



Conformance Requirements for the OASIS Security Assertion Markup Language (SAML) V2.0

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46 **Abstract:**

47 This normative specification provides the technical requirements for SAML V2.0 conformance and
48 specifies the entire set of documents comprising SAML V2.0.

49 **Status:**

50 This is a **Committee Draft** approved by the Security Services Technical Committee on 14
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52 Committee members should submit comments and potential errata to the [security-](mailto:security-services@lists.oasis-open.org)
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54 at http://www.oasis-open.org/committees/comments/form.php?wg_abbrev=security. The
55 committee will publish on its web page (<http://www.oasis-open.org/committees/security>) a catalog
56 of any changes made to this document.

57 For information on whether any patents have been disclosed that may be essential to
58 implementing this specification, and any offers of patent licensing terms, please refer to the
59 Intellectual Property Rights web page for the Security Services TC ([http://www.oasis-](http://www.oasis-open.org/committees/security/ipr.php)
60 [open.org/committees/security/ipr.php](http://www.oasis-open.org/committees/security/ipr.php)).

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1 Introduction

This normative specification describes features that are mandatory and optional for implementations claiming conformance to SAML V2.0 and also specifies the entire set of documents comprising SAML V2.0.

1.1 Overview and Specification of SAML V2.0

The SAML V2.0 standard consists of the following documents:

- This specification: Conformance Requirements for the OASIS Security Assertion Markup Language (SAML) V2.0
- Assertions and Protocols for the OASIS Security Assertion Markup Language (SAML) V2.0 [SAMLCore]
 - SAML assertions schema [SAMLAssn-xsd]
 - SAML protocols schema [SAMLProt-xsd]
- Bindings for the OASIS Security Assertion Markup Language (SAML) V2.0 [SAMLBind]
- Profiles for the OASIS Security Assertion Markup Language (SAML) V2.0 [SAMLProf]
 - SAML ECP profile schema [SAMLECP-xsd]
 - SAML LDAP attribute profile schema [SAMLLDAP-xsd]
 - SAML DCE PAC attribute profile schema [SAMLDCExsd]
 - SAML XACML attribute profile schema [SAMLXAC-xsd]
- Metadata for the OASIS Security Assertion Markup Language (SAML) V2.0 [SAMLMeta]
- SAML metadata schema [SAMLMeta-xsd]
- Authentication Context for the OASIS Security Assertion Markup Language (SAML) V2.0 [SAMLAuthnCxt]
 - SAML authentication context schema [SAMLAC-xsd]
 - SAML context class schema for Internet Protocol [SAMLAC-IP]
 - SAML context class schema for Internet Protocol Password [SAMLAC-IPP]
 - SAML context class schema for Kerberos [SAMLAC-Kerb]
 - SAML context class schema for Mobile One Factor Unregistered [SAMLAC-MOFU]
 - SAML context class schema for Mobile Two Factor Unregistered [SAMLAC-MTFU]
 - SAML context class schema for Mobile One Factor Contract [SAMLAC-MOFC]
 - SAML context class schema for Mobile Two Factor Contract [SAMLAC-MTFC]
 - SAML context class schema for Password [SAMLAC-Pass]
 - SAML context class schema for Password Protected Transport [SAMLAC-PPT]
 - SAML context class schema for Previous Session [SAMLAC-Prev]
 - SAML context class schema for Public Key – X.509 [SAMLAC-X509]
 - SAML context class schema for Public Key – PGP [SAMLAC-PGP]
 - SAML context class schema for Public Key – SPKI [SAMLAC-SPKI]
 - SAML context class schema for Public Key – XML Signature [SAMLAC-XSig]
 - SAML context class schema for Smartcard [SAMLAC-Smart]
 - SAML context class schema for Smartcard PKI [SAMLAC-SmPKI]
 - SAML context class schema for Software PKI [SAMLAC-SwPKI]

- 120 • SAML context class schema for Telephony [SAMLAC-Tele]
- 121 • SAML context class schema for Telephony (“Nomadic”) [SAMLAC-TNom]
- 122 • SAML context class schema for Telephony (Personalized) [SAMLAC-TPers]
- 123 • SAML context class schema for Telephony (Authenticated) [SAMLAC-TAuthn]
- 124 • SAML context class schema for Secure Remote Password [SAMLAC-SPKI]
- 125 • SAML context class schema for SSL/TLS Certificate-Based Client Authentication [SAMLAC-SSL]
- 126
- 127 • SAML context class schema for Time Sync Token [SAMLAC-TST]
- 128 • Security and Privacy Considerations for the OASIS Security Assertion Markup Language (SAML) V2.0 [SAMLSec]
- 129
- 130 • Glossary for the OASIS Security Assertion Markup Language (SAML) V2.0 [SAMLGloss]

131 The term “SAML V2.0” or “SAML2” is often used informally to refer to the standard specified by the above
132 documents, or subsets thereof. However, the SAML V2.0 standard should be formally identified in other
133 documents by a normative reference to this document.

