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

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Abstract:

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

Status:

This is a **second Committee Draft** approved by the Security Services Technical Committee on 21 September 2004.

Committee members should submit comments and potential errata to the security-services@lists.oasis-open.org list. Others should submit them by filling out the web form located at http://www.oasis-open.org/committees/comments/form.php?wg_abbrev=security. The committee will publish on its web page (http://www.oasis-open.org/committees/security) a catalog of any changes made to this document.

For information on whether any patents have been disclosed that may be essential to implementing this specification, and any offers of patent licensing terms, please refer to the Intellectual Property Rights web page for the Security Services TC (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 [SAMLDCE-xsd]
  - 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]

- SAML context class schema for Telephony [SAMLAC-Tele]
- SAML context class schema for Telephony (“Nomadic”) [SAMLAC-TNom]
- SAML context class schema for Telephony (Personalized) [SAMLAC-TPers]
- SAML context class schema for Telephony (Authenticated) [SAMLAC-TAuthn]
- SAML context class schema for Secure Remote Password [SAMLAC-SPKI]
- SAML context class schema for SSL/TLS Certificate-Based Client Authentication [SAMLAC-SSL]
- SAML context class schema for Time Sync Token [SAMLAC-TST]

- Security and Privacy Considerations for the OASIS Security Assertion Markup Language (SAML) V2.0 [SAMLSec]
- Glossary for the OASIS Security Assertion Markup Language (SAML) V2.0 [SAMLGloss]

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

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

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

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

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

1.2 Notation

The keywords "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this specification are to be interpreted in this specification and all of the SAML V2.0 specifications 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.

2 SAML V2.0 Profiles and Possible Implementations

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

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3 Conformance

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

3.1 Operational Modes

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

- IdP – Identity Provider
- IdP Lite – Identity Provider Lite
- SP – Service Provider
- SP Lite – Service Provider Lite
- ECP – Enhanced Client/Proxy
- SAML Attribute Responder
- SAML Authorization Decision Responder
- SAML Authentication Responder

3.2 Feature Matrix

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

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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

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

186

Table 3: Extended IdP, SP

Feature	IdP Extended	SP Extended
Identity Provider proxy (Section of 3.4.1.6 [SAMLCore])	MUST	MUST
Name identifier mapping, SOAP	MUST	MUST

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188

189 The following table summarizes conformance requirements for SAML responders.

Table 4: SAML Responder Matrix

Feature	SAML Authentication Responder	SAML Attribute Responder	SAML Authorization Decision Responder
Authentication Query, SOAP	MUST	OPTIONAL	OPTIONAL
Attribute Query, SOAP	OPTIONAL	MUST	OPTIONAL
Authorization Decision Query, SOAP	OPTIONAL	OPTIONAL	MUST
Request for Assertion by Identifier, SOAP	MUST	MUST	MUST
SAML URI Binding	MUST	MUST	MUST

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191 3.3 Implementation of SAML-Defined Identifiers

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

193 1. All Attribute Name Format Identifiiers as defined in Section 8.2 of [SAMLCore].

194 2. All Name Identifier Format Identifiers as defined in Section 8.3 of [SAMLCore].

195 3. All Consent Identifiers as defined in Section 8.4 of [SAMLCore].

196 3.4 Implementation of Encrypted Elements

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

198 1. <saml:EncryptedID>,

199 2. <saml:EncryptedAssertion>,

200 3. <saml:EncryptedAttribute>

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

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3.5 Security Models for SOAP and URI Bindings

The following security models are mandatory to implement for all profiles implemented using the SOAP binding as well as for the SAML URI binding. The SAML requester and responder MUST implement the following authentication methods:

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

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

4 XML Digital Signature and XML Encryption

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

4.1 XML Signature Algorithms

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

- Digest: SHA1
- MAC: HMAC-SHA1
- XML Canonicalization: CanonicalXML (Without comments),
- Transform: Enveloped Signature

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

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

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

4.2 XML Encryption Algorithms

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

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

5 Use of SSL 3.0 or TLS 1.0

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

5.1 SAML SOAP and URI Binding

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

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

SSL-capable implementations MUST implement the SSL_RSA_WITH_3DES_EDE_CBC_SHA cipher suite.

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

5.2 Web SSO Profiles of SAML

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

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Appendix A. Acknowledgements

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