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

OASIS Draft, 2 March 2004

Document identifier:
sstc-saml-profiles-2.0-draft-02

Location:
http://www.oasis-open.org/committees/documents.php?wg_abbrev=security

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Abstract:
This specification defines profiles for the use of SAML assertions and request-response messages in communications protocols and frameworks.

Status:
This is a Draft.

Committee members should submit comments and potential errata to the security-services@lists.oasis-open.org list. Others should submit them to the security-services-comment@lists.oasis-open.org list (to post, you must subscribe; to subscribe, send a message to security-services-comment-request@lists.oasis-open.org with "subscribe" in the body) or use other OASIS-supported means of submitting comments. The committee will publish vetted errata on the Security Services TC web page (http://www.oasis-open.org/committees/security/).

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).

Table of Contents

1 Introduction

This document specifies profiles for the use of SAML assertions and request-response messages in communications protocols and frameworks.

A separate specification [SAMLCore] defines the SAML assertions and request-response messages themselves and another [SAMLBindings] defines protocol bindings.

The following sections define profiles of SAML that are sanctioned by the OASIS Security Services Technical Committee.

Two web browser-based profiles are defined to support single sign-on (SSO), supporting Scenario 1-1 of the SAML requirements document [SAMLReqs]:

- The browser/artifact profile of SAML
- The browser/POST profile of SAML

An additional profiles is defined to support enhanced clients:

- The ECP profile of SAML.

For each type of profile, a section describing the threat model and relevant countermeasures is also included.

Some additional profiles that have been published outside the Security Services Technical Committee are:

- The OASIS Web Services Security Technical Committee has produced a draft “SAML token profile” of the WSS specification [WSS-SAML], which describes how to use SAML assertions to secure a web service message.
- The Liberty Alliance Project [Liberty] has produced a set of profiles for its extended version of SAML.

1.1 Profile Concepts

Sets of rules describing how to embed SAML assertions into and extract them from a framework or protocol are called *profiles of SAML*. A profile describes how SAML assertions are embedded in or combined with other objects (for example, files of various types, or protocol data units of communication protocols) by an originating party, communicated from the originating site to a destination site, and subsequently processed at the destination. A particular set of rules for embedding SAML assertions into and extracting them from a specific class of <FOO> objects is termed a *<FOO> profile of SAML*.

For example, a SOAP profile of SAML describes how SAML assertions can be added to SOAP messages, how SOAP headers are affected by SAML assertions, and how SAML-related error states should be reflected in SOAP messages.

The intent of this specification is to specify a selected set of profiles in sufficient detail to ensure that independently implemented products will interoperate.

For other terms and concepts that are specific to SAML, refer to the SAML glossary [SAMLGloss].

1.2 Notation

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].

```
Listings of productions or other normative code appear like this.
```

```
Example code listings appear like this.
```

Note: Non-normative notes and explanations appear like this.

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

- The prefix saml: stands for the SAML assertion namespace [SAMLCore].
- The prefix samlp: stands for the SAML request-response protocol namespace [SAMLCore].
- The prefix ds: stands for the W3C XML Signature namespace, http://www.w3.org/2000/09/xmldsig# [XMLSig].
- The prefix SOAP-ENV: stands for the SOAP 1.1 namespace, http://schemas.xmlsoap.org/soap/envelope [SOAP1.1].

This specification uses the following typographical conventions in text: `<SAMLElement>`, `<ns:ForeignElement>`, `Attribute`, **Datatype**, `OtherCode`. In some cases, angle brackets are used to indicate non-terminals, rather than XML elements; the intent will be clear from the context.

2 Specification of Additional Profiles

This specification defines a selected set of profiles, but others will possibly be developed in the future. It is not possible for the OASIS Security Services Technical Committee to standardize all of these additional profiles for two reasons: it has limited resources and it does not own the standardization process for all of the technologies used. The following sections offer guidelines for specifying profiles and a process framework for describing and registering them.

2.1 Guidelines for Specifying Profiles

This section provides a checklist of issues that MUST be addressed by each profile.

1. Describe the set of interactions between parties involved in the profile. Any restrictions on applications used by each party and the protocols involved in each interaction must be explicitly called out.
2. Identify the parties involved in each interaction, including how many parties are involved and whether intermediaries may be involved.
3. Specify the method of authentication of parties involved in each interaction, including whether authentication is required and acceptable authentication types.
4. Identify the level of support for message integrity, including the mechanisms used to ensure message integrity.
5. Identify the level of support for confidentiality, including whether a third party may view the contents of SAML messages and assertions, whether the profile requires confidentiality, and the mechanisms recommended for achieving confidentiality.
6. Identify the error states, including the error states at each participant, especially those that receive and process SAML assertions or messages.
7. Identify security considerations, including analysis of threats and description of countermeasures.
8. Identify SAML confirmation method identifiers defined and/or utilized by the profile.

2.2 Process Framework for Describing and Registering Profiles

For any new profile to be interoperable, it needs to be openly specified. The OASIS Security Services Technical Committee will maintain a registry and repository of submitted profiles titled “Additional Bindings and Profiles” at the SAML website [SAMLWeb] in order to keep the SAML community informed. The committee will also provide instructions for submission of profiles by OASIS members.

When a profile is registered, the following information MUST be supplied:

1. Identification: Specify a URI that uniquely identifies this profile.
2. Contact information: Specify the postal or electronic contact information for the author of the profile.
3. Description: Provide a text description of the profile. The description SHOULD follow the guidelines described in Section 2.1.
4. Updates: Provide references to previously registered profiles that the current entry improves or obsoletes.

3 Web Browser SSO Profiles of SAML

In the scenario supported by the web browser SSO profiles, a web user authenticates to a *source site*. The web user then uses a secured resource at a destination site, without directly authenticating to the *destination site*.

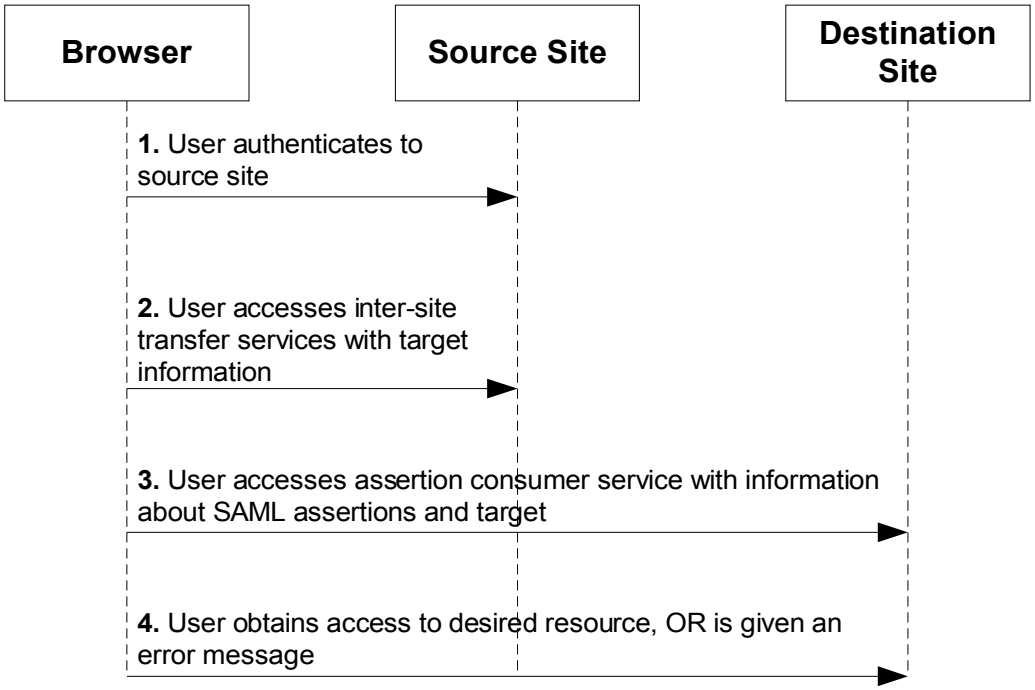
The following assumptions are made about this scenario for the purposes of these profiles:

- user is using a standard commercial browser and has authenticated to a source site by some means outside the scope of SAML.
- The source site has some form of security engine in place that can track locally authenticated users [WEBSSO]. Typically, this takes the form of a session that might be represented by an encrypted cookie or an encoded URL or by the use of some other technology [SESSION]. This is a substantial requirement but one that is met by a large class of security engines.