134 Additional non-normative documents, such as a Technical Overview [SAMLTechOvw], are available to
135 provide assistance to developers and others in understanding SAML. These documents are available at
136 the SAML website, <http://www.oasis-open.org/committees/security>.

137 SAML V2.0 defines a number of named profiles. Each profile (other than attribute profiles) describes
138 details of selected SAML message flows and can also be viewed as indivisible functionality that could be
139 implemented by a software component. Implementation of a profile involves use of a binding for each
140 message exchange included in the profile. A binding can be viewed as a specific implementation
141 technique for achieving a message exchange.

142 Section 2 of this document enumerates all of the different profiles defined by [SAMLProfiles]. For each
143 profile, the relevant SAML V2.0 message flows are listed, and for each message flow the set of possible
144 bindings is also described. The combination of profile, message exchange and a selected binding is
145 termed a SAML V2.0 *feature*.

146 Section 3 describes the conformance matrix for SAML V2.0. A number of different *operational modes* or
147 roles are identified. The conformance matrix describes the feature set that must be
148 implemented by each operational mode.

149 1.2 Notation

150 The keywords "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD
151 NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this specification are to be interpreted in this
152 specification and all of the SAML V2.0 specifications as described in IETF RFC 2119 [RFC2119]:

153

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

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

2 SAML V2.0 Profiles and Possible Implementations

160 The following table enumerates all of the profiles defined by the SAML profiles specification [SAMLProf].
 161 For each profile, the message protocol flows (defined in the assertions and protocols specification
 162 [SAMLCore]) found within the profile are also described. For each message flow, a list of relevant bindings
 163 (defined in the bindings specification [SAMLBind]) is given in the final column.

Table 1: Possible Implementations

| Profile | Message Flows | Binding |
|-----------------------------|---------------------------------------|---------------|
| Web SSO | <AuthnRequest> from SP to IdP | HTTP redirect |
| | | HTTP POST |
| | | HTTP artifact |
| | IdP <Response> to SP | HTTP POST |
| HTTP artifact | | |
| Enhanced Client/Proxy SSO | ECP to SP, SP to ECP to IdP | PAOS |
| | IdP to ECP to SP, SP to ECP | PAOS |
| Identity Provider Discovery | Cookie setter | HTTP |
| | Cookie getter | HTTP |
| Single Logout | <LogoutRequest> | HTTP redirect |
| | | HTTP POST |
| | | HTTP artifact |
| | | SOAP |
| | <LogoutResponse> | HTTP redirect |
| | | HTTP POST |
| | | HTTP artifact |
| | | SOAP |
| Name Identifier Management | <ManageNameIDRequest> | HTTP redirect |
| | | HTTP POST |
| | | HTTP artifact |
| | | SOAP |
| | <ManageNameIDResponse> | HTTP redirect |
| | | SOAP |
| Artifact Resolution | <ArtifactResolve>, <ArtifactResponse> | SOAP |
| Authentication Query | <AuthNQuery>, <Response> | SOAP |

| Profile | Message Flows | Binding |
|-------------------------------------|---|----------------|
| Attribute Query | <AttributeQuery>, <Response> | SOAP |
| Authorization Decision Query | <AuthZDecisionQuery>, <Response> | SOAP |
| Request for Assertion by Identifier | <AssertionIDRequest>, <Response> | SOAP |
| Name Identifier Mapping | <NameIDMappingRequest>, <NameIDMappingResponse> | SOAP |
| SAML URI binding | GET, HTTP Response | HTTP |
| UUID attribute profile | | |
| DCE PAC attribute profile | | |
| X.500 attribute profile | | |
| XACML attribute profile | | |
| Metadata | Consumption | |
| | Exchange | |

