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# A SASL and GSS-API Mechanism for SAML

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### Abstract

Security Assertion Markup Language (SAML) has found its usage on the Internet for Web Single Sign-On. Simple Authentication and Security Layer (SASL) and the Generic Security Service Application Program Interface (GSS-API) are application frameworks to generalize authentication. This memo specifies a SASL mechanism and a GSS-API mechanism for SAML 2.0 that allows the integration of existing SAML Identity Providers with applications using SASL and GSS-API.

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## 1. Introduction

Security Assertion Markup Language (SAML) 2.0 [[OASIS.saml-core-2.0-os](#)] is a modular specification that provides various means for a user to be identified to a relying party (RP) through the exchange of (typically signed) assertions issued by an identity provider (IdP). It includes a number of protocols, protocol bindings [[OASIS.saml-bindings-2.0-os](#)], and interoperability profiles [[OASIS.saml-profiles-2.0-os](#)] designed for different use cases.

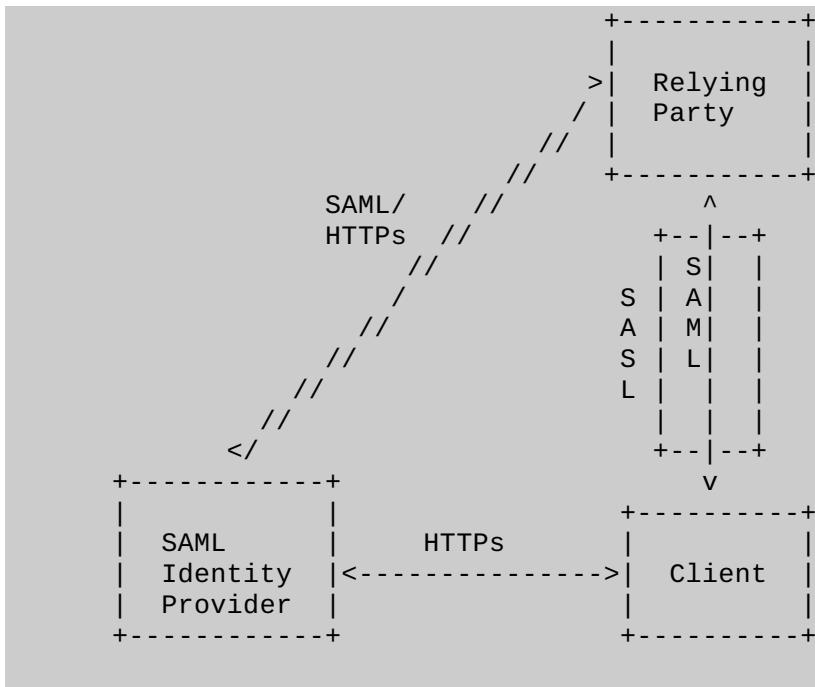
Simple Authentication and Security Layer (SASL) [[RFC4422](#)] is a generalized mechanism for identifying and authenticating a user and for optionally negotiating a security layer for subsequent protocol interactions. SASL is used by application protocols like **IMAP** [RFC3501], **POP** [RFC1939] and **XMPP** [RFC6120]. The effect is to make modular authentication, so that newer authentication mechanisms can be added as needed. This memo specifies just such a mechanism.

The **Generic Security Service Application Program Interface (GSS-API)** [RFC2743] provides a framework for applications to support multiple authentication mechanisms through a unified programming interface. This document defines a pure SASL mechanism for SAML, but it conforms to the new bridge between SASL and the GSS-API called **GS2** [RFC5801]. This means that this document defines both a SASL mechanism and a GSS-API mechanism. The GSS-API interface is OPTIONAL for SASL implementers, and the GSS-API considerations can be avoided in environments that use SASL directly without GSS-API.

As currently envisioned, this mechanism is to allow the interworking between SASL and SAML in order to assert identity and other attributes to relying parties. As such, while servers (as relying parties) will advertise SASL mechanisms (including SAML), clients will select the SAML SASL mechanism as their SASL mechanism of choice.

The SAML mechanism described in this memo aims to re-use the Web Browser SSO profile defined in section 3.1 of **the SAML profiles 2.0 specification** [[OASIS.saml-profiles-2.0-os](#)] to the maximum extent and therefore does not establish a separate authentication, integrity and confidentiality mechanism. The mechanism assumes a security layer, such as Transport Layer Security (**TLS** [RFC5246]), will continue to be used. This specification is appropriate for use when a browser is available.

**Figure 1** describes the interworking between SAML and SASL: this document requires enhancements to the Relying Party (the SASL server) and to the Client, as the two SASL communication end points, but no changes to the SAML Identity Provider are necessary. To accomplish this goal some indirect messaging is tunneled within SASL, and some use of external methods is made.



**Figure 1: Interworking Architecture**

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## 1.1. Terminology

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in RFC 2119 [[RFC2119](#)].

The reader is assumed to be familiar with the terms used in the SAML 2.0 specification.

