

[MS-MWBE]: Microsoft Web Browser Federated Sign-On Protocol Extensions

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1 Introduction

This specification extends the [Microsoft Web Browser Federated Sign-On Protocol Specification](#). It is assumed that the reader is familiar with the terms, concepts, and protocol specified in [MS-MWBF].

The extensions defined in this specification enable **Web browser requestors** that do not support scripting (to create POST messages) and enable passing **security identifiers (SIDs)** in Security Assertion Markup Language (SAML) version 1.1 assertions. These extensions are referred to, respectively, as the Query String Response Transfer Protocol and the SAML 1.1 Assertion Extension.

The Microsoft Web Browser Federated Sign-On Protocol specifies the use of HTTP POST to transmit the **wsignin1.0** result. The use of HTTP POST requires Web browser requestors to support scripting for automated form submittal, but Web browser requestors do not always have scripting support. The Query String Response Transfer Protocol provides a method for using a series of HTTP GET messages instead of a single HTTP POST to transmit the result of a wsignin1.0 action. This eliminates the scripting requirement for the Web browser requestor. That is, the extension increases the number of messages needed to perform a wsignin1.0 action to avoid the POST message.

The SAML 1.1 Assertion Extension is an extension of the Microsoft Web Browser Federated Sign-On Protocol that specifies a method for transmitting security identifiers (SIDs) as elements in **SAML advice**.

1.1 Glossary

The following terms are defined in [\[MS-GLOS\]](#):

- Account**
- Active Directory (AD)**
- Base64**
- Domain**
- Forest**
- Global Group**
- Lightweight Directory Access Protocol (LDAP)**
- NetBIOS**
- Relative Identifier (RID)**
- Security Identifier (SID)**
- Trusted Forest**
- Universal Group**
- User Agent**

The following terms are defined in [\[MS-MWBF\]](#):

- Claim**
- Identity Provider**
- Identity Provider/Security Token Service**
- Relying Party**
- Requestor IP/STS**
- Resource IP/STS**
- Security Realm**
- Security Token**
- Security Token Service (STS)**
- User**
- Web Browser Requestor**
- Web Service (WS) Resource**

The following terms are specific to this document:

Aggregated Result: The assembly of received parts transferred using the Query String Response Transfer Protocol. The **aggregated result** is assembled at a **relying party** and may not represent the complete result if all parts have not been received. Once complete, the **relying party** extracts a **RequestSecurityTokenResponse (RSTR)** from the **aggregated result**. For more information, see section [3.2.1.1.1](#).

Pending Result: The transformed **RequestSecurityTokenResponse (RSTR)** that an **identity provider/security token service (IP/STS)** maintains for the duration of a Query String Response Transfer Protocol message series. Each message in the Query String Response Transfer Protocol transfers a portion of the **pending result** to the **relying party**, where the portions are assembled into the **aggregated result**. For more information, see section [3.1.1.1.1](#).

RequestSecurityTokenResponse (RSTR): An XML element used to return an issued **security token** and associated metadata. An **RSTR** element is the result of the **wsignin1.0** action in the [\[MS-MWBF\]](#) protocol. For more information, see [\[MS-MWBF\]](#) section 2.2.4.1.

SAML Advice: The advice element of a **SAML assertion**. The data in the advice element is advisory, and can be ignored without affecting the validity of the assertion. See [\[SAMLCore\]](#) section 2.3.2.2. The SAML 1.1 Assertion Extension includes **security identifiers (SIDs)** and related data in the **SAML advice** element.

SAML Assertion: The Security Assertion Markup Language (SAML) v1.1 Assertion is a standard XML format for representing a **security token**. For more information, see [\[SAMLCore\]](#) section 2.

Subject: The entity to which the **claims** and other data in a **SAML assertion** apply. For more information, see [\[SAMLCore\]](#) section 1.3.1.

wsignin1.0: A protocol message exchange defined in [\[WSFedPRP\]](#) sections 2.1 and 3.1. The **wsignin1.0** request and response are the HTTP binding for the WS-Trust Issue action and response; as such, the WS-Trust **RequestSecurityTokenResponse (RSTR)** element is used to return the issued **security token** in the **wsignin1.0** response ([\[WSTrust\]](#) section 3.2). For more information, see [\[MS-MWBF\]](#) section 2.2.