At some point, the user attempts to access a *target* resource available from the destination site, and subsequently, through one or more steps (for example, redirection), arrives at an *inter-site transfer service* (which may be associated with one or more URIs) at the source site. Starting from this point, the web browser SSO profiles describe a canonical sequence of HTTP exchanges that transfer the user browser to an *assertion consumer service* at the destination site. Information about the SAML assertions provided by the source site and associated with the user, and the desired target, is conveyed from the source to the destination site by the protocol exchange.

The assertion consumer service at the destination site can examine both the assertions and the target information and determine whether to allow access to the target resource, thereby achieving web SSO for authenticated users originating from a source site. Often, the destination site also utilizes a security engine that will create and maintain a session, possibly utilizing information contained in the source site assertions, for the user at the destination site.

The following figure illustrates this basic template for achieving SSO.



Two HTTP-based techniques are used in the web browser SSO profiles for conveying information from

one site to another via a standard commercial browser.

- **SAML artifact:** A SAML artifact of “small” bounded size is carried to the destination site as part of a URL query string such that, when the artifact is later conveyed back to the source site, the artifact unambiguously references an assertion. The artifact is conveyed via redirection to the destination site, which then acquires the referenced assertion from the source site by some further steps. Typically, this involves the use of a registered SAML protocol binding. This technique is used in the browser/artifact profile of SAML.
- **Form POST:** SAML assertions are uploaded to the browser within an HTML form and conveyed to the destination site as part of an HTTP POST payload when the user submits the form. This technique is used in the browser/POST profile of SAML.

Cookies are not employed in these profiles, as cookies impose the limitation that both the source and destination site belong to the same "cookie domain."

In the discussion of the web browser SSO profiles, the term *SSO assertion* will be used to refer to an assertion that has a `<saml:Conditions>` element with `NotBefore` and `NotOnOrAfter` attributes present, and also contains at least one or more authentication statements about the subject. Note that an SSO assertion MAY also include additional information about the subject, such as attributes.

3.1 Browser/Artifact Profile of SAML

3.1.1 Required Information

Identification: urn:oasis:names:tc:SAML:1.0:profiles:artifact-01

Contact information: security-services-comment@lists.oasis-open.org

SAML Confirmation Method Identifiers: The "SAML artifact" confirmation method identifier is used by this profile. The following RECOMMENDED identifier has been assigned to this confirmation method:

urn:oasis:names:tc:SAML:1.0:cm:artifact

Description: Given below.

Updates: None.

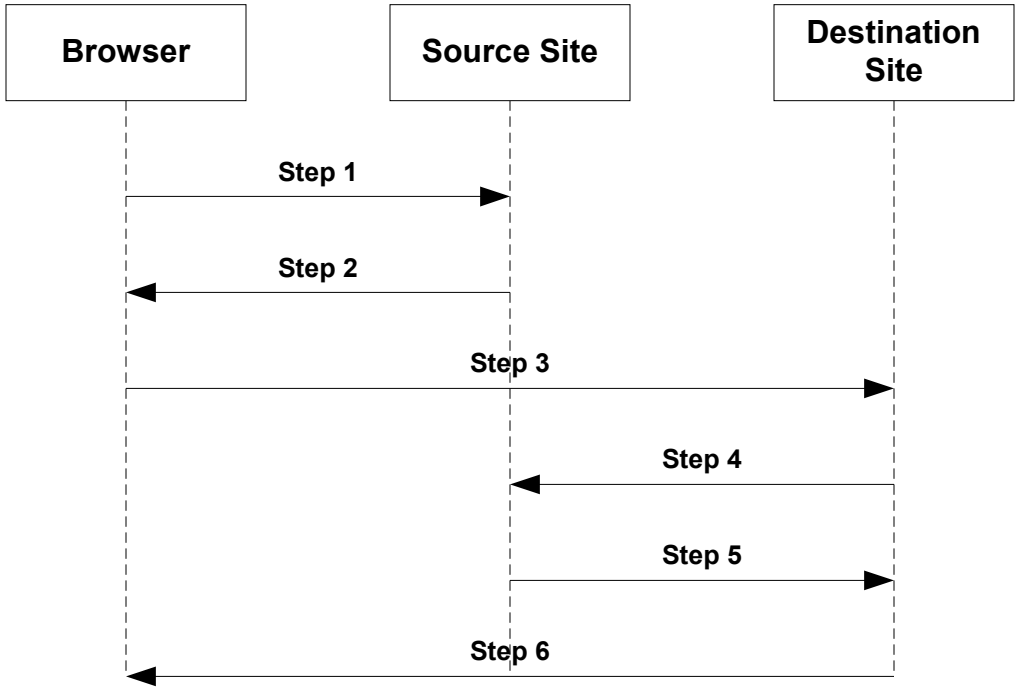
3.1.2 Preliminaries

The browser/artifact profile of SAML relies on a reference to the needed assertion traveling in a SAML artifact, which the destination site must dereference from the source site in order to determine whether the user is authenticated.

> **Note:** The need for a “small’’ SAML artifact is motivated by restrictions on URL size imposed by commercial web browsers. While RFC 2616 [RFC2279] UTF-8, a transformation format of ISO 10646, http://www.ietf.org/rfc/rfc2279.txt. does not specify any restrictions on URL length, in practice commercial web browsers and application servers impose size constraints on URLs, for a maximum size of approximately 2000 characters (see Section). Further, as developers will need to estimate and set aside URL “real estate” for the artifact, it is important that the artifact have a bounded size, that is, with predefined maximum size. These measures ensure that the artifact can be reliably carried as part of the URL query string and thereby transferred successfully from source to destination site.

The browser/artifact profile consists of a single interaction among three parties (a user equipped with a browser, a source site, and a destination site), with a nested sub-interaction between two parties (the source site and the destination site). The interaction sequence is shown in the following figure, with the

following sections elucidating each step.



Terminology from RFC 1738 [RFC1738] is used to describe components of a URL. An HTTP URL has the following form:

```
http://<HOST>:<port>/<path>?<searchpart>
```

The following sections specify certain portions of the `<searchpart>` component of the URL. Ellipses will be used to indicate additional but unspecified portions of the `<searchpart>` component.

HTTP requests and responses MUST be drawn from either HTTP 1.1 [RFC2279] UTF-8, a transformation format of ISO 10646, http://www.ietf.org/rfc/rfc2279.txt. or HTTP 1.0 [RFC1945]. Distinctions between the two are drawn only when necessary.