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## 1.2. Applicability

Because this mechanism transports information that should not be controlled by an attacker, the SAML mechanism MUST only be used over channels protected by TLS, and the client MUST successfully validate the server certificate, or similar integrity protected and authenticated channels. [[RFC5280](#)][[RFC6125](#)]

Note: An Intranet does not constitute such an integrity protected and authenticated channel!

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## 2. Authentication flow

While SAML itself is merely a markup language, its common use case these days is with **HTTP** [[RFC2616](#)] or **HTTPs** [[RFC2818](#)] and **HTML** [W3C.REC-html401-19991224]. What follows is a typical flow:

1. The browser requests a resource of a Relying Party (RP) (via an HTTP request).
2. The Relying Party redirects the browser via an HTTP redirect (as described in Section 10.3 of [[RFC2616](#)]) to the Identity Provider (IdP) or an IdP discovery service with as parameters an authentication request that contains the name of resource being requested, a browser cookie and a return URL as specified in Section 3.1 of the **SAML profiles 2.0 specification** [[OASIS.saml-profiles-2.0-os](#)].
3. The user authenticates to the IdP and perhaps authorizes the authentication to the service provider.
4. In its authentication response, the IdP redirects (via an HTTP redirect) the

browser back to the RP with an authentication assertion (stating that the IdP vouches that the subject has successfully authenticated), optionally along with some additional attributes.

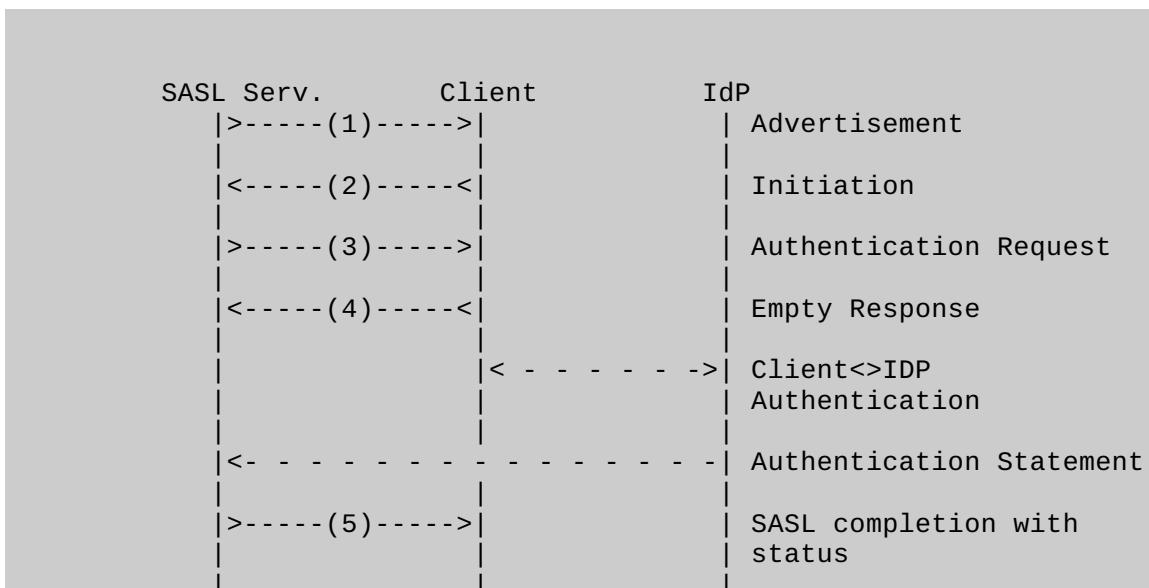
5. The Relying Party now has sufficient identity information to approve access to the resource or not, and acts accordingly. The authentication is concluded.

When considering this flow in the context of SASL, we note that while the Relying Party and the client both must change their code to implement this SASL mechanism, the IdP can remain untouched. The Relying Party already has some sort of session (probably a TCP connection) established with the client. However, it may be necessary to redirect a SASL client to another application or handler. This will be discussed below. The steps are shown from below:

1. The SASL server (Relying Party) advertises support for the SASL SAML20 mechanism to the client
  2. The client initiates a SASL authentication with SAML20 and sends a domain name that allows the SASL server to determine the appropriate IdP
  3. The SASL server transmits an authentication request encoded using a Universal Resource Identifier (URI) as described in RFC 3986 [RFC3986] and an HTTP redirect to the IdP corresponding to the domain
  4. The SASL client now sends an empty response, as authentication continues via the normal SAML flow.
  5. At this point the SASL client MUST construct a URL containing the content received in the previous message from the SASL server. This URL is transmitted to the IdP either by the SASL client application or an appropriate handler, such as a browser.
  6. Next the client authenticates to the IdP. The manner in which the end user is authenticated to the IdP and any policies surrounding such authentication is out of scope for SAML and hence for this draft. This step happens out of band from SASL.
  7. The IdP will convey information about the success or failure of the authentication back to the the SASL server (Relying Party) in the form of an Authentication Statement or failure, using a indirect response via the client browser or the handler (and with an external browser client control should be passed back to the SASL client). This step happens out of band from SASL.
  8. The SASL Server sends an appropriate SASL response to the client, along with an optional list of attributes

Please note: What is described here is the case in which the client has not previously authenticated. It is possible that the client already holds a valid SAML authentication token so that the user does not need to be involved in the process anymore, but that would still be external to SASL. This is classic Web Single Sign-On, in which the Web Browser client presents the authentication token (cookie) to the RP without renewed user authentication at the IdP.

