Executive Overview of the Security Assertions Markup Language (SAML) v2.0

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Editor:
Paul Madsen, Entrust Inc (p.madsen@entrust.com)

Contributors:

Abstract:
This document provides an executive overview of the Security Assertions Markup Language.

Status:

This is boilerplate; to use, fix the hyperlinks:] Committee members should send comments on this specification to the xxx@lists.oasis-open.org list. Others should subscribe to and send comments to the xxx-comment@lists.oasis-open.org list. To subscribe, send an email message to xxx-comment-request@lists.oasis-open.org with the word "subscribe" as the body of the message.

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1.1 Introduction

Both browser & Web Services transactions blur the boundaries that separate business partners by the flow of application data across them. So too must identity management mechanisms - identity must flow across these boundaries as well, accompanying the fundamental transaction data.

Traditional authentication systems have required enterprises to maintain a one-to-one mapping of identity within their business systems for their customers, suppliers, and partners. In this model of identity management, customer identity data must be registered and maintained within the enterprise's electronic authentication databases.

This model, with this relatively tight coupling of identity data between business partners, does not easily scale to support today's dynamic business relationships. To support today's distributed transactions, what is needed are standardized mechanisms and syntax for the communication of identity information between business partners in a secure manner. The Security Assertion Markup Language (SAML) defines just such a standard.

1.2 What is SAML?

The Security Assertions Markup Language (SAML), developed by the Security Services Technical Committee of the Organization for the Advancement of Structured Information Standards (OASIS)., is an XML-based framework for communicating user authentication, entitlements and attribute information. As its name suggests, SAML will allow business entities to make assertions regarding the identity, attributes, and entitlements of a subject to other entities, which may be a partner company, another enterprise application etc.

SAML is a flexible and extensible protocol designed to be used by other by other standards.The Liberty Alliance, the Internet2 Shibboleth project, and OASIS Web Services Security (WS-Security) have all adopted SAML as a technological underpinning to varying degrees.

SAML 1.0 became an OASIS standard in November 2002 (SAML 1.1 followed in September 2003) and has seen significant success within industry.- gaining momentum in financial services, higher education, government, and other verticals. SAML has been broadly implemented by all major Web access management vendors. SAML is also supported in major application server products and SAML support is also common among Web services management and security vendors.

SAML 2.0 builds on that success.

1.3 What are the benefits of SAML?

The benefits of SAML include:

- **Platform neutral** – SAML abstracts the security framework away from particular vendor implementations and architectures.
- **Loose coupling of directories** – SAML does not require user information to be maintained and synchronized between directores.
- **Improved Online Experience for end-users** – SAML authentication assertions enables single sign-on by allowing users to authenticate at an identity provider and then access services/resources at service

providers without additional authentication

- **Reduced administrative costs for service providers** - use of SAML for federation between identity domains can reduce the cost of maintaining account information (e.g. username & password).This burden is placed on the identity provider.
- **Risk transference** – SAML can act to push responsibility for proper management of identities to the identity provider, which is more often compatible with its business model than that of a service provider.

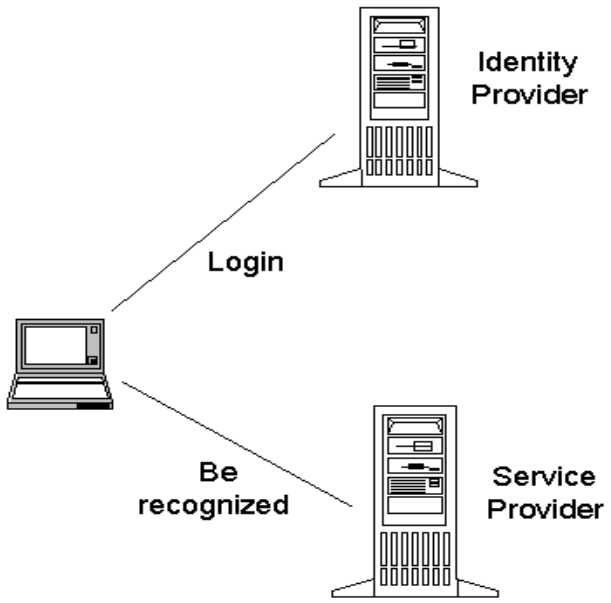
1.4 How is SAML being applied?

As befits a general framework for communicating security and identity information, SAML is being applied in a number of different manners, a number of which are presented here.