3.1.3 Step 1: Accessing the Inter-Site Transfer Service

In step 1, the user's browser accesses the inter-site transfer service at host https://<inter-site transfer host name>, with information about the desired target at the destination site attached to the URL.

No normative form is given for step 1. It is RECOMMENDED that the HTTP request take the following form:

```
GET <path>?…TARGET=<Target>…<HTTP-Version>
<other HTTP 1.0 or 1.1 components>
```

Where:

`<inter-site transfer host name>`

This provides the host name and optional port number at the source site where an inter-site transfer service is available.

`<path>`

This provides the path components of an inter-site transfer service URL at the source site.

`Target=<Target>`

This name-value pair occurs in the `<searchpart>` and is used to convey information about the desired target resource at the destination site.

Confidentiality and message integrity MUST be maintained in step 1.

3.1.4 Step 2: Redirecting to the Destination Site

In step 2, the source site's inter-site transfer service responds and redirects the user's browser to the assertion consumer service at the destination site.

> **Note:** In the browser/artifact profile, the URL used by the source site to access the assertion consumer service at the destination site is referred to as the *artifact receiver URL*.

The HTTP response MUST take the following form:

```
<HTTP-Version> 302 <Reason Phrase>
<other headers>
Location : https://<artifact receiver host name and path>?<SAML
searchpart>
<other HTTP 1.0 or 1.1 components>
```

Where:

<artifact receiver host name and path>

This provides the host name, port number, and path components of an artifact receiver URL associated with the assertion consumer service at the destination site.

<SAML searchpart>= …**TARGET=<Target>**…**SAMLart=<SAML artifact>** …

A single target description MUST be included in the `<SAML searchpart>` component. At least one SAML artifact MUST be included in the SAML `<SAML searchpart>` component; multiple SAML artifacts MAY be included. If more than one artifact is carried within `<SAML searchpart>`, all the artifacts MUST have the same `SourceID`.

According to HTTP 1.1 [RFC2279] UTF-8, a transformation format of ISO 10646, http://www.ietf.org/rfc/rfc2279.txt. and HTTP 1.0 [RFC1945], the use of status code 302 is recommended to indicate that "the requested resource resides temporarily under a different URI". The response may also include additional headers and an optional message body as described in those RFCs.

Confidentiality and message integrity MUST be maintained in step 2. It is RECOMMENDED that the inter-site transfer URL be protected by SSL 3.0 or TLS 1.0 (see Section 5). Otherwise, the one or more artifacts returned in step 2 will be available in plain text to an attacker who might then be able to impersonate the subject.

3.1.5 Step 3: Accessing the Artifact Receiver URL

In step 3, the user's browser accesses the artifact receiver service at host https://<artifact receiver host name>, with a SAML artifact representing the user's authentication information attached to the URL.

The HTTP request MUST take the form:

```
GET <path>?…<SAML searchpart>…<HTTP-Version>
<other HTTP 1.0 or 1.1 request components>
```

Where:

<artifact receiver host name>

This provides the host name and optional port number at the destination site where the artifact receiver service URL associated with the assertion consumer service is available.

<path>

This provides the path components of the artifact receiver service URL at the destination site.

<SAML searchpart>= …**TARGET=<Target>**…**SAMLart=<SAML**

artifact> …

A single target description MUST be included in the <SAML searchpart> component. At least one SAML artifact MUST be included in the <SAML searchpart> component; multiple SAML artifacts MAY be included. If more than one artifact is carried within <SAML searchpart>, all the artifacts MUST have the same SourceID.

Confidentiality and message integrity MUST be maintained in step 3. It is RECOMMENDED that the artifact receiver URL be protected by SSL 3.0 or TLS 1.0 (see Section 5). Otherwise, the artifacts transmitted in step 3 will be available in plain text to any attacker who might then be able to impersonate the assertion subject.

3.1.6 Steps 4 and 5: Acquiring the Corresponding Assertions

In steps 4 and 5, the destination site, in effect, dereferences the one or more SAML artifacts in its possession in order to acquire a SAML assertion that corresponds to each artifact.

These steps MUST utilize a SAML protocol binding for a SAML request-response message exchange between the destination and source sites. The destination site functions as a SAML requester and the source site functions as a SAML responder.

The destination site MUST send a <samlp:Request> message to the source site, requesting assertions by supplying assertion artifacts in the <samlp:AssertionArtifact> element.

If the source site is able to find or construct the requested assertions, it responds with a <samlp:Response> message with the requested assertions. Otherwise, it responds with a <samlp:Response> message with no assertions. The <samlp:Status> element of the <samlp:Response> MUST include a <samlp:StatusCode> element with the value Success.

In the case where the source site returns assertions within <samlp:Response>, it MUST return exactly one assertion for each SAML artifact found in the corresponding <samlp:Request> element. The case where fewer or greater number of assertions is returned within the <samlp:Response> element MUST be treated as an error state by the destination site.

The source site MUST implement a “one-time request” property for each SAML artifact. Many simple implementations meet this constraint by an action such as deleting the relevant assertion from persistent storage at the source site after one lookup. If a SAML artifact is presented to the source site again, the source site MUST return the same message as it would if it were queried with an unknown artifact.

The selected SAML protocol binding MUST provide confidentiality, message integrity, and bilateral authentication. The source site MUST implement the SAML SOAP binding with support for confidentiality, message integrity, and bilateral authentication.

The source site MUST return a response with no assertions if it receives a <samlp:Request> message from an authenticated destination site *X* containing an artifact issued by the source site to some other destination site *Y*, where *X* <>*Y*. One way to implement this feature is to have source sites maintain a list of artifact and destination site pairs. The <samlp:Status> element of the <samlp:Response> MUST include a <samlp:StatusCode> element with the value Success.

At least one of the SAML assertions returned to the destination site MUST be an *SSO assertion*.

Authentication statements MAY be distributed across more than one returned assertion.

Every subject-based statement in the assertion(s) returned to the destination site MUST contain a <saml:SubjectConfirmation> element as follows:

- The <saml:ConfirmationMethod> element MUST be set to urn:oasis:names:tc:SAML:1.0:cm:artifact.
- The <SubjectConfirmationData> element SHOULD NOT be specified.

Based on the information obtained in the assertions retrieved by the destination site, the destination site MAY engage in additional SAML message exchanges with the source site.

3.1.7 Step 6: Responding to the User's Request for a Resource

In step 6, the user's browser is sent an HTTP response that either allows or denies access to the desired resource.

No normative form is mandated for the HTTP response. The destination site SHOULD provide some form of helpful error message in the case where access to resources at that site is disallowed.

3.1.8 Artifact Format

The artifact format includes a mandatory two-byte artifact type code, as follows:

```
SAML_artifact     := B64(TypeCode RemainingArtifact)
TypeCode          := Byte1Byte2
```

Note: Depending on the level of security desired and associated profile protocol steps, many viable architectures could be developed for the SAML artifact [CoreAssnEx] [ShibMarlena]. The type code structure accommodates variability in the architecture.

The notation `B64(TypeCode RemainingArtifact)` stands for the application of the base64 [RFC2045] transformation to the catenation of the `TypeCode` and `RemainingArtifact`. This profile defines an artifact type of type code 0x0001, which is REQUIRED (mandatory to implement) for any implementation of the browser/artifact profile. This artifact type is defined as follows:

```
TypeCode          := 0x0001
RemainingArtifact := SourceID AssertionHandle
SourceID          := 20-byte_sequence
AssertionHandle   := 20-byte_sequence
```

`SourceID` is a 20-byte sequence used by the destination site to determine source site identity and location. It is assumed that the destination site will maintain a table of `SourceID` values as well as the URL (or address) for the corresponding SAML responder. This information is communicated between the source and destination sites out-of-band. On receiving the SAML artifact, the destination site determines if the `SourceID` belongs to a known source site and obtains the site location before sending a SAML request (as described in Section 3.1.6).