With all of this in mind, the flow appears as follows:



```
----- = SASL  
- - - = HTTP or HTTPS (external to SASL)
```

Figure 2: Authentication flow

### 3. SAML SASL Mechanism Specification

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This section specifies the details of the SAML SASL mechanism. Recall section 5 of [RFC4422] for what needs to be described here.

The name of this mechanism "SAML20". The mechanism is capable of transferring an authorization identity (via "gs2-header"). The mechanism does not offer a security layer.

The mechanism is client-first. The first mechanism message from the client to the server is the "initial-response" described below. As described in [RFC4422], if the application protocol does not support sending a client-response together with the authentication request, the server will send an empty server-challenge to let the client begin.

The second mechanism message is from the server to the client, the "authentication-request" described below.

The third mechanism message is from client to the server, and is the fixed message consisting of "=".

The fourth mechanism message is from the server to the client, indicating the SASL mechanism outcome described below.

#### 3.1. Initial Response

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A client initiates a "SAML20" authentication with SASL by sending the GS2 header followed by the authentication identifier (message 2 in Figure 2). The GS2 header carries the optional authorization identity.

```
initial-response = gs2-header Idp-Identifier  
IdP-Identifier = domain ; domain name with corresponding IdP
```

The "gs2-header" is specified in [RFC5801], and it is used as follows. The "gs2-nonstd-flag" MUST NOT be present. Regarding the channel binding "gs2-cb-flag" field, see Section 5. The "gs2-authzid" carries the optional authorization identity. Domain name is specified in [RFC1035].

#### 3.2. Authentication Request

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The SASL Server transmits to the SASL client a URI that (re)directs to the IdP (corresponding to the domain the user provided), with a SAML authentication request as one of the parameters (message 3 in Figure 2).

Note: The SASL server may have a static mapping of domain to corresponding IdP or alternatively a DNS-lookup mechanism could be envisioned, but that is out-of-scope for this document.

Note: While the SASL client MAY sanity check the URI it received, ultimately it is the SAML IdP that will be validated by the SAML client out-of-scope for this document..

**authentication-request = URI**

URI is specified in [RFC3986] and is encoded according to Section 3.4 (HTTP Redirect) of the **SAML bindings 2.0 specification** [OASIS.saml-bindings-2.0-os]. The SAML authentication request is encoded according to Section 3.4 (Authentication Request) of the **SAML core 2.0 specification** [OASIS.saml-core-2.0-os].

The client now sends the authentication request via an HTTP GET (sent over a server-authenticated TLS channel) to the IdP, as if redirected to do so from an HTTP server and in accordance with the Web Browser SSO profile, as described in section 3.1 of **SAML profiles 2.0 specification** [OASIS.saml-profiles-2.0-os]

The client handles both user authentication to the IdP and confirmation or rejection of the authentication of the RP (out-of-scope for this document).

After all authentication has been completed by the IdP, the IdP will send a redirect message to the client in the form of a URI corresponding to the Relying Party as specified in the authentication request ("AssertionConsumerServiceURL") and with the SAML response as one of the parameters.

Please note: this means that the SASL server needs to implement a SAML Relying Party. Also, the SASL server needs to correlate the TCP session from the SASL client with the SAML authentication.

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### 3.3. Outcome and parameters

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The SASL server now validates the response it received from the client via HTTP or HTTPS, as specified in the SAML specification

The response by the SASL server constitutes a SASL mechanism outcome, and SHALL be used to set state in the server accordingly, and it shall be used by the server to report that state to the SASL client as described in [RFC4422] Section 3.6 (message 5 in **Figure 2**).

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## 4. SAML GSS-API Mechanism Specification

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This section and its sub-sections and appropriate references of it not referenced elsewhere in this document are not required for SASL implementors, but this section MUST be observed to implement the GSS-API mechanism discussed below.

The SAML SASL mechanism is actually also a GSS-API mechanism. The SAML user takes the role of the GSS-API Initiator and the SAML Relying Party takes the role of the GSS-API Acceptor. The SAML Identity Provider does not have a role in GSS-API, and is considered an internal matter for the OpenID mechanism. The messages are the same, but

- a) the GS2 header on the client's first message and channel binding data is excluded when SAML is used as a GSS-API mechanism, and
- b) the RFC2743 section 3.1 initial context token header is prefixed to the client's first authentication message (context token).