MAY, SHOULD, MUST, SHOULD NOT, MUST NOT: These terms (in all caps) are used as described in [\[RFC2119\]](#). All statements of optional behavior use either MAY, SHOULD, or SHOULD NOT.

1.2 References

1.2.1 Normative References

We conduct frequent surveys of the normative references to assure their continued availability. If you have any issue with finding a normative reference, please contact dochelp@microsoft.com. We will assist you in finding the relevant information. Please check the archive site, <http://msdn2.microsoft.com/en-us/library/E4BD6494-06AD-4aed-9823-445E921C9624>, as an additional source.

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[SAMLCore] Maler, E., Mishra, P., Philpott, R., et al., "Assertions and Protocol for the OASIS Security Assertion Markup Language (SAML) V1.1", September 2003, <http://www.oasis-open.org/committees/download.php/3406/oasis-sstc-saml-core-1.1.pdf>

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If you have any trouble finding [WSFedPRP], please check [here](#).

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- [MS-ADTS] Microsoft Corporation, "[Active Directory Technical Specification](#)", June 2007.
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- [SIDS] Microsoft Corporation, "How Security Identifiers Work", March 2003, <http://technet2.microsoft.com/WindowsServer/en/Library/5dbc99be-7404-41a6-9be7-171d40c398db1033.mspx>

1.3 Protocol Overview (Synopsis)

This document specifies the Query String Response Transfer Protocol and Security Assertion Markup Language (SAML) 1.1 Assertion Extension. These extensions are based on the [Microsoft Web Browser Federated Sign-On Protocol](#). The extensions specified in this document broaden the applicability of the protocol to simpler Web browser requestors and a wider range of protected applications. The extensions in this specification do not change the services of authentication, identity federation, or single sign-on provided by [MS-MWBF].

1.3.1 Query String Response Transfer Protocol

The scripting capability for forms submittal is not specified as part of HTTP [RFC2616](#); consequently, not all Web browser requestor implementations support forms submittal as recommended for wsignin1.0 responses in [\[MS-MWBF\]](#) section 2.1. In addition, the **RequestSecurityTokenResponse (RSTR)** may be too large to be transferred in a single HTTP GET message. The Query String Response Transfer Protocol addresses these issues by eliminating the Web browser requestor requirement for scripting support.

When using the Query String Response Transfer Protocol, the wsignin1.0 message exchange in [MS-MWBF] is replaced by a series of wsignin1.0 message exchanges. In [MS-MWBF], the RSTR is transmitted using a single HTTP POST message. The Query String Response Transfer Protocol transmits the RSTR in pieces in query string parameters using multiple HTTP GET messages. The **relying party** accumulates the pieces from the responses in the series to produce an **aggregated result**. When the relying party has accumulated all the pieces, it extracts the RSTR from the aggregated result.

1.3.2 SAML 1.1 Assertion Extension

[Microsoft Web Browser Federated Sign-On Protocol](#) does not specify a method for including security identifiers (SIDs) in a **security token**. For applications requiring SIDs, **claims** are not sufficient for authorization.

The Security Assertion Markup Language (SAML) 1.1 Assertion Extension provides a method for including SIDs in a **SAML assertion**. How an **identity provider/security token service (IP/STS)** obtains the security identifiers and how a relying party interprets them is implementation-specific.

1.4 Relationship to Other Protocols

The [Microsoft Web Browser Federated Sign-On Protocol](#) and the extensions specified in this document use standard Web protocols, XML (as specified in [\[XML\]](#)), WS-Federation Passive Requestor Profile (as specified in [\[WSFedPRP\]](#)), and SAML 1.1 (as specified in [\[SAMLCore\]](#)). The reader should be familiar with the specifications listed in [\[MS-MWBF\]](#) section 1.4.

A relying party uses the Query String Response Transfer Protocol instead of the wsignin1.0 messages from Microsoft Web Browser Federated Sign-On Protocol to avoid the use of HTTP POST messages.

The SAML 1.1 Assertion Extension provides a facility for including security identifiers in SAML assertions. In order to understand the Windows behavior relating to this extension, the reader should be familiar with the Active Directory Technical Specification (as specified in [\[MS-ADTS\]](#)), the Windows Security Model (as specified in [\[MS-SECO\]](#)), and security identifiers (as specified in [\[SIDS\]](#)).