Web SSO

In Web Single Single-On, a user authenticates to one web site and then, without additional authentication, is able to access some personalized or customized resources at another site. SAML enables Web SSO through the communication of an authentication assertion from the first site to the second which, if confident of the origin of the assertion, can choose to log in the user as if they had authenticated directly.

The basic SSO model is shown in the diagram below. A principal authenticates at the I~~i~~dentity provider and is subsequently appropriately recognized as (and given corresponding access/service) at the Service provider.



Securing Web Services

SAML Assertions can be used as Security Tokens within SOAP Header blocks in order to carry security and identity information between actors in web service transactions. The SAML Token Profile of the OASIS WS-Security TC specifies how SAML assertions should be packaged into the WS-Security <Security> element in an interoperable manner. The Liberty Alliance's ID-Web Service Framework also uses SAML assertions as the base security token format for enabling secure & privacy respecting access to identity-based web services.

Attribute-based Authorization

Similar to the Web SSO scenario, the Attribute-based Authorization model has one web site communicating identity information about a principal to another web site in support of some transaction that principal is attempting to perform there. However, unlike the SSO scenario, the nature of the information is not an authentication assertion (i.e. that the principal authenticated at a certain time) but rather some other characteristic of the principal (e.g. their roles in a B2B scenario). The Attribute-based authorization model is important when the individuals particular identity is either not important or should not be shared (for privacy reasons).

1.5 What is new in SAML 2?

- Federation & pseudonyms
- Session management
- Devices
- Attribute Profiles

1.6 What is SAML composed of?

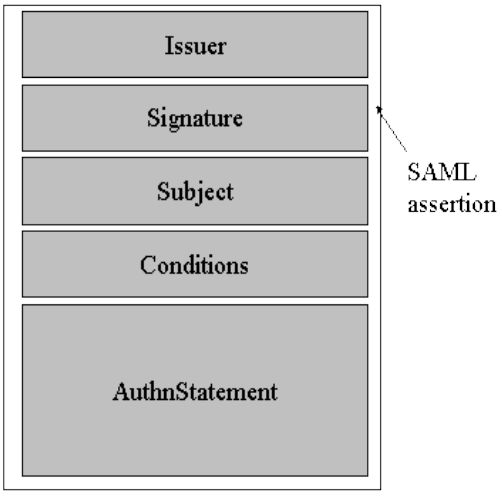
SAML is composed of a number of distinct (but interrelated) components.

Assertions

An assertion is a package of information that supplies one or more statements made by a SAML authority. SAML defines three different kinds of assertion statement that can be created by a SAML authority.

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

The outer structure of an assertion is generic, providing information that is common to all of the statements within it. Within an assertion, a series of inner elements describe the authentication, attribute, authorization decision, or user-defined statements containing the specifics. The diagram below illustrates the high-level structure of a SAML authentication assertion.



Protocols

SAML defines a number of different (generally) request/response protocols, including allowing providers to:

- Request one or more assertions (includes a direct request of the desired assertions, as well as querying for assertions that meet particular criteria)
- Request that a principal be authenticated with the corresponding assertion returned
- Request that a name identifier be registered
- Request that a federation be terminated
- Retrieve a protocol message that has been requested by means of an artifact
- Request a near-simultaneous logout of a collection of related sessions (“single logout”)
- Request a name identifier mapping

Bindings

Mappings from SAML request-response message exchanges into standard messaging or communication protocols are called SAML protocol bindings. For instance, the SAML SOAP Binding defines how SAML protocol messages can be communicated within SOAP messages whilst the SAML URI Binding defines how SAML protocol messages can be communicated through URI resolution

Profiles

Generally, a profile of SAML defines constraints and/or extensions in support of the usage of SAML for a particular application – the goal to enhance interoperability by removing some of the flexibility inevitable in a general usage standard. For instance, the Web Browser SSO Profile specifies how SAML authentication assertions are communicated between an identity provider and service provider to enable Single Sign-On for a browser user. The web user authenticates (or has already authenticated) to the identity provider, which then produces an authentication assertion which, on being delivered to the service provide, allows that service provider to establish a security context for the web user.