The GSS-API mechanism OID for SAML is OID-TBD (IANA to assign: see IANA considerations).

SAML20 security contexts MUST have the mutual\_state flag (GSS\_C\_MUTUAL\_FLAG) set to TRUE. SAML does not support credential delegation, therefore SAML security contexts MUST have the deleg\_state flag (GSS\_C\_DELEG\_FLAG) set to FALSE.

The mutual authentication property of this mechanism relies on successfully comparing the

TLS server identity with the negotiated target name. Since the TLS channel is managed by the application outside of the GSS-API mechanism, the mechanism itself is unable to confirm the name while the application is able to perform this comparison for the mechanism. For this reason, applications MUST match the TLS server identity with the target name, as discussed in [RFC6125].

The SAML mechanism does not support per-message tokens or GSS\_Pseudo\_random.

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## 4.1. GSS-API Principal Name Types for SAML

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SAML supports standard generic name syntaxes for acceptors such as GSS\_C\_NT\_HOSTBASED\_SERVICE (see [RFC2743], Section 4.1). SAML supports only a single name type for initiators: GSS\_C\_NT\_USER\_NAME. GSS\_C\_NT\_USER\_NAME is the default name type for SAML. The query, display, and exported name syntaxes for SAML principal names are all the same. There are no SAML-specific name syntaxes -- applications should use generic GSS-API name types such as GSS\_C\_NT\_USER\_NAME and GSS\_C\_NT\_HOSTBASED\_SERVICE (see [RFC2743], Section 4). The exported name token does, of course, conform to [RFC2743], Section 3.2.

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## 5. Channel Binding

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The "gs2-cb-flag" MUST use "n" because channel binding data cannot be integrity protected by the SAML negotiation.

Note: In theory channel binding data could be inserted in the SAML flow by the client and verified by the server, but that is currently not supported in SAML.

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## 6. Examples

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### 6.1. XMPP

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Suppose the user has an identity at the SAML IdP saml.example.org and a Jabber Identifier (JID) "somenode@example.com", and wishes to authenticate his XMPP connection to xmpp.example.com. The authentication on the wire would then look something like the following:

Step 1: Client initiates stream to server:

```
<stream:stream xmlns='jabber:client'  
    xmlns:stream='http://etherx.jabber.org/streams'  
    to='example.com' version='1.0'>
```

Step 2: Server responds with a stream tag sent to client:

```
<stream:stream  
    xmlns='jabber:client' xmlns:stream='http://etherx.jabber.org/streams'  
    id='some_id' from='example.com' version='1.0'>
```

Step 3: Server informs client of available authentication mechanisms:

```

<stream:features>
  <mechanisms xmlns='urn:ietf:params:xml:ns:xmpp-sasl'>
    <mechanism>DIGEST-MD5</mechanism>
    <mechanism>PLAIN</mechanism>
    <mechanism>SAML20</mechanism>
  </mechanisms>
</stream:features>

```

Step 4: Client selects an authentication mechanism and provides the initial client response containing the **BASE64** [RFC4648] encoded gs2-header and domain:

```

<auth xmlns='urn:ietf:params:xml:ns:xmpp-sasl' mechanism='SAML20'>
biwsZXhhbXBsZS5vcmc</auth>