Any two source sites with a common destination site MUST use distinct `SourceID` values. Construction of `AssertionHandle` values is governed by the principle that they SHOULD have no predictable relationship to the contents of the referenced assertion at the source site and it MUST be infeasible to construct or guess the value of a valid, outstanding assertion handle.

The following practices are RECOMMENDED for the creation of SAML artifacts at source sites:

- Each source site selects a single identification URL. The domain name used within this URL is registered with an appropriate authority and administered by the source site.
- The source site constructs the `SourceID` component of the artifact by taking the SHA-1 hash of the identification URL.
- The `AssertionHandle` value is constructed from a cryptographically strong random or pseudorandom number sequence [RFC1750] generated by the source site. The sequence consists of values of at least eight bytes in size. These values should be padded to a total length of 20 bytes.

3.1.9 Threat Model and Countermeasures

This section utilizes materials from [ShibMarlena] and [Rescorla-Sec].

3.1.9.1 Stolen Artifact

Threat: If an eavesdropper can copy the real user's SAML artifact, then the eavesdropper could construct a URL with the real user's SAML artifact and be able to impersonate the user at the destination site.

Countermeasure: As indicated in steps 2, 3, 4, and 5, confidentiality MUST be provided whenever an artifact is communicated between a site and the user's browser. This provides protection against an eavesdropper gaining access to a real user's SAML artifact.

If an eavesdropper defeats the measures used to ensure confidentiality, additional countermeasures are available:

- The source and destination sites SHOULD make some reasonable effort to ensure that clock settings at both sites differ by at most a few minutes. Many forms of time synchronization service are available, both over the Internet and from proprietary sources.
- SAML assertions communicated in step 5 MUST include an SSO assertion.
- The source site SHOULD track the time difference between when a SAML artifact is generated and placed on a URL line and when a `<samlp:Request>` message carrying the artifact is received from the destination. A maximum time limit of a few minutes is recommended. Should an assertion be requested by a destination site query beyond this time limit, the source site MUST not provide the assertions to the destination site.
- It is possible for the source site to create SSO assertions either when the corresponding SAML artifact is created or when a `<samlp:Request>` message carrying the artifact is received from the destination. The validity period of the assertion SHOULD be set appropriately in each case: longer for the former, shorter for the latter.
- Values for `NotBefore` and `NotOnOrAfter` attributes of SSO assertions SHOULD have the shortest possible validity period consistent with successful communication of the assertion from source to destination site. This is typically on the order of a few minutes. This ensures that a stolen artifact can only be used successfully within a small time window.
- The destination site MUST check the validity period of all assertions obtained from the source site and reject expired assertions. A destination site MAY choose to implement a stricter test of validity for SSO assertions, such as requiring the assertion's `IssueInstant` or `AuthenticationInstant` attribute value to be within a few minutes of the time at which the assertion is received at the destination site.
- If a received authentication statement includes a `<saml:SubjectLocality>` element with the IP address of the user, the destination site MAY check the browser IP address against the IP address contained in the authentication statement.

3.1.9.2 Attacks on the SAML Protocol Message Exchange

Threat: The message exchange in steps 4 and 5 could be attacked in a variety of ways, including artifact or assertion theft, replay, message insertion or modification, and MITM (man-in-the-middle attack).

Countermeasure: The requirement for the use of a SAML protocol binding with the properties of bilateral authentication, message integrity, and confidentiality defends against these attacks.

3.1.9.3 Malicious Destination Site

Threat: Since the destination site obtains artifacts from the user, a malicious site could impersonate the user at some new destination site. The new destination site would obtain assertions from the source site and believe the malicious site to be the user.

Countermeasure: The new destination site will need to authenticate itself to the source site so as to obtain the SAML assertions corresponding to the SAML artifacts. There are two cases to consider:

1. If the new destination site has no relationship with the source site, it will be unable to authenticate and this step will fail.
2. If the new destination site has an existing relationship with the source site, the source site will determine that assertions are being requested by a site other than that to which the artifacts were originally sent. In such a case, the source site MUST not provide the assertions to the new destination site.

3.1.9.4 Forged SAML Artifact

Threat: A malicious user could forge a SAML artifact.

Countermeasure: Section 3.1.8 provides specific recommendations regarding the construction of a SAML artifact such that it is infeasible to guess or construct the value of a current, valid, and outstanding assertion handle. A malicious user could attempt to repeatedly “guess” a valid SAML artifact value (one that corresponds to an existing assertion at a source site), but given the size of the value space, this action would likely require a very large number of failed attempts. A source site SHOULD implement measures to ensure that repeated attempts at querying against non-existent artifacts result in an alarm.

3.1.9.5 Browser State Exposure

Threat: The SAML browser/artifact profile involves “downloading” of SAML artifacts to the web browser from a source site. This information is available as part of the web browser state and is usually stored in persistent storage on the user system in a completely unsecured fashion. The threat here is that the artifact may be “reused” at some later point in time.

Countermeasure: The “one-use” property of SAML artifacts ensures that they cannot be reused from a browser. Due to the recommended short lifetimes of artifacts and mandatory SSO assertions, it is difficult to steal an artifact and reuse it from some other browser at a later time.

3.2 Browser/POST Profile of SAML

3.2.1 Required Information

Identification: urn:oasis:names:tc:SAML:1.0:profiles:browser-post

Contact information: security-services-comment@lists.oasis-open.org

SAML Confirmation Method Identifiers: The "Bearer" confirmation method identifier is used by this profile. The following identifier has been assigned to this confirmation method:

urn:oasis:names:tc:SAML:1.0:cm:bearer

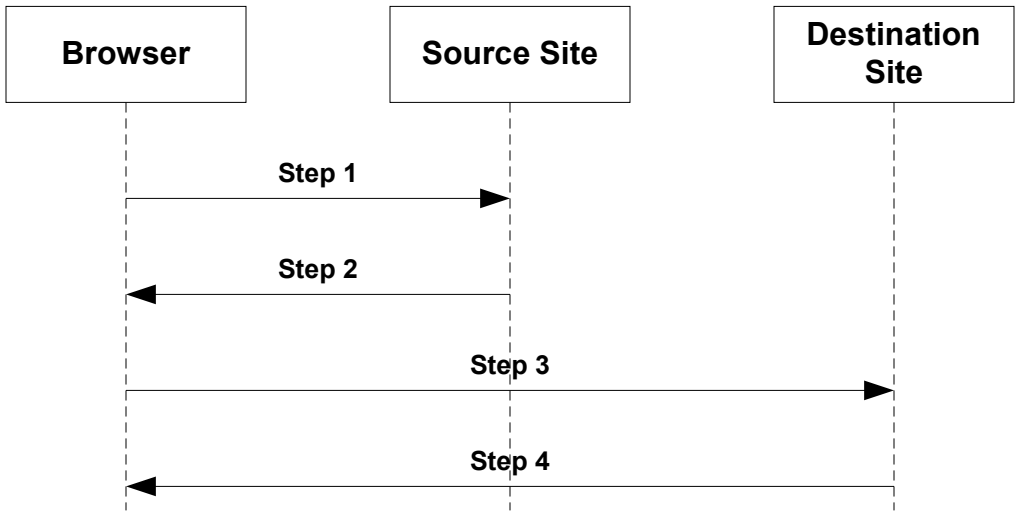
Description: Given below.