Microsoft Web Browser Federated Sign-On Protocol and the extensions specified in this document may be applicable where other Web-based authentication protocols are used. For more information, see [\[MS-MWBF\]](#) section 1.4.

1.5 Prerequisites/Preconditions

The SAML 1.1 Assertion Extension requires that an IP/STS have a source of security identifiers, and that the relying party have an authorization framework in which to interpret them. The exact methods by which the identity provider/security token service (IP/STS) obtains the SIDs, and the methods by which the relying party interprets them, are implementation-specific. [<1><2>](#)

1.6 Applicability Statement

The Query String Response Transfer Protocol is applicable where the [Microsoft Web Browser Federated Sign-On Protocol](#) is applicable. The Query String Response Transfer Protocol widens the applicability of the Microsoft Web Browser Federated Sign-On Protocol to include Web browser requestors that do not implement scripting or form submittal via scripting.

The SAML 1.1 Assertion Extension is applicable when the protected HTTP Web application requires SIDs to perform authorization. [<3>](#)

1.7 Versioning and Capability Negotiation

[Microsoft Web Browser Federated Sign-On Protocol](#) section 1.7 defers all versioning and capability negotiation to [\[WSFederation\]](#), [\[WSFedPRP\]](#), and [\[RFC2616\]](#).

When using the Query String Response Transfer Protocol, an IP/STS uses the presence of the *ttpindex* parameter (as specified in section [2.2.1.1.1](#)) in the request to determine whether the Query String Response Transfer Protocol is used for the response.

The SAML 1.1 Assertion Extension uses SIDs. SIDs have a revision mechanism. For more information, see [\[MS-DTYP\]](#), as specified in section [2.2.1](#).

1.8 Vendor-Extensible Fields

The extensions specified in this document make use of vendor-extensible fields that are specified as part of [\[MS-MWBF\]](#) section 1.8. Specifically, the Query String Response Transfer Protocol specifies new message parameters as allowed by [\[WSFedPRP\]](#) section 3.1, and the SAML 1.1 Assertion Extension specifies new elements in the SAML advice as allowed by [\[SAMLCore\]](#) section 2.3.2.2.

The Query String Response Transfer Protocol does not introduce any vendor-extensible fields that are not present in [\[MS-MWBF\]](#) section 1.8.

The SAML 1.1 Assertion Extension introduces the [ClaimSource \(section 3.1.5.2.1.1\)](#) element whose value is a URI that can be extended by vendors. Uniqueness of URIs is scheme-dependent. For more information, see [\[IANAScheme\]](#) and [\[RFC4395\]](#).

1.9 Standards Assignments

There are no standards assignments beyond those for XML namespaces and standard ports specified in [\[MS-MWBF\]](#) section 1.9. [<4>](#)

2 Messages

The Query String Response Transfer Protocol and Security Assertion Markup Language (SAML) version 1.1 Assertion Extension extend the messages specified in [\[MS-MWBF\]](#) section 2 as described in this section.

2.1 Transport

No additional transport is required other than that provided for in [\[MS-MWBF\]](#) section 2.1.

2.1.1 Query String Response Transfer Protocol

In the Query String Response Transfer Protocol, all wsignin1.0 messages MUST use HTTP GET.

2.2 Message Syntax

The Query String Response Transfer Protocol extends the wsignin1.0 message specified in [\[MS-MWBF\]](#) section 2.2. The SAML 1.1 Assertion Extension extends the SAML assertion specified in [\[MS-MWBF\]](#) section 2.2.4.2.

2.2.1 Query String Response Transfer Protocol

The Query String Response Transfer Protocol extends the wsignin1.0 message from [\[MS-MWBF\]](#) section 2.2 to enable passing results in pieces rather than using POST. The protocol does not extend any other message types.

2.2.1.1 wsignin1.0 Message

[\[MS-MWBF\]](#) section 2.2 specifies how parameters are encoded in messages, including new parameters added by extensions. Specifically, it describes that in HTTP GET messages, the parameters are encoded as query string parameters for transmission in the URL. It also specifies how invalid values are handled.

Section [2.2.1.1.1](#) specifies parameters included in both wsignin1.0 requests and wsignin1.0 responses that use this protocol.