```

The decoded string is: n,,example.org

Step 5: Server sends a BASE64 encoded challenge to client in the form of an HTTP Redirect to the SAML IdP corresponding to example.org (<https://saml.example.org>) with the SAML Authentication Request as specified in the redirection url:

```

aHR0cHM6Ly9zYW1sLmV4YW1wbGUub3JnL1NBToUwvQnJvd3Nlcj9TQU1MUUmVx
dWVzdD1QSE5oY1d4d09rRjFkR2h1VW1WeGRXVnpkQ0I0Y1d4dWN6cHpZVzFz
Y0QwaWRYSnVPbTloYzJsek9tNWhiV1Z6T25Sak9sTkJUVXc2Twk0d09uQnli
M1J2WTI5c0lnMETJQ0FnSUVsRVBTsMZZbVZqTkRJMFPtRTFNVEF6TkRJNE9U
QTVZVE13Wm1ZeFpUTXhNVfk0TxpJM1pqYzVORGmWt1RnME1pQ1daWEp6YVc5
dVBTsX1MakFpRFVfZ01DQwdTWE56ZFdWSmJuTjBZVzUwUFNjeU1EQTNMVEV5
TFRFd1ZERXhPak01T2pNMFdPswDsBt15WTJWQmRYUm9iajBpWm1Gc2MyVw1E
UW9nSUNBZ1NYT1FzWE56YvhabFBTSm1ZV3h6W1NJTkNpQwdJQ0JRY205MGIy
TnZiRUpwYm1ScGjtYz1Jb1Z5Ympwd11YTnBjenB1WVcxbGN6cDBZenBUUVUx
TU9qSXVNRHbPvyc1a2FXNW5jenBJVkJzSUUxWQ1BVMVFpRFFVz01DQwdRWE56
WlhKMGFXOXVRMj11YzNwdFpYs1RaWEoyYVd0bFZWSk1QUTBLsUNBZ01DQwdJ
Q0FpYUhSMGNITZMeTk0Y1hCd0xtVjRZVzf3YkdVdVky0XRMMU5CVFV3d1FY
TnpaWEowYVc5dVEy0XvjM1Z0WlhKVfpYsJjhV05sSw0TkNpQThjMkZ0YkRw
SmMzTjFaWE1nZUcx2JuTTZjMkZ0YkQwaWRYSnVPbTloYzJsek9tNWhiV1Z6
T25Sak9sTkJUVXc2Twk0d09tRnpjM1Z5ZEsdmJpSStEUW9nSUNBZ01HaDBk
SEJ6T2k4dmVHMXdjQzVsZUDGdGNHeGxMbU52Y1EwS01Ed3ZjMkZ0YkRwSmMz
TjFaWEkrRFFVfZ1BITmhiV3h3T2s1aGJXVkpSRkJ2YkdsamVTQjRiV3h1Y3pw
e11XMXNjRDBpZFhKdu9t0WhjMmx6T201aGJXVnpPb1jqT2x0Q1RVdzZNaTR3
T25CeWizUnZZMj1zSwcwS01DQwdJQ0JHYjNKdF1YUT1Jb1Z5Ympwd11YTnBj
enB1WVcxbGN6cDBZenBUUVUxTU9qSXVNRHb1WVcxbGFXUXRabT15Y1dGME9u
Qmxjbk5wYzNSbGJuUW1EUw9nSUNBZ01GT1FuBuz0WlZGMV1XeHBabWxsY2ow
aVHMXdjQzVsZUDGdGNHeGxMbU52Y1NjZ1FxehNiM2REY21WaGRHVT1Jb1J5
ZFdvau1DOctEUW9nUEh0aGJXeHdPbEpsY1hWbGMzUmxaRUyXZEdodVEy0Xvk
R1Y0ZEEwS01DQwdJQ0I0Y1d4dWN6cHpZVzFzY0QwaWRYSnVPbTloYzJsek9t
NWhiV1Z6T25Sak9sTkJUVXc2Twk0d09uQnliM1J2WTI5c0lpQU5DaUFnSUNB
Z01DQwdRMj10Y0dGeWFYtNziajBpWlhoaFkzUw1QzzBLSUNBOGMyRnRiRHBC
ZFhsB2JrTnZibljsZUhSRGJHRnpjMUpSwmcwS01DQwdJQ0FnZUcxc2JuTTZj
MkZ0YkQwaWRYSnVPbTloYzJsek9tNWhiV1Z6T25Sak9sTkJUVXc2Twk0d09t
RnpjM1Z5ZEsdmJpSStEUW9nb0NBZ01DQjFjbTQ2YjJGemFYTtzibUz0Wlhn
NmRHTTZVMEZOVERveUxqQTZZV002WTJ4aGMzTmxjenBRWvhOemQyOXlaRkJ5
YjNSbFkzUmxaR1J5WVc1emNHOX1kQTBLsUNB0EwzTmhiV3c2UVhWMGFHNURI
MjuwWlhoMFEyeGhjM05TwldZK0RRb2dQQz16WVcxc2NEcFNawEYxWlhOMFpX
UkjkwFJvYmt0dmJuUmx1SFerSUEwS1BD0XpZVzFzY0RwQmRYUm9ibEpsY1hw
bGMzUss=

```

The decoded challenge is:

