexContent>
1991 </complexType>
1992 <element name="AuthorizationDecisionQuery"
1993   type="samlp:AuthorizationDecisionQueryType" />
1994 <complexType name="AuthorizationDecisionQueryType">
1995   <complexContent>
1996     <extension base="samlp:SubjectQueryAbstractType">
1997       <sequence>
1998         <element ref="saml:Actions" />
1999         <element ref="saml:Evidence"
2000           minOccurs="0" maxOccurs="unbounded"/>
2001       </sequence>
2002       <attribute name="Resource" type="anyURI" use="required"/>
2003     </extension>
2004   </complexContent>
2005 </complexType>
2006 <complexType name="ResponseAbstractType" abstract="true" >
2007   <sequence>
2008     <element ref = "ds:Signature" minOccurs="0" />
2009   </sequence>
2010   <attribute name="ResponseID" type="saml:IDType" use="required" />
2011   <attribute name="InResponseTo" type="saml:IDReferenceType"
2012     use="required" />
2013   <attribute name="MajorVersion" type="integer" use="required" />
2014   <attribute name="MinorVersion" type="integer" use="required" />
2015   <attribute name="IssueInstant" type="dateTime" use="required" />
2016 </complexType>
2017
2018 <element name="Response" type="samlp:ResponseType" />
2019 <complexType name="ResponseType">
2020   <complexContent>
2021     <extension base="samlp:ResponseAbstractType">
2022       <sequence>
2023         <element ref="samlp>Status" />
2024         <element ref="saml:Assertion"
2025           minOccurs="0" maxOccurs="unbounded" />
2026       </sequence>
2027     </extension>
2028   </complexContent>
2029 </complexType>
2030 <element name="Status" type="samlp:StatusType" />
2031 <complexType name="StatusType">
2032   <sequence>
2033     <element ref="samlp:StatusCode" />
2034     <element ref="samlp:StatusMessage"
2035       minOccurs="0" maxOccurs="unbounded" />
2036     <element ref="samlp:StatusDetail" minOccurs="0" />
2037   </sequence>
2038 </complexType>
2039 <element name="StatusCode" type="samlp:StatusCodeType" />
2040 <complexType name="StatusCodeType">
2041   <sequence>
2042     <element ref="samlp:SubStatusCode" minOccurs="0" />

```

```

2043      </sequence>
2044      <attribute name="Value" type="samlp:StatusCodeEnumType" use="required" />
2045  </complexType>
2046  <simpleType name="StatusCodeEnumType " >
2047    <restriction base="QName " >
2048      <enumeration value="samlp:Success" />
2049      <enumeration value="samlp:VersionMismatch" />
2050      <enumeration value="samlp:Receiver" />
2051      <enumeration value="samlp:Sender" />
2052    </restriction>
2053  </simpleType>
2054  <element name="SubStatusCode" type="samlp:SubStatusCodeType" />
2055  <complexType name="SubStatusCodeType " >
2056    <sequence>
2057      <element ref="samlp:SubStatusCode" minOccurs="0" />
2058    </sequence>
2059    <attribute name="Value" type="QName" use="required" />
2060  </complexType>
2061  <element name="StatusMessage" type="string" />
2062  <element name="StatusDetail" type="samlp:StatusDetailType" />
2063  <complexType name="StatusDetailType" >
2064    <sequence>
2065      <any namespace="##any"
2066        processContents="lax" minOccurs="0" maxOccurs="unbounded" />
2067    </sequence>
2068  </complexType>
2069</schema>
2070
```

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