



SAML V2.0 Identity Assurance Profiles, Version 1.0

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Related Work:

This specification profiles the SAML 2.0 Authentication Context [SAMLAC] mechanisms to allow SAML authentication requests and assertions to carry assurance information. It relies on the features specified in [SAMLMA] to represent information about a SAML entity as a SAML attribute associated with a metadata entry.

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N/A

34 **Abstract:**

35 This document specifies methods of representing assurance information as used in two
36 aspects of SAML. It profiles the use of SAML's Authentication Context mechanisms to express
37 per-authentication assurance information via authentication requests and assertions. Level-of-
38 Assurance (LOA) definitions in Identity Assurance Frameworks are expressed as a set of
39 authentication context classes. The document also specifies a means for representing
40 assurance certification status of entities in SAML metadata.

41 **Status:**

42 This document was last revised or approved by the SSTC on the above date. The level of
43 approval is also listed above. Check the current location noted above for possible later
44 revisions of this document. This document is updated periodically on no particular schedule.

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53

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1 Introduction

120

121 *Expressing Identity Assurance in SAML 2.0* provides standard means for parties using SAML to
122 exchange information regarding identity assurance. It defines, as a profile of the SAML Authentication
123 Context [SAMLAC] specification, a restricted version of the AuthnContext schema for representing
124 assurance indicators (sometimes called levels of assurance) defined by external documentation of any
125 given assurance framework. In addition, it defines a SAML attribute profile that may be used to
126 represent the certification status of an issuer of authentication statements (i.e., an Identity Provider)
127 regarding its conformance with the requirements of an identity assurance framework.

1.1 Motivation [Non-Normative]

128

129 Many organizations using federated service access have found it useful to define or adopt “identity
130 assurance frameworks,” such as [LibertyIAF]. Such frameworks offer a model for categorizing the
131 large number of possible combinations of registration processes, security mechanisms, and
132 authentication methods that underlie authentication processes into a smaller, more manageable set.
133 The term “levels of assurance” (LOA) is often used to refer to this concept, or a particular such set
134 (“assurance profiles” is also used). Different combinations of processes and technology are rated
135 according to the quality of assurance they can provide. Typically, a framework defines 3-5 levels or
136 profiles, ranging from low to high assurance. Relying parties then decide which LOA is required to
137 access specific protected resources, based on an assessment of the risk associated with those
138 resources – high risk requires high assurance, for example – and work with identity providers to ensure
139 that the requirements of that level are met.

140 Given this interest, it is useful for parties using SAML for federation to express in SAML authentication
141 messages the LOA requested by a relying party, and the LOA that is applicable to an authentication
142 response. The SAML authentication context specification [SAMLAC] defines a variety of options for
143 representing the details of identity management processes and mechanisms. The LOA profile in this
144 document is motivated by two related considerations:

- 145 • The SAML authentication context scheme is comprehensive, but quite complex. Deployers find
146 that this complexity is a barrier to designing authentication contexts that match their LOA
147 requirements.
- 148 • Representing the details of a LOA definition using the full expressiveness of the authentication
149 context schema results in XML documents that must be passed in-band with authentication
150 events and parsed by SAML implementations. In most cases, the processing requirements are
151 not sustainable and interoperability issues have not been explored.

152 The approach taken here simply represents each LOA in an assurance framework as a separate
153 authentication context class. Each LOA class is characterized by a URI, and the body of the schema
154 simply contains a reference to the external documentation that defines the LOA. These URI values are
155 conveyed in the `<RequestedAuthnContext>` element of an authentication request and the
156 `<AuthnContextClassRef>` element in the assertion within any authentication response.

157 Another common element in assurance programs is certification. See section 5.2 for background and
158 motivation for expressing assurance certification status in a standard fashion in SAML.

1.2 Limitations [Non-Normative]

159

160 A limitation to the LOA profile defined in this document is that the URIs representing the levels must be
161 configured into every system in the deployment, and the ordering of the URI levels must be decided
162 and configured out-of-band.

163 1.3 Terminology

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

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

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

172 Listings of XML schemas appear like this.

173 Example code listings appear like this.

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

Prefix	XML Namespace	Comments
saml:	urn:oasis:names:tc:SAML:2.0:assertion	This is the SAML V2.0 assertion namespace defined in the SAML V2.0 core specification [SAMLCore].
samlp:	urn:oasis:names:tc:SAML:2.0:protocol	This is the SAML V2.0 protocol namespace defined in the SAML V2.0 core specification [SAMLCore].
xs:	http://www.w3.org/2001/XMLSchema	This namespace is defined in the W3C XML Schema specification [Schema1]. In schema listings, this is the default namespace and no prefix is shown.