https://saml.example.org/SAML/Browser?SAMLRequest=PHNhbwXw0kF1dGhuUmVxdWVzdCB4bWxuczpzYW1scD0idXJu0m9hc2lzM0m5hbWVzOnRj01NBTUw6Mi4w0nByb3RvY29sIg0KICAgIE1EPSJfYmVjNDI0ZmE1MTAzNDI40TA5YTMwZmYxZTMxMTY4MzI3Zjc5NDc00Tg0IiBwZXJzaW9uPSIyLjAiDQogICAgSXNxzdWVJbnN0YW50PSIyMDA3LTEyLTEwVDEx0jM50jM0WiIgRm9yY2VBdXRobj0iZmFsc2UiDQogICAgSXNQYXNzaXZ1PSJmYwxzSINCiAgICBQcm90b2NvbEJpbmRpbm9cInVybjpVYXNpczpuYW1lczp0YzpTQU1MojIuMDpiaw5kaw5nczpIVFRQLVBU1QiDQogICAgQXNzZXJ0aW9uQ29uc3VtZXJTZXJ2aWNlVVJMPQ0KICAgICAgICAiaHR0cHM6Ly94bxBwLmV4YW1wbGUuY29tL1NBTUwvQXNzZXJ0aW9uQ29uc3VtZXJTZXJ2aWNlIj4NCiA8c2FtbDpJc3N1ZXIgeG1snsM6c2FtbD0idXJu0m9hc2lzM0m5hbWVzOnRj01NBTUw6Mi4w0mFzc2VydGlvbiI+DQogICAgIGh0dHBz0i8veG1wCC5leGFtcGx1LmNvbQ0KIDwvc2FtbDpJc3N1ZXI+DQogPHNhbwXw0k5hbWVJRFBvbGljeSB4bWxuczpzYW1scD0idXJu0m9hc2lzM0m5hbWVzOnRj01NBTUw6Mi4w0nByb3RvY29sIg0KICAgICBGB3JtYXQ9InVybjpVYXNpczpuYW1lczp0YzpTQU1MojIuMDpuYW1laWQtZm9ybfW00nBlcnNpc3R1bnQiDQogICAgIFNQTmFtZVF1YwpxZml1cj0ieG1wcC5leGFtcGx1LmNvbSIgQWxsb3dDcmvhGU9InRydWUiIC8+DQogPHNhbwXw0lJ1cxVlc3R1ZEf1dGhuQ29udGV4dA0KICAgICB4bWxuczpzYW1scD0idXJu0m9hc2lzM0m5hbWVzOnRj01NBTUw6Mi4w0nByb3RvY29sIiIANCiAgICAgICAgQ29tcGFyaXNvbj0iZXhhY3QiPg0KICAgIE1EPSJfYmVjNDI0ZmE1MTAzNDI40TA5YTMwZmYxZTMxMTY4MzI3Zjc5NDc00Tg0IiBwZXJzaW9uPSIyLjAiDQogICAgICAgeG1snsM6c2FtbD0idXJu0m9hc2lzM0m5hbWVzOnRj01NBTUw6Mi4w0mFzc2VydGlvbiI+DQogICAgICAgICAgIHVybjpVYXNpczpuYW1lczp0YzpTQU1MojIuMDphYzpjbGFzc2Vz0lBhc3N3b3JkUHJvdGVjdGVkVHJhbnNwb3J0DQogIDwvc2FtbDpBdXRobkNvbnnRleHRDbGFzc1J1Zj4NCiA8L3NhbWxw0lJ1cxVlc3R1ZEf1dGhuQ29udGV4dD4gDQo8L3NhbWxw0kF1dGhuUmVxdWVzdD4=

Where the decoded SAMLRequest looks like:

```
<samlp:AuthnRequest xmlns:samlp="urn:oasis:names:tc:SAML:2.0:protocol"
    ID="_bec424fa5103428909a30ff1e31168327f79474984" Version="2.0"
    IssueInstant="2007-12-10T11:39:34Z" ForceAuthn="false"
    IsPassive="false"
    ProtocolBinding="urn:oasis:names:tc:SAML:2.0:bindings:HTTP-POST"
    AssertionConsumerServiceURL=
        "https://xmpp.example.com/SAML/AssertionConsumerService">
<saml:Issuer xmlns:saml="urn:oasis:names:tc:SAML:2.0:assertion">
    https://xmpp.example.com
</saml:Issuer>
<samlp:NameIDPolicy xmlns:samlp="urn:oasis:names:tc:SAML:2.0:protocol"
    Format="urn:oasis:names:tc:SAML:2.0:nameid-format:persistent"
    SPNameQualifier="xmpp.example.com" AllowCreate="true" />
<samlp:RequestedAuthnContext
    xmlns:samlp="urn:oasis:names:tc:SAML:2.0:protocol"
    Comparison="exact">
<saml:AuthnContextClassRef
    xmlns:saml="urn:oasis:names:tc:SAML:2.0:assertion">
    urn:oasis:names:tc:SAML:2.0:ac:classes:PasswordProtectedTransport
</saml:AuthnContextClassRef>
</samlp:RequestedAuthnContext>
</samlp:AuthnRequest>
```

Note: the server can use the request ID (\_bec424fa5103428909a30ff1e31168327f79474984) to correlate the SASL session with the SAML authentication.

Step 5 (alt): Server returns error to client:

```
<failure xmlns='urn:ietf:params:xml:ns:xmpp-sasl'>
<incorrect-encoding/>
</failure>
</stream:stream>
```

Step 6: Client sends a BASE64 encoded empty response to the challenge:

```
<response xmlns='urn:ietf:params:xml:ns:xmpp-sasl'>
=
</response>
```

[ The client now sends the URL to a browser for processing. The browser engages in a normal SAML authentication flow (external to SASL), like redirection to the Identity Provider (<https://saml.example.org>), the user logs into <https://saml.example.org>, and agrees to authenticate to [xmpp.example.com](https://xmpp.example.com). A redirect is passed back to the client browser who sends the AuthN response to the server, containing the subject-identifier as an attribute. If the AuthN response doesn't contain the JID, the server maps the subject-identifier received from the IdP to a JID]

Step 7: Server informs client of successful authentication:

```
<success xmlns='urn:ietf:params:xml:ns:xmpp-sasl' />
```