The Web ~~Browser~~ SSO Profile details how to use the SAML Authentication Request/Response protocol in conjunction with different combinations of the HTTP Redirect, HTTP POST, HTTP Artifact, and SOAP bindings. Two different combinations are shown in the diagram below. In the top diagram, both the AuthnRequest and the subsequent response are sent using the HTTP POST Binding. In the bottom diagram, the AuthnRequest is sent using the HTTP POST Binding, the Response however uses a combination of the HTTP Artifact & SOAP Bindings.

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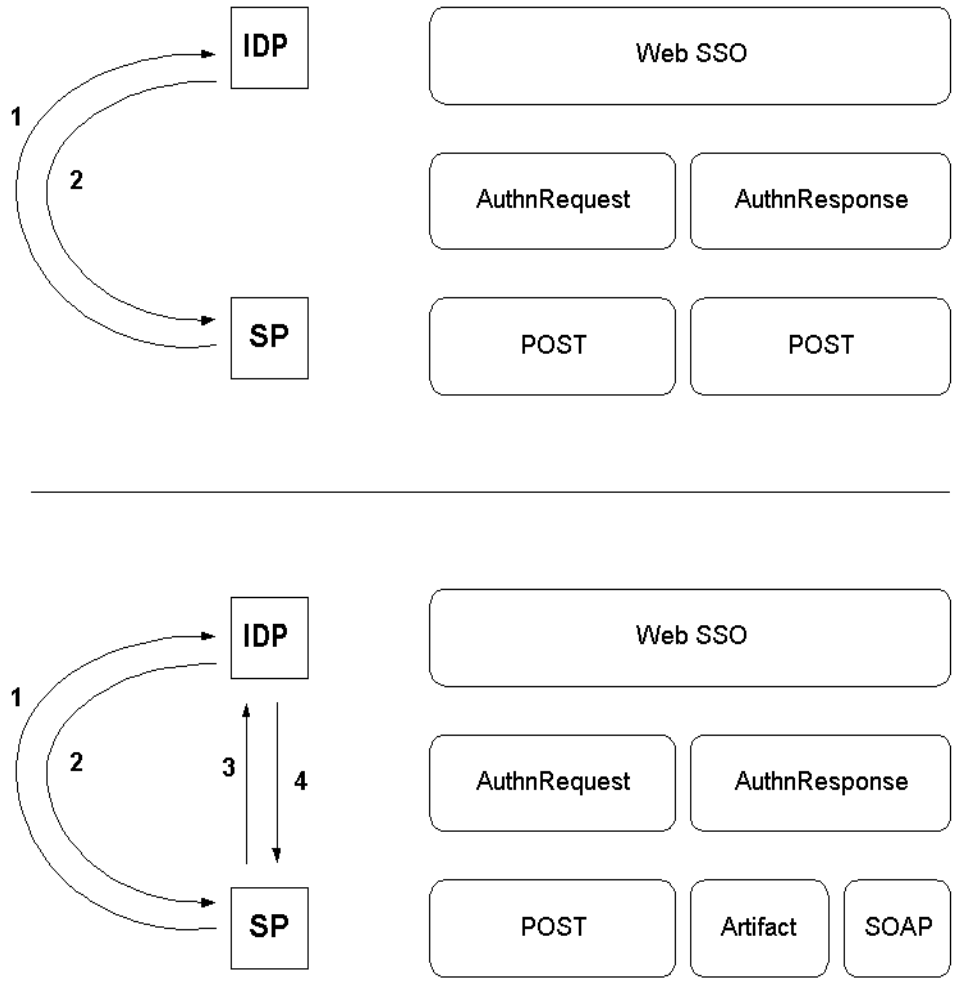

Another type of profile are the Attribute profiles – definitions of specific rules for the allowed names and syntax of attributes passed within SAML attribute assertions. An example of such an attribute profile is the X.500/LDAP profile, describing how to carry X.500/LDAP attributes within SAML attribute assertions.

1.7 ~~Different models for federation~~

~~SAML supports different models by which the providers refer to the subject of the assertion. Providers can use a non-random global identifier for the subject, i.e. an email address.~~

~~Where privacy concerns dictate that a non-random identifier for a principal is inappropriate, SAML supports a model in which the identity provider and service provider can establish (and subsequently manage) a privacy-respecting opaque pseudonym to be used for subjects.~~

~~In many deployments, more important than the particular identity of a principal will be the attributes associated with that principal. For instance, in a B2B situation, one company likely cares only that an employee arriving from a business partner site has the role of 'Senior Purchasing Agent' rather than the fact that they are a particular employee. SAML supports this model for federated identity.~~

1.8 How does SAML relate to other standards?

Liberty Alliance

The Liberty Alliance is an industry consortium defining standards for federated identity – including enabling simplified sign-on through federated network identification using current and emerging network access devices, and (ii) support and promote permission-based attribute sharing to enable a user's choice and control over the use and disclosure of his/her personal identification.