178 This specification uses the following typographical conventions in text: <SAML*Element*>,
179 <ns:ForeignElement>, Attribute, **Datatype**, OtherCode.

180 1.4 Normative References

- 181 **[RFC 2119]** S. Bradner. *Key words for use in RFCs to Indicate Requirement Levels*. IETF
182 RFC 2119, March 1997. <http://www.ietf.org/rfc/rfc2119.txt>.
- 183 **[SAMLAC]** OASIS Standard, *Authentication Context for the OASIS Security Assertion
184 Markup Language (SAML) V2.0*, March 2005. [http://docs.oasis-
185 open.org/security/saml/v2.0/saml-authn-context-2.0-os.pdf](http://docs.oasis-open.org/security/saml/v2.0/saml-authn-context-2.0-os.pdf)
- 186 **[SAMLCore]** OASIS Standard, *Assertions and Protocols for the OASIS Security Assertion
187 Markup Language (SAML) V2.0*, March 2005. [http://docs.oasis-
188 open.org/security/saml/v2.0/saml-core-2.0-os.pdf](http://docs.oasis-open.org/security/saml/v2.0/saml-core-2.0-os.pdf)
- 189 **[SAMLMA]** OASIS Committee Specification, *SAML V2.0 Metadata Extension for Entity
190 Attributes*. August 2009. [http://docs.oasis-open.org/security/saml/Post2.0/ssstc-
191 metadata-attr-cs-01.odt](http://docs.oasis-open.org/security/saml/Post2.0/ssstc-metadata-attr-cs-01.odt)
- 192 **[SAMLMeta]** OASIS Standard, *Metadata for the OASIS Security Assertion Markup Language
193 (SAML) V2.0*, March 2005. [http://docs.oasis-open.org/security/saml/v2.0/saml-
194 metadata-2.0-os.pdf](http://docs.oasis-open.org/security/saml/v2.0/saml-metadata-2.0-os.pdf)
- 195 **[Schema1]** H. S. Thompson et al. *XML Schema Part 1: Structures*. World Wide Web
196 Consortium Recommendation, May 2001. See <http://www.w3.org/TR/2001/REC->

197 [xmlschema-1-20010502/](http://www.w3.org/TR/2001/REC-xmlschema-1-20010502/). Note that this specification normatively references
198 [Schema2], listed below.
199 **[Schema2]** Paul V. Biron, Ashok Malhotra. *XML Schema Part 2: Datatypes*. World Wide
200 Web Consortium Recommendation, May 2001. See
201 <http://www.w3.org/TR/2001/REC-xmlschema-2-20010502/>.

202 **1.5 Non-normative References**

203 **[LibertyIAF]** Russ Cutler, ed. Liberty Identity Assurance Framework 1.0, Liberty Alliance
204 Project, 2008.

2 AuthnContext Level-of-Assurance Profile

205

2.1 Required Information

206

207 **Identification:** urn:oasis:names:tc:SAML:2.0:ac:profiles:assurance

208 **Contact Information:** security-services-comment@lists.oasis-open.org

209 **Description:** Given below.

210 **Updates:** None.

2.2 AuthnContext Schema

211

212 The following schema redefines the basic abstract `AuthnContextDeclarationBaseType` to limit the
213 allowed elements to the `GoverningAgreements` element. It will be through this element that the
214 appropriate external assurance framework documentation will be referenced.

```
215 <?xml version="1.0" encoding="UTF-8"?>
216 <xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema"
217   finalDefault="extension"
218   blockDefault="substitution" version="2.0">
219   <xs:redefine schemaLocation="saml-schema-authn-context-types-2.0.xsd">
220     <xs:annotation>
221       <xs:documentation>
222         Base class for building level-of-assurance style AuthnContext
223         class definitions.
224       </xs:documentation>
225     </xs:annotation>
226
227     <xs:complexType name="AuthnContextDeclarationBaseType">
228       <xs:complexContent>
229         <xs:restriction base="AuthnContextDeclarationBaseType">
230           <xs:sequence>
231             <xs:element ref="Identification"
232               minOccurs="0" maxOccurs="0"/>
233             <xs:element ref="TechnicalProtection"
234               minOccurs="0" maxOccurs="0"/>
235             <xs:element ref="OperationalProtection"
236               minOccurs="0" maxOccurs="0"/>
237             <xs:element ref="AuthnMethod"
238               minOccurs="0" maxOccurs="0"/>
239             <xs:element ref="GoverningAgreements"
240               minOccurs="1" maxOccurs="1"/>
241             <xs:element ref="Extension" minOccurs="0"
242               maxOccurs="unbounded"/>
243           </xs:sequence>
244           <xs:attribute name="ID" type="xs:ID" use="optional"/>
245         </xs:restriction>
246       </xs:complexContent>
247     </xs:complexType>
248
249     <xs:complexType name="GoverningAgreementRefType">
250       <xs:annotation>
251         <xs:documentation>
252           A specific restriction of this type specifying or
253           enumerating the governing document(s) and/or section
254           within such document(s) that define this particular
255           level of assurance.
```

```

256         </xs:documentation>
257     </xs:annotation>
258     <xs:complexContent>
259         <xs:restriction base="GoverningAgreementRefType">
260             <xs:attribute name="governingAgreementRef"
261                 type="xs:anyURI" use="required"/>
262         </xs:restriction>
263     </xs:complexContent>
264 </xs:complexType>
265 </xs:redefine>
266 </xs:schema>