Step 7 (alt): Server informs client of failed authentication:

```
<failure xmlns='urn:ietf:params:xml:ns:xmpp-sasl'>
<temporary-auth-failure/>
</failure>
</stream:stream>
```

Step 8: Client initiates a new stream to server:

```
<stream:stream xmlns='jabber:client'
xmlns:stream='http://etherx.jabber.org/streams'
to='example.com' version='1.0'>
```

Step 9: Server responds by sending a stream header to client along with any additional features (or an empty features element):

```
<stream:stream xmlns='jabber:client'
xmlns:stream='http://etherx.jabber.org/streams'
id='c2s_345' from='example.com' version='1.0'>
<stream:features>
<bind xmlns='urn:ietf:params:xml:ns:xmpp-bind' />
<session xmlns='urn:ietf:params:xml:ns:xmpp-session' />
</stream:features>
```

Step 10: Client binds a resource:

```
<iq type='set' id='bind_1'>
  <bind xmlns='urn:ietf:params:xml:ns:xmpp-bind'>
    <resource>someresource</resource>
  </bind>
</iq>
```

Step 11: Server informs client of successful resource binding:

```
<iq type='result' id='bind_1'>
  <bind xmlns='urn:ietf:params:xml:ns:xmpp-bind'>
    <jid>somenode@example.com/someresource</jid>
  </bind>
</iq>
```

Please note: line breaks were added to the base64 for clarity.

---

## 6.2. IMAP

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The following describes an IMAP exchange. Lines beginning with 'S:' indicate data sent by the server, and lines starting with 'C:' indicate data sent by the client. Long lines are wrapped for readability.

```
S: * OK IMAP4rev1
C: . CAPABILITY
S: * CAPABILITY IMAP4rev1 STARTTLS
S: . OK CAPABILITY Completed
C: . STARTTLS
S: . OK Begin TLS negotiation now
C: . CAPABILITY
S: * CAPABILITY IMAP4rev1 AUTH=SAML20
S: . OK CAPABILITY Completed
C: . AUTHENTICATE SAML20
S: +
C: biwsZXhhbXBsZS5vcmc
S: + aHR0cHM6Ly9zYW1sLmV4YW1wbGUub3JnL1NBTUwvQnJvd3Nlcj9TQU1MUmVx
dWVzdD1QSE5oYld4d09rRjfKtR2h1VW1WeGRXVnpkQ0I0Yld4dWN6cHpZVzFz
Y0QwaWRYSnVPbTloYzJsek9tNWhiV1Z6T25Sak9sTkJUVXc2Twk0d09uQnli
M1J2WTI5c0lnMETJQ0FnSUVsRVBTSmZZbVZqTkRJMFPtRTFNVEF6TkRJNE9U
QTVZVE13Wm1ZeFpUTXhNVFk0TxpJM1pqYzVORGmWt1RnME1pQ1daWEp6YVc5
dVBTsX1MakFpRFFvZ01DQwdTWE56ZFdWSmJuTjBZVzUwUFNjeU1EQTNMVEV5
TFRFd1ZERXhPak01T2pNMFdpsWdSbt15WTJWQmRYUm9iajBpWm1Gc2MyVW1E
UW9nSUNBZ1NYT1FZWE56YVhabFBTSm1ZV3h6W1NJTkNpQWdJQ0JRY205MGIy
TnZiRUpwYm1ScGjtYz1Jb1Z5Ympwd11YTnBjenB1WVcxbGN6cDBZenBUUVUx
TU9qSXVNRRHbpYVc1a2FXNW5jenBJVkJzSUUXwQ1BVMVfpRFFvZ01DQwdRWE56
WlhKMGFXOXVRMj11YzNwdFpYs1RawEoyYVd0bFZWSk1QUTBLSUNBZ01DQwdJ
Q0FpYUhSMGNITZMeTk0Y1hCd0xtVjRZVzf3YkdVdVky0XRMMU5CVFV3d1FY
TnpaWEowYVc5dVEy0XVjM1Z0WlhKVFpYSjJhV05sSw0TkNpQThjMkZ0YkRw
SmMzTjFaWElnZUcxc2JuTTZjMkZ0YkQwaWRYSnVPbTloYzJsek9tNWhiV1Z6
T25Sak9sTkJUVXc2Twk0d09tRnpjM1Z5ZEsdmJpSStEUw9nSUNBZ01HaDBk
SEJ6T2k4dmVHMXdjQzVsZUdGdGNHeGxMbU52Y1EwS01Ed3ZjMkZ0YkRwSmMz
TjFaWEkrRFFvZ1BITmhiV3h3T2s1aGJXVkpSRkJ2YkdsamVTQjRiV3h1Y3pw
e1lXMXNjRDBpZFhKdu9t0WhjMmx6T201aGJXVnpPb1Jqt2x0QlRVdzZNaTR3
T25CeWIzUnZZMj1zSwcwS01DQwdJQ0JHYjNKdF1YUT1Jb1Z5Ympwd11YTnBj
```

```
enB1WVcxbGN6cDBZenBUUVUxTU9qSXVNRHB1WVcxbGFXUXRabT15Y1dGME9u
Qmxjbk5wYzNSbGJuUW1EUW9nSUNBZ01GT1FUbUZ0W1ZGMV1XeHBabWxsY2ow
aWVHMXdjQzVsZUDGdGNHeGxMbU52Y1NJZ1FXeHNiM2REY21WaGRHVT1Jb1J5
ZFdvau1DOCTEUW9nUEhOaGJXeHdPbEpsY1hWbGMzUmxaRUYxZEodvEy0XVk
R1Y0ZEEwS01DQWdJQ0I0Y1d4dWN6cHpZVzFzY0QwaWRYSnVPbT1oYzJsek9t
NWhiV1Z6T25Sak9sTkJUVXc2TWk0d09uQn1iM1J2WTI5c01pQU5DaUFnSUNB
Z01DQWdRMj10Y0dGeWFYTnZiajBpWlhoaFkzUWlQZzBLSUNBOGMyRnRiRHBC
ZFhSb2JrTnZib1JsZUhSRGJHRnpjMUpSwmcwS01DQWdJQ0FnZUcxc2JuTTZj
MkZ0YkQwaWRYSnVPbT1oYzJsek9tNWhiV1Z6T25Sak9sTkJUVXc2TWk0d09t
RnpjM1Z5ZEdsdmJpSStEUW9nb0NBZ01DQjFjbTQ2YjJGemFYTTZibUZ0WlhN
NmRHTTZVMEZOVERveUxqQTZZV002WTJ4aGMzTmxjenBRWVh0emQy0XlaRkJ5
YjNSbFkzUmxaR1J5WVc1emNHOX1kQTBLsUNBOEwzTmhiV3c2UVhWMGFHNURi
MjUwWlhoMFEyeGhjM05TwIdZK0RRb2dQQz16WVcxc2NEcFNawEYxWlhOMFpX
UkJKWFJvYmt0dmJuUmxlSFerSUEwS1BD0XpZVzFzY0RwQmRYUm9ibEpsY1hW
bGMzUSS=
C:
S: . OK Success (tls protection)
```