Section [2.2.1.1.2](#) specifies parameters included only in wsignin1.0 responses that use this protocol.

2.2.1.1.1 Common Parameters

ttpindex: The length, in characters, of the aggregated result as a 32-bit unsigned integer in decimal notation.

2.2.1.1.2 wsignin1.0 Response

ttpsize: The length in characters of the **pending result** as a 32-bit unsigned integer in decimal notation.

wresult: The current part of the result being transferred, as a string.

2.2.2 SAML 1.1 Assertion Extension

The Security Assertion Markup Language (SAML) version 1.1 Assertion Extension extends the SAML assertion subset as specified in [\[MS-MWBF\]](#) section 2.2.4.2. This extension uses the SAML advice element specified in [\[SAMLCore\]](#) section 2.3.2.2 as an extensibility point.

The sections below define new elements to convey the source of claims, hash data, **user** name, and security identifiers (SIDs). These new elements are included as child elements of the advice element in a SAML assertion. These elements use the XML namespace "urn:microsoft:federation". The element content is described using XML schema data types, as specified in [\[XMLSCHEMA2\]](#) section 3.

2.2.2.1 SAML Advice Elements

[ClaimSource](#) (optional): A Uniform Resource Identifier (URI) identifying a **Requestor IP/STS** or other authentication service (such as a local **account** store) that is the source of the claims in the security token. The content is of type any URI (as specified in [\[XMLSCHEMA2\]](#) section 3.2.17).

[CookieInfoHash](#) (optional): A Base64-encoded implementation-specific hash value. The content is of type **Base64** Binary (as specified in [\[XMLSCHEMA2\]](#) section 3.2.16).[<5>](#)

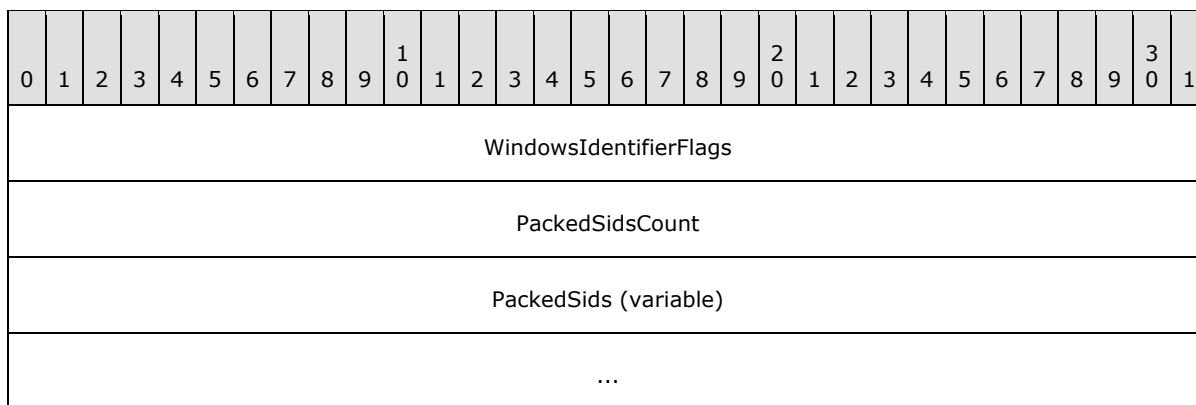
[WindowsUserIdentifier](#) (optional): A SID identifying the **subject** of the SAML assertion. The content is of type string (as specified in [\[XMLSCHEMA2\]](#) section 3.2.1) and MUST follow the restrictions for the string representation of a SID, as specified in [\[MS-DTYP\]](#) section 2.4.2).

[WindowsUserName](#) (optional): A user name associated with the subject of the SAML assertion. The content is of type string (as specified in [\[XMLSCHEMA2\]](#) section 3.2.1) and MUST be of the form "DOMAIN\user name".[<6>](#)

[WindowsIdentifiers](#) (optional): A base64-encoded binary structure that defines a set of SIDs that identify the subject of the SAML assertion and a set of flags that specify the use of the SIDs. The content is of type base64 Binary (as specified in [\[XMLSCHEMA2\]](#) section 3.2.16) and the binary data MUST be structured as specified in [WindowsIdentifiers Binary Structure \(section 2.2.2.2\)](#).