```

267 The functional definition of the `GoverningAgreementRefType` is not changed from the original
 268 schema in [SAMLAC], but documentation is added to serve as a reminder that definitions derived from
 269 this schema should redefine `GoverningAgreementRefType` to suit a particular LOA purpose.

270 2.3 Example LOA Framework classes

271 We show here a set of LoA classes for a fictional FAF (Foo Assurance Framework) with three different
 272 levels of assurance. The 3 LOA schemas will extend the base LOA schema defined above. Each LOA
 273 schema will reference the corresponding section of the FAF documentation.

274 We define the following URIs to represent the 3 LOA

- 275 ● <http://foo.example.com/assurance/loa1>
- 276 ● <http://foo.example.com/assurance/loa2>
- 277 ● <http://foo.example.com/assurance/loa3>

278 As an example, the schema for the level 1 might look like:

```

279 <?xml version="1.0" encoding="UTF-8"?>
280 <xs:schema
281     targetNamespace="http://foo.example.com/assurance/loa1"
282     xmlns:xs="http://www.w3.org/2001/XMLSchema"
283     xmlns="http://foo.example.com/assurance/loa1"
284     finalDefault="extension"
285     blockDefault="substitution"
286     version="2.0">
287
288     <xs:redefine schemaLocation="saml-schema-authn-context-loa-profile.xsd">
289
290         <xs:annotation>
291             <xs:documentation>
292                 Class identifier:
293                 http://foo.example.com/assurance/loa1
294
295                 Defines Level 1 of FAF
296             </xs:documentation>
297         </xs:annotation>
298
299         <xs:complexType name="GoverningAgreementRefType">
300             <xs:complexContent>
301                 <xs:restriction base="GoverningAgreementRefType">
302                     <xs:attribute name="governingAgreementRef"
303                         type="xs:anyURI"
304                         fixed="http://foo.example.com/foo_assurance.pdf#sect
305                         ion1"
306                         use="required"/>

```

```
307         </xs:restriction>
308         </xs:complexContent>
309     </xs:complexType>
310 </xs:redefine>
311 </xs:schema>
```

312

313 The class schemas for the other 2 FAF LOA would refer to the corresponding section of the FAF
314 documentation.

315 **3 Identity Assurance Certification Attribute Profile**

316 A SAML attribute is defined to represent the certification status of an Identity Provider regarding its
317 conformance to the elements of an identity assurance framework.

318 **3.1 Required Information**

319 **Identification:** urn:oasis:names:tc:SAML:2.0:attribute:profiles:assurance-certification

320 **Contact Information:** security-services-comment@lists.oasis-open.org

321 **Description:** Given below.

322 **Updates:** None.

323 **3.2 Profile Overview**

324 In some relatively simple scenarios where identity assurance is used, a relying party may have a direct
325 business relationship with an organization operating an Identity Provider that satisfies the relying party
326 that the practices of the Identity Provider conform to the requirements of an assurance framework. In a
327 larger-scale scenario, a relying party may wish to rely on a third party (a “certification service”) to certify
328 the practices of the Identity Provider organization. In this scenario, it is useful for the IdP's certification
329 status as determined by that certification service to be represented in a standard fashion, in a way that
330 can be communicated securely among the various parties involved. The SAML metadata specification
331 [SAMLMeta] defines means for information about SAML entities to be represented and communicated
332 securely.