Updates: None.

3.2.2 Preliminaries

The browser/POST profile of SAML allows authentication information to be supplied to a destination site without the use of an artifact. The following figure diagrams the interactions between parties in the browser/POST profile.

The browser/POST profile consists of a series of two interactions, the first between a user equipped with a browser and a source site, and the second directly between the user and the destination site. The interaction sequence is shown in the following figure, with the following sections elucidating each step.



3.2.3 Step 1: Accessing the Inter-Site Transfer Service

In step 1, the user's browser accesses the inter-site transfer service at host https://<inter-site transfer host name>, with information about the desired target at the destination site attached to the URL.

No normative form is given for step 1. It is RECOMMENDED that the HTTP request take the following form:

```
GET <path>?…TARGET=<Target>…<HTTP-Version>
<other HTTP 1.0 or 1.1 components>
```

Where:

<inter-site transfer host name>

This provides the host name and optional port number at the source site where an inter-site transfer service is available.

<path>

This provides the path components of an inter-site transfer service URL at the source site.

Target=<Target>

This name-value pair occurs in the `<searchpart>` and is used to convey information about the desired target resource at the destination site.

3.2.4 Step 2: Generating and Supplying the Response

In step 2, the source site generates HTML form data containing a SAML response message which contains an SSO assertion.

Note: In the browser/POST profile, the URL used to access the assertion consumer service at the destination site is referred to as the assertion consumer URL.

The HTTP response MUST take the form:

```
<HTTP-Version> 200 <Reason Phrase>
<other HTTP 1.0 or 1.1 components>
```

Where:

<other HTTP 1.0 or 1.1 components>

This MUST include an HTML FORM (see Chapter 17, [HTML401]) with the following FORM body:

```
<Body>
```

```
<FORM Method="Post" Action="https://<assertion consumer host name and
path>" …>
<INPUT TYPE="hidden" NAME="SAMLResponse" Value="B64(<response>)">
…
<INPUT TYPE="hidden" NAME="TARGET" Value="<Target>">
</Body>
```

<assertion consumer host name and path>

This provides the host name, port number, and path components of an assertion consumer URL at the destination site.

Exactly one SAML response MUST be included within the FORM body with the control name `SAMLResponse`; multiple SAML assertions MAY be included in the response. At least one of the assertions MUST be an SSO assertion. A single target description MUST be included with the control name `TARGET`.

The notation `B64(<response>)` stands for the result of applying the Base64 Content-Transfer-Encoding to the response, as defined by [RFC2045] §6.8, and SHOULD consist of lines of encoded data of up to 76 characters. The first encoded line begins after the opening quote signifying the "value" attribute of the SAMLResponse form element.

The character set used to represent the encoded data is determined by the "charset" attribute of the Content-Type of the HTML document containing the form. The character set of the XML document resulting from decoding the data is determined in the normal fashion, and defaults to UTF-8 if no character set is indicated.

The SAML response MUST be digitally signed following the guidelines given in [SAMLCore]. Assertions included in the SAML response MAY be digitally signed.

Confidentiality and message integrity MUST be maintained for step 2. It is RECOMMENDED that the inter-site transfer URL be protected by SSL 3.0 or TLS 1.0 (see Section 5). Otherwise, the assertions returned will be available in plain text to any attacker who might then be able to impersonate the assertion subject.

3.2.5 Step 3: Posting the Form Containing the Response

In step 3, the browser submits the form containing the SAML response using the following HTTP request to the assertion consumer service at host https://<assertion consumer host name>.

Note: Posting the form can be triggered by various means. For example, a "submit" button could be included in Step 2 by including the following line:

```
<INPUT TYPE="Submit" NAME="button" Value="Submit">
```

This requires the user to explicitly "submit" the form for the POST request to be sent. Alternatively, JavaScript™ can be used to avoid an additional "submit" step from the user as follows [Anders]:

```
<HTML>
<BODY Onload="document.forms[0].submit()">
      <FORM METHOD="POST" ACTION=" https://<assertion consumer host name
and path>">
      …
      <INPUT TYPE="HIDDEN" NAME="SAMLResponse"
        VALUE="base64 encoded SAML Protocol Response">
      <INPUT TYPE="hidden" NAME="TARGET" Value="<Target>">
     </FORM>
</BODY>
</HTML>
```

The HTTP request MUST include the following components:

```
POST <path> <HTTP-Version>
<other HTTP 1.0 or 1.1 request components>
```

Where:

<assertion consumer host name>

This provides the host name and optional port number at the destination site where the assertion consumer service URL is available.

<path>

This provides the path components of the assertion consumer service URL at the destination site.

<other HTTP 1.0 or 1.1 request components>

This consists of the form data set derived by the browser processing of the form data received in step 2 according to § 17.13.3 of [HTML401]. Exactly one SAML response MUST be included within the form data set with control name `SAMLResponse`; multiple SAML assertions MAY be included in the response. A single target description MUST be included with the control name set to `TARGET`.

The SAML response MUST include the `Recipient` attribute [SAMLCore] with its value set to https://`<assertion consumer host name and path>`. At least one of the SAML assertions included within the response MUST be an SSO assertion.

The destination site MUST ensure a "single use" policy for SSO assertions communicated by means of this profile.

Note: The implication here is that the destination site will need to save state. A simple implementation might maintain a table of pairs, where each pair consists of the assertion ID and the time at which the entry is to be deleted (where this time is based on the SSO assertion lifetime.). The destination site needs to ensure that there are no duplicate entries. Since SSO assertions containing authentication statements are recommended to have short lifetimes in the web browser context, such a table would be of bounded size.

Confidentiality and message integrity MUST be maintained for the HTTP request in step 3. It is RECOMMENDED that the assertion consumer URL be protected by SSL 3.0 or TLS 1.0 (see Section 5). Otherwise, the assertions transmitted in step 3 will be available in plain text to any attacker who might then impersonate the assertion subject.

Every subject-based statement in the assertion(s) returned to the destination site MUST contain a `<saml:SubjectConfirmation>` element. The <ConfirmationMethod> element in the <SubjectConfirmation> MUST be set to urn:oasis:names:tc:SAML:1.0:cm:bearer.

3.2.6 Step 4: Responding to the User's Request for a Resource

In step 4, the user's browser is sent an HTTP response that either allows or denies access to the desired resource. The TARGET form element may be used to decide how to respond to the request and what resource to return, possibly via a redirect or some other means,

No normative form is mandated for the HTTP response. The destination site SHOULD provide some form of helpful error message in the case where access to resources at that site is disallowed.

3.2.7 Threat Model and Countermeasures

This section utilizes materials from [ShibMarlena] and [Rescorla-Sec].

3.2.7.1 Stolen Assertion

Threat: If an eavesdropper can copy the real user's SAML response and included assertions, then the eavesdropper could construct an appropriate POST body and be able to impersonate the user at the destination site.

Countermeasure: As indicated in steps 2 and 3, confidentiality MUST be provided whenever a response is communicated between a site and the user's browser. This provides protection against an eavesdropper obtaining a real user's SAML response and assertions.