2.2.2.2 WindowsIdentifiers Structure

The WindowsIdentifiers structure has variable length. It defines a set of SIDs and flags. To reduce the overall data size, the SIDs are not included in full binary expansion. Rather, [PACKED_SIDS](#) structures are created for each group of SIDs that are identical except for the last sub-authority.



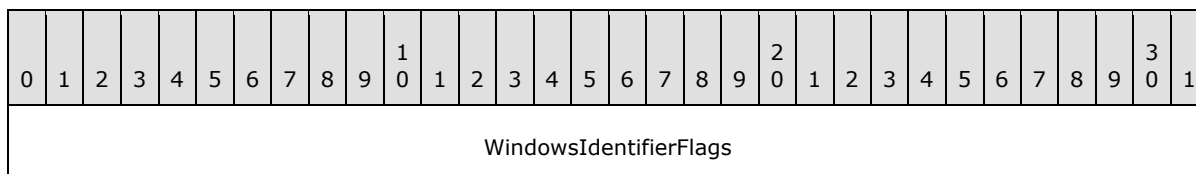
WindowsIdentifierFlags (4 bytes): A 32-bit **WindowsIdentifierFlags** structure (see [WindowsIdentifierFlags Structure \(section 2.2.2.2.1\)](#)).

PackedSidsCount (4 bytes): A 4-byte little-endian unsigned integer that defines the number of **PackedSids** fields in this structure. This field MUST NOT be 0.

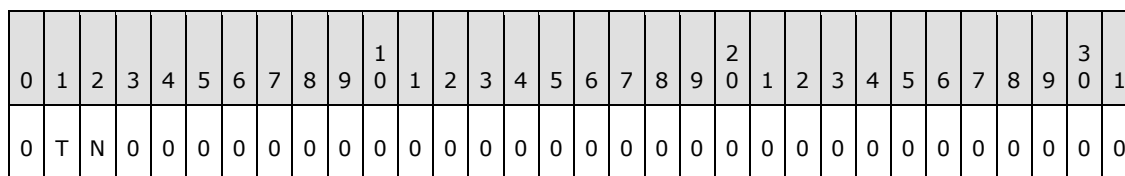
PackedSids (variable): A sequence of PACKED_SIDS structures of variable size, each of which defines a set of SIDs. The sequence defines a set of SIDs, which is the union of the sets of SIDs defined by all the elements.

2.2.2.2.1 WindowsIdentifierFlags Structure

The WindowsIdentifierFlags structure is a field of 32 bits.



WindowsIdentifierFlags (4 bytes): Bits marked 0 MUST be 0. The T and N bits operate independently.



Value	Description
T TryLocalAccount	A value of 1 indicates that the SAML NameIdentifier (as specified in [SAMLCore] section 2.4.2.2) takes precedence over the WindowsIdentifiers structure (section 2.2.2.2) element. A value of 0 indicates that the WindowsIdentifiers structure (section 2.2.2.2) element takes precedence over the SAML NameIdentifier (as specified in [SAMLCore] section 2.4.2.2).

Value	Description
N NoUserSid	A value of 1 indicates that a user SID is not encoded in the WindowsIdentifiers structure. A value of 0 indicates that a user SID is encoded in the WindowsIdentifiers structure.

2.2.2.2.2 PACKED_SIDs Structure

The PACKED_SIDs structure encapsulates a set of security identifiers (SIDs) that are identical except for the value of the final sub-authority, which is called the **relative identifier (RID)**. The identical portion of the SIDs is included in the **DomainSid** field, and each RID is included separately. The PACKED_SIDS (section 2.2.2.2.2) structure has a variable length.

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
DomainSid (variable)																															
...																															
RidCount																															
RID (variable)																															
...																															

DomainSid (variable): A SID structure of variable size that defines the identical portion of the SIDs encoded in this structure. For details on the SIDs structure, see [\[MS-DTYP\]](#) section 2.4.2.

RidCount (4 bytes): A 4-byte little-endian unsigned integer that defines the number of RID fields in this structure. This field MUST NOT be zero.

RID (variable): A sequence of 4-byte little-endian unsigned integers that define the RIDs for the SIDs encoded in this structure.