Liberty had defined its ID-Federation Framework on the base provided by SAML 1, layering additional functionality on top. Recognizing the value of a single standard for federated SSO, the Alliance submitted v1.2 of the ID-FF 1.2 into the SAML TC as input for SAML 2.

Liberty's ID-Web Services Framework, a platform for ~~permissions based identity services~~ securing web services, continues to evolve within the Liberty Alliance. Liberty ID-WSF uses SAML assertions as the security token format by which the authentication & authorization information associated with the various web service actors is communicated amongst them.

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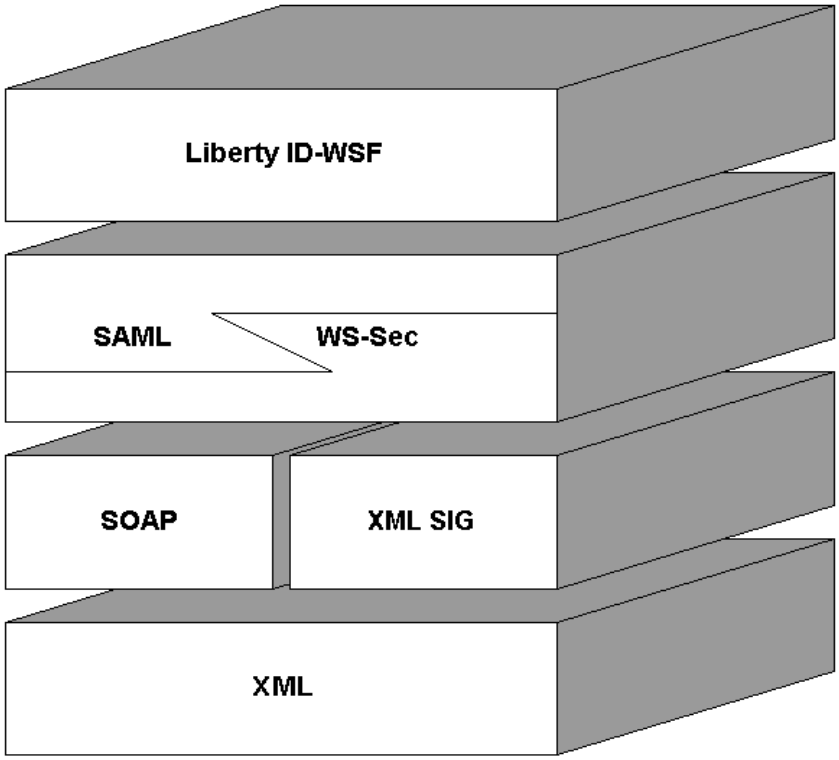
WS-Security

WS-Security is a OASIS standard that specifies SOAP security extensions providing data integrity and confidentiality. WS-Security defines a framework for securing SOAP messages- the specifics defined in profiles determined by the nature of the security token used to carry identity information. So, for instance, there are different profiles of WS-Security for the three different security token formats of X.509 certificates, Kerberos tickets, and SAML assertions.

SAML also points to WS-Security as an approved mechanism for securing SOAP messages carrying SAML protocol messages and assertions.

The following diagram illustrates the relationship between SAML and other components in the web services standards stack ~~....~~



1.9 Conclusions

A federated identity is one that is both *portable* and *potable*, ie it can be used and understood across autonomous domains or business boundaries. Effective identity federation can benefits both users and enterprises - providing principals with a smooth, cross-domain browsing experience through SSO and allowing enterprises to make available its resources to a class of users without the associated administrative costs.

SAML is the core standard for federated identity. By defining standardized mechanisms for the communication of security & identity information between business partners, SAML makes federated identity, and the cross-domain transactions that it enables, a reality.

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- John Hughes, Entegrity Solutions
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- Miguel Pallares, Ericsson
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- Steve Anderson, OpenNetwork
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- Jim Lien, RSA Security
- John Linn, RSA Security
- Rob Philpott, RSA Security (co-chair)
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