164

165 **3 Conformance**

166 This section describes the technical conformance requirements for SAML V2.0.

167 **3.1 Operational Modes**

168 This document uses the phrase “operational mode” to describe a role that a software component can play
169 in conforming to SAML. The operational modes are as follows:

- 170 • IdP – Identity Provider
- 171 • IdP Lite – Identity Provider Lite
- 172 • SP – Service Provider
- 173 • SP Lite – Service Provider Lite
- 174 • ECP – Enhanced Client/Proxy
- 175 • SAML Attribute Authority
- 176 • SAML Authorization Decision Authority
- 177 • SAML Authentication Authority
- 178 • SAML Requester

179 **3.2 Feature Matrix**

180 The following matrices identify unique sets of conformance requirements by means of a triple taken from
181 Table 1 with the form: profile, message(s), binding The message component is not always included when
182 it is obvious from context.

Table 2: Feature Matrix

| Feature | IdP | IdP Lite | SP | SP Lite | ECP |
|---|------------|-----------------|-----------|----------------|------------|
| Web SSO, <AuthnRequest>, HTTP redirect | MUST | MUST | MUST | MUST | N/A |
| Web SSO, <Response>, HTTP POST | MUST | MUST | MUST | MUST | N/A |
| Web SSO, <Response>, HTTP artifact | MUST | MUST | MUST | MUST | N/A |
| Artifact Resolution, SOAP | MUST | MUST | MUST | MUST | N/A |
| Enhanced Client/Proxy SSO, PAOS | MUST | MUST | MUST | MUST | MUST |
| Name Identifier Management, HTTP redirect (IdP-initiated) | MUST | MUST NOT | MUST | MUST NOT | N/A |
| Name Identifier Management, SOAP (IdP-initiated) | MUST | MUST NOT | OPTIONAL | MUST NOT | N/A |
| Name Identifier Management, HTTP redirect | MUST | MUST NOT | MUST | MUST NOT | N/A |
| Name Identifier Management, SOAP (SP-initiated) | MUST | MUST NOT | OPTIONAL | MUST NOT | N/A |
| Single Logout (IdP-initiated) – HTTP redirect | MUST | MUST | MUST | MUST | N/A |
| Single Logout (IdP-initiated) – SOAP | MUST | OPTIONAL | MUST | OPTIONAL | N/A |
| Single Logout (SP-initiated) – HTTP redirect | MUST | MUST | MUST | MUST | N/A |
| Single Logout (SP-initiated) – SOAP | MUST | OPTIONAL | MUST | OPTIONAL | N/A |
| Identity Provider Discovery (cookie) | MUST | MUST | OPTIONAL | OPTIONAL | N/A |

184

185 The following table summarizes operational modes that extend the IdP or SP modes defined above.
 186 These are to be understood as a combination of an IdP or SP mode from the table above with the
 187 corresponding extended feature set below.

Table 3: Extended IdP, SP

| Feature | IdP Extended | SP Extended |
|---|--------------|-------------|
| Identity Provider proxy (Section 3.4.1.5 [SAMLCore]) | MUST | MUST |
| Name identifier mapping, SOAP | MUST | MUST |

189

190

191 The following table summarizes conformance requirements for SAML authorities and requesters .

Table 4: SAML Authority and Requester Matrix

| Feature | SAML Authentication Authority | SAML Attribute Authority | SAML Authorization Decision Authority | SAML Requester |
|---|-------------------------------|--------------------------|---------------------------------------|----------------|
| Authentication Query, SOAP | MUST | OPTIONAL | OPTIONAL | OPTIONAL |
| Attribute Query, SOAP | OPTIONAL | MUST | OPTIONAL | OPTIONAL |
| Authorization Decision Query, SOAP | OPTIONAL | OPTIONAL | MUST | OPTIONAL |
| Request for Assertion by Identifier, SOAP | MUST | MUST | MUST | OPTIONAL |
| SAML URI Binding | MUST | MUST | MUST | OPTIONAL |

192

193 **3.3 Implementation of SAML-Defined Identifiers**

194 All relevant operational modes MUST implement the following SAML-defined identifiers:

- 195 1. All Attribute Name Format Identifiers as defined in Section 8.2 of [SAMLCore].
- 196 2. All Name Identifier Format Identifiers as defined in Section 8.3 of [SAMLCore].
- 197 3. All Consent Identifiers as defined in Section 8.4 of [SAMLCore].