3 Protocol Details

The following sections specify the IP/STS and relying party protocol details. Each section details role-specific behavior for the extensions specified in this document. There is not a section for the Web browser requestor role because additional protocol details for the Web browser requestor other than those specified in [\[MS-MWBF\]](#) section 3.4 do not exist.

The identity provider/security token service (IP/STS) details (see section [3.1](#)) apply to both the Requestor IP/STS and **Resource IP/STS** roles. The relying party details (see section [3.2](#)) apply to both the Resource IP/STS and **Web service (WS) resource** roles.

Because the behavior for issuance and consumption of the SIDs is implementation-specific, an abstract data model is not introduced for the Security Assertion Markup Language (SAML) 1.1 Assertion Extension. Hence, sections [3.1.1](#) and [3.2.1](#) do not have subsections for that extension.

3.1 IP/STS Details

The following sections specify the protocol details of the IP/STS, including details for the Query String Response Transfer Protocol and SAML 1.1 Assertion Extension. These details apply to both the Resource IP/STS and Requestor IP/STS roles.

3.1.1 Abstract Data Model

This section describes a conceptual organization of data that an implementation maintains to participate in this protocol. The described organization is provided to facilitate the explanation of how the protocol behaves. This document does not mandate that implementations adhere to this model as long as their external behavior is consistent with that described in this document.

3.1.1.1 Query String Response Transfer Protocol

The following sections specify the abstract data model for transmitting the pending result as a series of parts in separate messages that are assembled by a relying party.

3.1.1.1.1 Pending Result

When the Query String Response Transfer Protocol is used, the result of a `wsignin1.0` action is transmitted by a series of HTTP 302 responses.

The first message in the exchange establishes the pending result. Each message exchange in the series transmits a portion of the pending result to the relying party until all parts have been delivered. Consequently, the pending result must be available to the IP/STS when processing each message exchange until the series is complete.

The message exchange also includes parameters for the current position and the total length of the result (see section [2.2.1.1](#)) to ensure proper construction and error/completion detection. The method used to maintain the availability of the pending result during the series of exchanges is implementation-specific. The IP/STS MUST discard the pending result when cleaning up local state. See [\[MS-MWBF\]](#) section 3.2.5.3.3 for Requestor IP/STS. See [\[MS-MWBF\]](#) section 3.3.5.4.2 for Resource IP/STS. [<7>](#)

3.1.1.1.2 Maximum Query String Response Message Length

Although the HTTP protocol (as specified in [\[RFC2616\]](#)) does not place a limit on the length of a Uniform Resource Locator (URL), some Web browser requestor implementations have such a limit. IP/STS implementations SHOULD use a maximum query string response message length that will

allow a broad range of Web browser implementations to act as the Web browser requestor. This is a limit on the length of the URL after escaping, including the scheme, authority, path, and query components (as specified in [\[RFC2396\]](#) section 3). The recommended value is 2083 octets for all messages. For more information, see [\[MAXURL\].<8>](#)

3.1.2 Timers

There are no timers required other than any specified in [\[MS-MWBF\]](#) section 3.1.2; however, a timer MAY [<9>](#) be used to manage state associated with the pending result.

3.1.3 Initialization

There are no new initializations beyond any described in [\[MS-MWBF\]](#) section 3.1.3; however, the pending result is initialized after the protocol has been initiated (see section [3.1.5.1.2](#)).

3.1.4 Higher-Layer Triggered Events

There are no higher-layer triggered events other than any described in [\[MS-MWBF\]](#) section 3.1.4.

3.1.5 Message Processing Events and Sequencing Rules

The following sections specify the message processing events and sequencing rules for the Query String Response Transfer Protocol and SAML 1.1 Assertion Extension.

3.1.5.1 Query String Response Transfer Protocol

The following sections specify protocol details for the Query String Response Transfer Protocol when receiving wsignin1.0 requests.

Sections [3.1.5.1.1](#), [3.1.5.1.2](#), and [3.1.5.1.3](#) specify how wsignin1.0 requests are processed given the value of the *ttpindex* parameter. Section [3.1.5.1.4](#) specifies common behavior for responding to such requests when Query String Response Protocol is used.