If an eavesdropper defeats the measures used to ensure confidentiality, additional countermeasures are available:

- The source and destination sites SHOULD make some reasonable effort to ensure that clock settings at both sites differ by at most a few minutes. Many forms of time synchronization service are available, both over the Internet and from proprietary sources.
- SAML assertions communicated in step 3 MUST include an SSO assertion.
- Values for `NotBefore` and `NotOnOrAfter` attributes of SSO assertions SHOULD have the shortest possible validity period consistent with successful communication of the assertion from source to destination site. This is typically on the order of a few minutes. This ensures that a stolen assertion can only be used successfully within a small time window.
- The destination site MUST check the validity period of all assertions obtained from the source site and reject expired assertions. A destination site MAY choose to implement a stricter test of validity for SSO assertions, such as requiring the assertion's `IssueInstant` or `AuthenticationInstant` attribute value to be within a few minutes of the time at which the assertion is received at the destination site.
- If a received authentication statement includes a `<saml:SubjectLocality>` element with the IP address of the user, the destination site MAY check the browser IP address against the IP address contained in the authentication statement.

3.2.7.2 MITM Attack

Threat: Since the destination site obtains bearer SAML assertions from the user by means of an HTML form, a malicious site could impersonate the user at some new destination site. The new destination site would believe the malicious site to be the subject of the assertion.

Countermeasure: The destination site MUST check the Recipient attribute of the SAML response to ensure that its value matches the https://`<assertion consumer host name and path>`. As the response is digitally signed, the `Recipient` value cannot be altered by the malicious site.

3.2.7.3 Forged Assertion

Threat: A malicious user, or the browser user, could forge or alter a SAML assertion.

Countermeasure: The browser/POST profile requires the SAML response carrying SAML assertions to be signed, thus providing both message integrity and authentication. The destination site MUST verify the signature and authenticate the issuer.

3.2.7.4 Browser State Exposure

Threat: The browser/POST profile involves uploading of assertions from the web browser to a source site. This information is available as part of the web browser state and is usually stored in persistent storage on the user system in a completely unsecured fashion. The threat here is that the assertion may be "reused" at some later point in time.

Countermeasure: Assertions communicated using this profile must always include an SSO assertion. SSO assertions are expected to have short lifetimes and destination sites are expected to ensure that SSO assertions are not re-submitted.

3.3 Enhanced Client and Proxy (ECP) Profile

3.3.1 Required Information

Identification: urn:oasis:names:tc:SAML:2.0:profiles:ecp

Contact information: security-services-comment@lists.oasis-open.org

SAML Confirmation Method Identifiers: none

Description: Given below.

Updates: None.

3.3.2 Preliminaries

The Enhanced Client and Proxy (ECP) profile specifies interactions between enhanced clients and/or proxies, service providers, and identity providers. An enhanced client or proxy (ECP) is a client or proxy that:

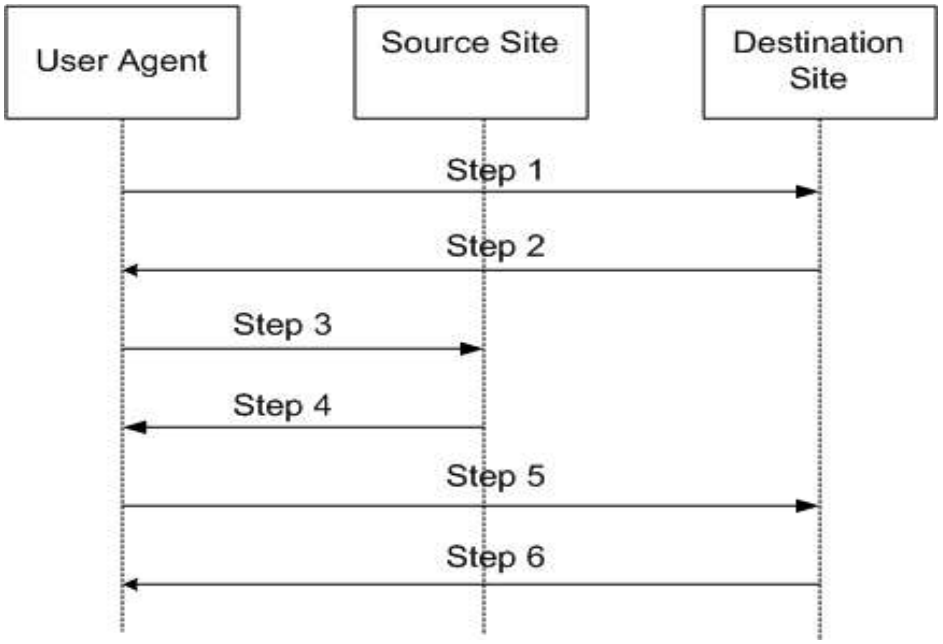
1. Has, or knows how to obtain, knowledge about the identity provider that the Principal associated with the client wishes to use with the service provider.
    - This allows a Service Provider to make an authentication request to such a client without the need to know or discover the appropriate identity provider.
2. Is able to use a reverse SOAP binding (PAOS) as profiled here for an authentication request and response
    - This enables a service provider to obtain an authentication assertion from a client that is not necessarily directly addressable and not necessarily continuously available.
    - It leverages the benefits of SOAP while using a well-defined exchange pattern and profile to enable interoperability.
    - The enhanced client may be viewed as a SOAP intermediary between the service provider and the identity provider.

In this profile, the user agent authenticates or has already authenticated to the source site, so this authentication act is out of scope of the profile. The source site is also known as an identity provider, or IDP, to use Liberty terminology. The destination site is a service provider (SP) that offers a service or provides data.

The Enhanced Client may be a browser or some other user agent that supports the functionality described in this profile. An enhanced proxy is an HTTP proxy (typically a WAP gateway) that emulates an enhanced client. Unless stated otherwise, all statements referring to enhanced clients are to be understood as statements about both enhanced clients as well as enhanced client proxies.

Since the enhanced client sends and receives messages in the body of HTTP requests and responses it has no arbitrary restrictions on the size of the protocol messages.

This profile leverages the PAOS specification that has been developed in an open standards organization [PAOS]. This profile does not define PAOS, and the PAOS specification is normative in case of question. PAOS defines a SOAP header block conveyed between the destination site and the ECP, this header block is profiled in this specification. The PAOS HTTP indications defined in the SAML 2.0 Bindings document are required for compliance to this profile [SAMLBindings].



3.3.3 Step 1: Accessing the Destination Service Provider: ECP>SP

In step 1, the ECP accesses the service provider with an HTTP GET request. This HTTP request SHOULD include the following HTTP header fields, as outlined in the PAOS specification:

1. The HTTP Accept Header field SHOULD indicate ability to accept “application/vnd.paos+xml”
2. The HTTP PAOS Header field SHOULD be present and specify the PAOS version with urn:liberty:paos:2003-08 at a minimum.
3. The authentication service must be specified in the HTTP PAOS Header field as a service value, with the value “urn:saml2:idp:authentication”. This value should correspond to the service attribute in the PAOS Request SOAP header block

To give an example, a user-agent may request a page from the SP as follows:

```
GET /index HTTP/1.1
Host: horoscope.example.com
Accept: text/html; application/vnd.paos+xml
PAOS: ver=”urn:liberty:paos:2003-08’ ; “urn:saml2:idp:authentication””
```

3.3.4 Step 2: Authentication Request SOAP Message: SP>ECP>IDP

When the destination service provider requires authentication before providing a service or providing data it may respond to the service request with an authentication request in the HTTP response. The SP will issue an HTTP 200 OK response to the EC containing a single SOAP envelope.