198 **3.4 Implementation of Encrypted Elements**

199 All relevant operational modes MUST be able to process or generate the following encrypted elements:

- 200 1. <saml:EncryptedID>,
- 201 2. <saml:EncryptedAssertion>,
- 202 3. <saml:EncryptedAttribute>

203 In any context where they are required to process or generate the corresponding unencrypted elements,
204 namely, 1) <saml:NameID>, 2) <saml:Assertion>, 3) <saml:Attribute>.

205

206 **3.5 Security Models for SOAP and URI Bindings**

207 The following security models are mandatory to implement for all profiles implemented using the SOAP
208 binding as well as for the SAML URI binding. SAML authorities and requesters **MUST** implement the
209 following authentication methods:

- 210 • No client or server authentication.
- 211 • HTTP basic authentication [RFC2617] with and without SSL 3.0 or TLS 1.0 (see Section 3 below).
212 The SAML requester **MUST** preemptively send the authorization header with the initial request.
- 213 • HTTP over SSL 3.0 or TLS 1.0 server authentication with server-side certificate.
- 214 • HTTP over SSL 3.0 or TLS 1.0 mutual authentication with both server-side and a client-side
215 certificate.

216 If a SAML authority uses SSL 3.0 or TLS 1.0, it **MUST** use a server-side certificate.

217

218 4 XML Digital Signature and XML Encryption

219

220 SAML V2.0 uses XML Digital Signature [XMLSig] to implement XML signing and encryption functionality
221 for integrity, and source authentication. SAML V2.0 uses XML Encryption [XMLEnc] to implement
222 confidentiality, including encrypted identifiers, encrypted assertions, and encrypted attributes.

223

224 4.1 XML Signature Algorithms

225

226 XML Signature mandates use of the following algorithms in section 6.1, therefore they MUST be
227 implemented by compliant SAML V2.0 implementations:

- 228 • Digest: SHA1
- 229 • MAC: HMAC-SHA1
- 230 • XML Canonicalization: CanonicalXML (Without comments),
- 231 • Transform: Enveloped Signature

232

233 In addition, to enable interoperability, the following MUST be implemented by compliant SAML V2.0
234 implementations:

235

- 236 • Signature: RSAwithSHA1 (recommended in Dsig but needed for
237 interoperability)

238 Although XML Digital Signature mandates the DSAwithSHA1 signature algorithm, it is not required by
239 SAML V2.0, but is RECOMMENDED.

240 4.2 XML Encryption Algorithms

241 XML Encryption mandates use of the following algorithms in sections 5.2.1 and 5.2.2, therefore they
242 MUST be implemented by compliant SAML V2.0 implementations:

243

- 244 • Block Encryption: TRIPLE DES, AES-128, AES-256.
- 245 • Key Transport: RSA-v1.5, RSA-OAEP

246

247 **5 Use of SSL 3.0 or TLS 1.0**

248 In any SAML V2.0 use of SSL 3.0 [SSL3] or TLS 1.0 [RFC2246] , servers MUST authenticate to clients
249 using a
250 X.509 v3 certificate. The client MUST establish server identity based on contents of the certificate
251 (typically through examination of the certificate's subject DN field).

252 **5.1 SAML SOAP and URI Binding**

253 TLS-capable implementations MUST implement the TLS_RSA_WITH_3DES_EDE_CBC_SHA cipher
254 suite and MAY implement the TLS_RSA_AES_128_CBC_SHA cipher suite [AES].

256 FIPS TLS-capable implementations MUST implement the corresponding
257 TLS_RSA_FIPS_WITH_3DES_EDE_CBC_SHA cipher suite and MAY implement the corresponding
258 TLS_RSA_FIPS_AES_128_CBC_SHA cipher suite [AES].

259 SSL-capable implementations MUST implement the SSL_RSA_WITH_3DES_EDE_CBC_SHA cipher
260 suite.

261 FIPS SSL-capable implementations MUST implement the FIPS cipher suite corresponding to the SSL
262 SSL_RSA_WITH_3DES_EDE_CBC_SHA cipher suite.

263 **5.2 Web SSO Profiles of SAML**

264 SSL-capable implementations of the Web SSO profile of SAML MUST implement the
265 SSL_RSA_WITH_3DES_EDE_CBC_SHA cipher suite. TLS-capable implementations MUST implement
266 the TLS_RSA_WITH_3DES_EDE_CBC_SHA cipher suite.
267

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