3.1.5.1.1 Receiving a wsignin1.0 Request That Does Not Specify a ttpindex

When the IP/STS receives a wsignin1.0 request that does not specify the *ttpindex* parameter, the response MUST NOT use the Query String Response Transfer Protocol. The IP/STS MUST discard any pending result, and the IP/STS MUST process the message as specified in [\[MS-MWBF\]](#) section 3.1.5.4.

3.1.5.1.2 Receiving a wsignin1.0 Request That Specifies a ttpindex of 0

When the IP/STS receives a wsignin1.0 request that specifies a *ttpindex* parameter value of 0, the IP/STS MUST process the wsignin1.0 request (as specified in [\[MS-MWBF\]](#) section 3.1.5.4) up to the point where the IP/STS has constructed the RequestSecurityTokenResponse (RSTR) element (as specified in [\[MS-MWBF\]](#) section 3.1.5.4.6). The IP/STS MUST apply the following transforms to the RSTR element to produce the pending result:

1. Convert the XML string to binary data by applying UTF-8 encoding, as specified in [\[RFC2279\]](#).
2. Compress the result from step 1 to the zlib format (as specified in [\[RFC1950\]](#)) by using the deflate algorithm (as specified in [\[RFC1951\]](#)).
3. Base64-encode the result from step 2, as specified in [\[RFC2045\]](#) section 6.8.

The IP/STS MUST respond as specified in section [3.1.5.1.4](#), by using the result from step 3 as the pending result.

3.1.5.1.3 Receiving a wsignin1.0 Request That Specifies a ttpindex Other Than 0

When the IP/STS receives a wsignin1.0 request that specifies a *ttpindex* parameter value other than 0, the following conditions MUST be evaluated in order.

1. The *ttpindex* value does not conform to message syntax rules (for example, if it is not a number, as specified in section [2.2.1.1.1](#)).
2. The corresponding pending result is not available.
3. The value of *ttpindex* is greater than or equal to the length in characters of the pending result.

If the message meets any of the conditions, the IP/STS MUST reject the message and return an HTTP 500 response. Otherwise, the IP/STS MUST respond as specified in section [3.1.5.1.4](#).

3.1.5.1.4 Responding to a wsignin1.0 Request That Specifies a ttpindex

The IP/STS MUST construct a wsignin1.0 response for the relying party by using the values below as properly escaped query string parameters in the returned status URL, as specified in [\[WSFedPRP\]](#) section 3.

- *ttpindex* MUST be the same value of *ttpindex* as requested.
- *ttpsize* MUST be the same length in characters as the pending result.
- *wctx* MUST be the same value of *wctx* as requested.
- *wresult* MUST contain a portion of the pending result, beginning at the character of index *ttpindex* (zero-based), and including as many characters as possible without exceeding the maximum query string response message length. Note that the maximum query string response message length applies after the escaping rules for URL query string parameters.

The IP/STS MUST transmit the message to the Web browser requestor using HTTP 302 as specified in [\[WSFedPRP\]](#) section 3.

3.1.5.2 SAML 1.1 Assertion Extension

The IP/STS uses the Security Assertion Markup Language (SAML) 1.1 Assertion Extension when responding to wsignin1.0 requests. Although the protocol details are largely similar, it is necessary in this section to distinguish between the Requestor IP/STS and Resource IP/STS roles.

The IP/STS is a Requestor IP/STS when issuing a token to a relying party that is in a different **security realm** than the IP/STS. Conversely, the IP/STS is a Resource IP/STS when issuing a token to a relying party that is in the same security realm as the IP/STS.

3.1.5.2.1 Responding to a wsignin1.0 Request

When responding to a wsignin1.0 request, the IP/STS MAY include any of the [ClaimSource \(section 3.1.5.2.1.1\)](#), [CookieInfoHash \(section 3.1.5.2.1.2\)](#), [WindowsUserIdentifier \(section 3.1.5.2.1.3\)](#), [WindowsUserName \(section 3.1.5.2.1.4\)](#), and [WindowsIdentifiers \(section 3.1.5.2.1.5\)](#) elements in the issued SAML assertion. For syntax details, see section [2.2.2](#).

The following sections describe the processing semantics for each of these OPTIONAL SAML assertion elements.

3.1.5.2.1.1 ClaimSource Element

The IP/STS MAY [<10>](#) include the ClaimSource (section 3.1.5.2.1.1) element in the issued SAML assertion.