333 This profile defines a SAML attribute that can be applied to entries in a SAML metadata document to
334 express certification status. To indicate that an Identity Provider (or group of Identity Providers) is
335 certified as conformant with an LOA, the attribute defined in this profile is added to that identity
336 Provider's entity metadata as described in [SAMLMA]. This may be done using a <saml:Attribute>
337 or a <saml:Assertion> element. A <saml:Assertion> element can be used to include an
338 assurance certification attribute that is signed independently from the enclosing metadata.

339 **3.3 SAML Attribute Naming**

340 The NameFormat XML attribute in <Attribute> elements MUST be
341 urn:oasis:names:tc:SAML:2.0:attrname-format:uri.

342 This profile defines a single SAML attribute name:

343 urn:oasis:names:tc:SAML:attribute:assurance-certification

344 **3.4 Profile-Specific XML Attributes**

345 No additional XML attributes are defined for use with this attribute.

346 **3.5 SAML Attribute Values**

347 Values of this attribute are URIs representing LOAs as defined in section 2 of this document. Multiple
348 values may be present. This document does not define any relationship between LOAs or define
349 relying party behavior if multiple values are present. It is the responsibility of assurance framework
350 documentation to specify whether, for example, certification at a “higher” LOA implies approval to
351 assert a “lower” LOA.

352 3.6 Example

353 In this example a metadata publisher would place the SAML attribute statement in the IdP's entity
354 descriptor to indicate that the practices of the indicated IdP had been certified as conformant with the
355 requirements of the stated LOA. A party relying on this metadata could use this value as part of
356 determining whether and how to accept SAML authentication assertions from this IdP.

357

```
358 <EntityDescriptor xmlns="urn:oasis:names:tc:SAML:2.0:metadata"  
359   xmlns:saml="urn:oasis:names:tc:SAML:2.0:assertion"  
360   xmlns:attr="urn:oasis:names:tc:SAML:metadata:attribute"  
361   xmlns:ds="http://www.w3.org/2000/09/xmldsig#"  
362   entityID="https://IdentityProvider.example.com/SAML">  
363   <Extensions>  
364     <attr:EntityAttributes>  
365       <saml:Attribute  
366         NameFormat="urn:oasis:names:tc:SAML:2.0:attrname-format:uri"  
367         Name="urn:oasis:names:tc:SAML:attribute:assurance-  
368 certification">  
369         <saml:AttributeValue>  
370           http://foo.example.com/assurance/loa1  
371         </saml:AttributeValue>  
372       </saml:Attribute>  
373     </attr:EntityAttributes>  
374   </Extensions>  
375   <IDPSSODescriptor WantAuthnRequestsSigned="true"  
376     protocolSupportEnumeration="urn:oasis:names:tc:SAML:2.0:protocol">  
377     <KeyDescriptor use="signing"> ... </KeyDescriptor>  
378     <NameIDFormat>...</NameIDFormat>  
379     <SingleSignOnService  
380       Binding="urn:oasis:names:tc:SAML:2.0:bindings:HTTP-POST"  
381       Location="https://IdentityProvider.example.com/SAML/SSO/Browser"/>  
382     ...  
383   </IDPSSODescriptor>  
384   ...  
385 </EntityDescriptor>
```

386

387 4 Conformance

388 4.1 AuthnContext Level-of-Assurance Profile Conformance

389 To conform to this profile, implementations MUST support the use of the
390 <samlp:RequestedAuthnContext> and <saml:AuthnContext> elements defined by [SAMLCore].

391 4.2 Identity Assurance Certification Attribute Profile Conformance

392 An asserting party (typically, a metadata publisher) conforms to this profile if it can generate valid
393 SAML instances containing the SAML attribute defined in this profile.

394 A relying party (typically, a metadata consumer) conforms to this profile if it can process the SAML
395 attribute defined in this profile and make the results available for further processing.

396 All parties must also meet the conformance requirements in [SAMLMA].

397

Appendix A. Acknowledgments

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416

417

Appendix B. Revision History

418

- Draft 01 – first draft of sstc-saml-loa-authncontext-profile

419

420

- Draft 02 - minor tweaks to text. Removed editorial comments. Removed example class derived from base class.

421

- Draft 03 – removed the NIST 800 63 specific references and schema.

422

423

- Draft 00 sstc-saml-assurance-profile : renamed to reflect added material. Added certification motivation and specification.

424

425

426

- Draft 01 sstc-saml-assurance-profile : added attribute profile conformance, added attribute profile example, more description of certification usage, reorganized section numbering, put conformance material in section 1.

427

- Committee Draft, cosmetic edits.