The SOAP envelope will contain:

1. A SAML 2.0 AuthnRequest in the SOAP body, thus targeted at the ultimate SOAP receiver, the identity provider.
2. A PAOS SOAP header block targeted at “next”, the EP. This header block provides control information such as the URL to send the response to in this solicit-response message exchange pattern

The EC will determine which identity provider is appropriate and route the SOAP message appropriately.

The EC MUST remove the PAOS header block before passing the SOAP request on to the IDP.

Other SOAP headers may be used as appropriate, such as a SOAP Message Security header block to allow encryption of the authentication request. Note that the AuthnRequest element may be itself signed.

3.3.4.1 PAOS Request Header Block: SP>ECP

The PAOS header block signals the use of PAOS processing and includes the following attributes:

Attribute	*Meaning*	*Usage*
responseConsumerURL	Conveys the AssertionConsumerURL value. This specifies where the ECP is to send the AuthnResponse.	Required in the request from SP to ECP. This value is used as the URL to post either a SOAP Fault or the authentication response.
service	This indicates that the ECP authentication service is used as outlined in this profile. The value is defined in this profile as: "urn:saml2:idp:authentication"	Required.
[messageID]	Allow optional response correlation.	This is NOT required when using this profile since this functionality is provided by authentication application layer, via the RequestID attribute in the AuthnRequest and the InResponseTo attribute in the AuthnResponse.
mustUnderstand	A Fault must be returned if the PAOS header block is not understood.	Required, value 1
actor/role	Targeted SOAP node	next

The PAOS SOAP request header block has no element content.

3.3.4.2 SP>ECP Request Example

The following is an example of the SOAP authentication request from the SP to the ECP:

```
<?xml version='1.0' encoding='UTF-8'?>
<soap:Envelope
xmlns:paos='urn:liberty:paos:2003-08'
xmlns:saml2='plugh'
xmlns:soap='http://schemas.xmlsoap.org/soap/envelope/'>
  <soap:Header>
    <paos:Request responseConsumerURL='http://horiscope.example.com/abc'
messageID='6c3a4f8b9c2d' role='next' mustUnderstand='1'
service='urn:saml2:idp:authentication'/>
  </soap:Header>
  <soap:Body>
    <saml2:AuthnRequest> ...
</saml2:AuthnRequest>
  </soap:Body>
</soap:Envelope>
```

3.3.4.3 ECP>IDP Request Example

As noted above, the PAOS header is removed from the SOAP message by the ECP before the authentication request is forwarded to the IDP. An example authentication request from the ECP to the IDP is as follows:

```
<?xml version='1.0' encoding='UTF-8'?>
<soap:Envelope xmlns:soap='http://schemas.xmlsoap.org/soap/envelope/'
xlms:saml2='plugh'
  <soap:Header>...</soap:Header>
  <soap:Body>
    <saml2:AuthnRequest> ... </saml2:AuthnRequest>
  </soap:Body>
</soap:Envelope>
```

3.3.5 Authentication Response SOAP Message: IDP>ECP>SP

The IDP may return an authentication response (or fault) when presented with an authentication request. An authentication response is conveyed in a SOAP message with an AuthnResponse in the SOAP body, targeted at the SP as the ultimate SOAP receiver.

The ECP MAY add a SOAP PAOSResponse header block before forwarding the SOAP response to the SP using an HTTP POST.

The PAOSResponse SOAP header block in the response is generally used to correlate this response to an earlier request from the SP. In this profile the correlation refToMessageID attribute is not required since the AuthnResponse element InResponseTo attribute may be used for this purpose, but if the PAOSRequest SOAP Header block had a messageID then the PAOSResponse block SHOULD be used.

3.3.5.1 IDP>ECP Response Example

```
<?xml version='1.0' encoding='UTF-8'?>
<soap:Envelope xmlns:lecp='urn:liberty:lecp:2003-08'
xmlns:saml2='plugh'
xmlns:soap='http://schemas.xmlsoap.org/soap/envelope/'>
  <soap:Header>
  </soap:Header>
  <soap:Body>
    <lib:AuthnResponse> ...
</lib:AuthnResponse>
  </soap:Body>
</soap:Envelope>
```

3.3.5.2 PAOS Response Header Block : ECP>SP

The PAOS SOAP Response header has the following attributes:

Attribute	*Usage*
refToMessageID	Allow correlation with the PAOS request. This optional attribute is not required by this profile since the equivalent functionality is provided with the AuthnRequest and AuthnResponse correlation.
mustUnderstand	1
actor/role	next

The PAOS response SOAP header has no element content.

3.3.5.3 ECP>SP Response Example

```
<?xml version='1.0' encoding='UTF-8'?>
<soap:Envelope xmlns:paos='urn:liberty:paos:2003-08'
xmlns:lib='http://projectliberty.org/schemas/core/2002/12'
xmlns:soap='http://schemas.xmlsoap.org/soap/envelope/'>
  <soap:Header>
    <paos:Response refToMessageID='6c3a4f8b9c2d' role='next'
mustUnderstand='1'/>
  </soap:Header>
  <soap:Body>
    <lib:AuthnResponse> ...
</lib:AuthnResponse>
  </soap:Body>
</soap:Envelope>
```

3.3.6 HTTP service response: SP>ECP

Once the SP has received an authentication response in an HTTP request it may respond with the service data in the HTTP response.

3.3.7 Security Considerations

1. The AuthnRequest and AuthnResponse elements should be signed.
2. The PAOS header should be integrity protected, such as with SOAP Message Security or through the use of SSL/TLS over every link.
3. The SP should be authenticated to the ECP, for example with server-side TLS authentication.
4. The ECP should be authenticated to the IDP, such as by maintaining an authenticated session.

4 Confirmation Method Identifiers

The SAML assertion and protocol specification [SAMLCore] defines <ConfirmationMethod> as part of the <SubjectConfirmation> element. The <SubjectConfirmation> element SHOULD be used by the relying party to confirm that the request or message came from the System Entity that corresponds to the subject in the statement. The <ConfirmationMethod> element indicates the specific method that the relying party should use to make this judgment. This may or may not have any relationship to an authentication that was performed previously. Unlike the authentication method, the subject confirmation method will often be accompanied by some piece of information, such as a certificate or key, in the <SubjectConfirmationData> and/or <ds:KeyInfo> elements that will allow the relying party to perform the necessary check.

It is anticipated that profiles and bindings will define and use several different values for <ConfirmationMethod>, each corresponding to a different SAML usage scenario. Some examples are as follows:

- A website employs the browser/artifact profile of SAML to sign in a user. The <ConfirmationMethod> element in the resulting assertion is set to urn:oasis:names:tc:SAML:1.0:cm:artifact.
- There is no login, but an application request sent to a relying party includes SAML assertions and is digitally signed. The associated public key from the <ds:KeyInfo> element is used for confirmation.

4.1 Holder of Key

URI: urn:oasis:names:tc:SAML:1.0:cm:holder-of-key

A <ds:KeyInfo> element MUST be present within the <SubjectConfirmation> element.

As described in [XMLSig], the <ds:KeyInfo> element holds a key or information that enables an application to obtain a key. The subject of the statement(s) in the assertion is the party that can demonstrate that it is the holder of the key.

4.2 Sender Vouches

URI: urn:oasis:names:tc:SAML:1.0:cm:sender-vouches

Indicates that no other information is available about the context of use of the assertion. The relying party SHOULD utilize other means to determine if it should process the assertion further.