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## 7. Security Considerations

This section will address only security considerations associated with the use of SAML with SASL applications. For considerations relating to SAML in general, the reader is referred to the SAML specification and to other literature. Similarly, for general SASL Security Considerations, the reader is referred to that specification.

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### 7.1. Man in the middle and Tunneling Attacks

This mechanism is vulnerable to man-in-the-middle and tunneling attacks unless a client always verify the server identity before proceeding with authentication (see [\[RFC6125\]](#)). Typically TLS is used to provide a secure channel with server authentication.

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### 7.2. Binding SAML subject identifiers to Authorization Identities

As specified in [\[RFC4422\]](#), the server is responsible for binding credentials to a specific authorization identity. It is therefore necessary that only specific trusted IdPs be allowed. This is typical part of SAML trust establishment between Relying Parties and IdP.

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### 7.3. User Privacy

The IdP is aware of each Relying Party that a user logs into. There is nothing in the protocol to hide this information from the IdP. It is not a requirement to track the visits, but there is nothing that prohibits the collection of information. SASL servers should be aware that SAML IdPs will track - to some extent - user access to their services.

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### 7.4. Collusion between RPs

It is possible for Relying Parties to link data that they have collected on you. By using the same identifier to log into every Relying Party, collusion between Relying Parties is possible. In SAML, targeted identity was introduced. Targeted identity allows the IdP to transform the identifier the user typed in to an opaque identifier. This way the Relying Party would never see the actual user identifier, but a randomly generated identifier. This is an option the user has to understand and decide to use if the IdP is supporting it.

## 8. IANA Considerations

The IANA is requested to register the following SASL profile:

SASL mechanism profile: SAML20

Security Considerations: See this document

Published Specification: See this document

For further information: Contact the authors of this document.

Owner/Change controller: the IETF

Note: None

The IANA is further requested to assign an OID for this GSS mechanism in the SMI numbers registry, with the prefix of iso.org.dod.internet.security.mechanisms (1.3.6.1.5.5) and to reference this specification in the registry.

## 9. References

### 9.1. Normative References

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### 9.2. Informative References

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## Appendix A. Acknowledgments

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## Appendix B. Changes

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This section to be removed prior to publication.

- 06 Fixed text per AD comments
- 05 Fixed references per ID-nits
- 04 Added request for IANA assignment, few text clarifications
- 03 Number of cosmetic changes, fixes per comments Alexey Melnikov
- 02 Changed IdP URI to domain per Joe Hildebrand, fixed some typos
- 00 WG -00 draft. Updates GSS-API section, some fixes per Scott Cantor
- 01 Added authorization identity, added GSS-API specifics, added client supplied IdP
- 00 Initial Revision.

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