4.3 SAML Artifact

URI: urn:oasis:names:tc:SAML:1.0:cm:artifact

The subject of the assertion is the party that presented a SAML artifact, which the relying party used to obtain the assertion from the party that created the artifact. See also Section 3.1.1.

4.4 Bearer

URI: urn:oasis:names:tc:SAML:1.0:cm:bearer

The subject of the assertion is the bearer of the assertion. See also Section 3.2.1.

5 Use of SSL 3.0 or TLS 1.0

In any SAML 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 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].

5.2 Web Browser Profiles of SAML

SSL-capable implementations of the browser/artifact profile or browser/POST 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.

6 Alternative SAML Artifact Format

6.1 Required Information

Identification: urn:oasis:names:tc:SAML:1.0:profiles:artifact-02

Contact information: security-services-comment@lists.oasis-open.org

Description: Given below.

Updates: None.

6.2 Format Details

An alternative artifact format is described here:

```
TypeCode          := 0x0002
RemainingArtifact := AssertionHandle SourceLocation
AssertionHandle   := 20-byte_sequence
SourceLocation    := URI
```

The `SourceLocation` URI is the address of the SAML responder associated with the source site. The `assertionHandle` is as described in Section 3.1.8, and governed by the same requirements. The `SourceLocation` URI is mapped to a sequence of bytes based on use of the UTF-8 [RFC2279] encoding. The destination site MUST process the artifact in a manner identical to that described in Section 3.1, with the exception that the location of the SAML responder at the source site MAY be obtained directly from the artifact, rather than by look-up, based on `sourceID`.

> **Note**: the destination site MUST confirm that assertions were issued by an acceptable issuer, not relying merely on the fact that they were returned in response to a `<samlp:Request>` message.

7 References

[AES] FIPS-197, Advanced Encryption Standard (AES), available from http://www.nist.gov/.

[Anders] A suggestion on how to implement SAML browser bindings without using "Artifacts", http://www.x-obi.com/OBI400/andersr-browser-artifact.ppt.

[CoreAssnEx] Core Assertions Architecture, Examples and Explanations, http://www.oasis-open.org/committees/security/docs/draft-sstc-core-phill-07.pdf.

[HTML401] HTML 4.01 Specification, W3C Recommendation 24 December 1999, http://www.w3.org/TR/html4.

[Liberty] The Liberty Alliance Project, http://www.projectliberty.org.

[MSURL] Microsoft technical support article, http://support.microsoft.com/support/kb/articles/Q208/4/27.ASP.

[PAOS] Aarts, R., "Liberty Reverse HTTP Binding for SOAP Specification", Version: 1.0, https://www.projectliberty.org/specs/liberty-paos-v1.0.pdf

[Rescorla-Sec] E. Rescorla et al., *Guidelines for Writing RFC Text on Security Considerations*, http://www.ietf.org/internet-drafts/draft-iab-sec-cons-03.txt.

[RFC1738] Uniform Resource Locators (URL), http://www.ietf.org/rfc/rfc1738.txt

[RFC1750] Randomness Recommendations for Security. http://www.ietf.org/rfc/rfc1750.txt

[RFC1945] Hypertext Transfer Protocol -- HTTP/1.0, http://www.ietf.org/rfc/rfc1945.txt.

[RFC2045] Multipurpose Internet Mail Extensions (MIME) Part One: Format of Internet Message Bodies, http://www.ietf.org/rfc/rfc2045.txt

[RFC2119] S. Bradner, *Key words for use in RFCs to Indicate Requirement Levels*, IETF RFC 2119, March 1997, http://www.ietf.org/rfc/rfc2119.txt.

[RFC2246] The TLS Protocol Version 1.0, http://www.ietf.org/rfc/rfc2246.txt.

[RFC2279] UTF-8, a transformation format of ISO 10646, http://www.ietf.org/rfc/rfc2279.txt.

[RFC2616] Hypertext Transfer Protocol -- HTTP/1.1, http://www.ietf.org/rfc/rfc2616.txt.

[RFC2617] *HTTP Authentication: Basic and Digest Access Authentication*, IETF RFC 2617, http://www.ietf.org/rfc/rfc2617.txt.

[**SAMLBindings]** Bindings for the OASIS Security Assertion Markup Language (SAML) V2.0, DRAFT

[SAMLCore] E. Maler et al. *Assertions and Protocol for the OASIS Security Assertion Markup Language (SAML)*. OASIS, September 2003. Document ID oasis-sstc-saml-core-1.1. http://www.oasis-open.org/committees/security/.

[SAMLGloss] E. Maler et al. *Glossary for the OASIS Security Assertion Markup Language (SAML)*. OASIS, September 2003. Document ID oasis-sstc-saml-glossary-1.1. http://www.oasis-open.org/committees/security/.

[SAMLSec] E. Maler et al. Security Considerations for the OASIS *Security Assertion Markup Language (SAML)*, OASIS, September 2003, Document ID oasis-sstc-saml-sec-consider-1.1. http://www.oasis-open.org/committees/security/.

[SAMLReqs] Darren Platt et al., SAML Requirements and Use Cases, OASIS, April 2002, http://www.oasis-open.org/committees/security/.

[SAMLWeb] OASIS Security Services Technical Committee website, http://www.oasis-open.org/committees/security.

[SESSION] RL "Bob" Morgan, Support of target web server sessions in Shibboleth, http://middleware.internet2.edu/shibboleth/docs/draft-morgan-shibboleth-session-00.txt

[ShibMarlena] Marlena Erdos, Shibboleth Architecture DRAFT v1.1, http://shibboleth.internet2.edu/draft-internet2-shibboleth-arch-v05.html .

[SOAP1.1] D. Box et al., *Simple Object Access Protocol (SOAP) 1.1*, World Wide Web Consortium Note, May 2000, http://www.w3.org/TR/SOAP.

[SSL3] A. Frier et al., *The SSL 3.0 Protocol*, Netscape Communications Corp, November 1996.

[SSTC-Liberty1.1]"Liberty v1.1 specification set submittal letter", 11 Apr 2003, http://lists.oasis-open.org/archives/security-services/200304/msg00072.html

[SSTC-Liberty1.2] "Liberty ID-FF 1.2 Contribution to SSTC", 13 Nov 2003, http://www.oasis-open.org/archives/security-services/200311/msg00060.html

[WEBSSO] RL "Bob" Morgan, Interactions between Shibboleth and local-site web sign-on services, http://middleware.internet2.edu/shibboleth/docs/draft-morgan-shibboleth-websso-00.txt

[WSDL1_1] "Web Services Description Language (WSDL) 1.1", W3C Note 15 March 2001, http://www.w3.org/TR/2001/NOTE-wsdl-20010315

[WSS-SAML] P. Hallam-Baker et al., Web Services Security: SAML Token Profile, OASIS, March 2003, http://www.oasis-open.org/committees/wss.

[**XMLSig]** D. Eastlake et al., XML-Signature Syntax and Processing, World Wide Web Consortium, http://www.w3.org/TR/xmldsig-core/.

A. Acknowledgments

The editors would like to acknowledge the contributions of the OASIS Security Services Technical Committee, whose voting members at the time of publication were:

- TBD

B. Revision History

Rev	Date	By Whom	What
00	02/16/04	Frederick Hirsch	Split new profiles document from bindings and profiles, removed bindings section. Added ECP profile, added and formatted references.
2	03/02/04	Frederick Hirsch	Removed URL Size restriction section – this is located in the bindings document. Minor cleanup in section 2.1

C. Notices

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