3.1.5.2.1.2 CookieInfoHash Element

The IP/STS MAY [<11>](#) include the CookieInfoHash (section 3.1.5.2.1.2) element in the issued SAML assertion.

3.1.5.2.1.3 WindowsUserIdentifier Element

The IP/STS MAY [<12>](#) include the WindowsUserIdentifier element in the issued SAML assertion.

3.1.5.2.1.4 WindowsUserName Element

IP/STS MAY [<13>](#) include the WindowsUserName element in the issued SAML assertion.

3.1.5.2.1.5 WindowsIdentifiers Element

The IP/STS MAY [<14>](#) include the WindowsIdentifiers (section 3.1.5.2.1.5) element in the issued SAML assertion.

3.1.6 Timer Events

Timer events are not required other than any specified in [\[MS-MWBF\]](#) section 3.1.6; however, a timer event MAY [<15>](#) be used to manage the state associated with the pending result.

3.1.7 Other Local Events

There are no other local events that impact the operation of this protocol.

3.2 Relying Party Details

These details apply to both the Resource IP/STS and Web service (WS) resource roles (when acting as a relying party for a received security token).

3.2.1 Abstract Data Model

This section describes a conceptual model of a possible data organization that an implementation maintains to participate in this protocol. The described organization is provided to facilitate the explanation of how the protocol behaves. This document does not mandate that implementations adhere to this model as long as their external behavior is consistent with that described in this document.

3.2.1.1 Query String Response Transfer Protocol

The following sections specify the abstract data model for receiving and concatenating the aggregated result as a series of messages.

3.2.1.1.1 Aggregated Result

When the Query String Response Transfer Protocol is used, the result of a wsignin1.0 action is transmitted by a series of message exchanges. When an aggregated result is not available, it is considered to be empty (with size 0). The relying party concatenates each portion of the result to the aggregated result when it is received, so the aggregated result must be available to the relying party when processing each message exchange. The method used to maintain the availability of the aggregated result is implementation-specific. The relying party **MUST** discard the aggregated result when it receives a wsignoutcleanup1.0 message (as specified in [\[MS-MWBF\]](#) section 3.3.5.4.2).[<16>](#)

3.2.2 Timers

There are no times required other than any specified in [\[MS-MWBF\]](#) section 3.3.2; however, a timer **MAY**[<17>](#) be used to manage a state associated with the aggregated result.

3.2.3 Initialization

There are no new initializations other than any described in [\[MS-MWBF\]](#) section 3.3.3; however, the aggregated result is initialized after the protocol has been initiated (as specified in section [3.2.5.1.3](#)).

3.2.4 Higher-Layer Triggered Events

There are no new higher-layer triggered events other than any described in [\[MS-MWBF\]](#) section 3.3.4.

3.2.5 Message Processing Events and Sequencing Rules

The Query String Response Transfer Protocol and SAML 1.1 Assertion Extension introduce new message processing rules.

3.2.5.1 Query String Response Transfer Protocol

The following sections specify protocol details for the Query String Response Transfer Protocol when processing wsignin1.0 messages.

Section [3.2.5.1.1](#) specifies how to send a wsignin1.0 request by using this protocol. Sections [3.2.5.1.2](#) and [3.2.5.1.3](#) specify how to process a wsignin1.0 response given the presence or absence of the *ttpindex* parameter. Section [3.2.5.1.4](#) specifies how the completed aggregated result is processed.

3.2.5.1.1 Sending a wsignin1.0 Request

When using the Query String Response Transfer Protocol, the relying party sends a wsignin1.0 request to the IP/STS as specified in [\[MS-MWBF\]](#) section 3.3.5.1 and **MUST** add the *ttpindex* parameter. When included, the value of the *ttpindex* parameter **MUST** be the length in characters of the aggregated result. **Note** If the aggregated result is not available, it is considered to have length 0 (see section [3.2.1.1.1](#)). Therefore, in the first request, the value of *ttpindex* **MUST** be 0.[<18>](#)

3.2.5.1.2 Receiving a wsignin1.0 Response That Does Not Specify a ttpindex

When the relying party receives a wsignin1.0 response that does not specify the *ttpindex* parameter, the message does not use the Query String Response Transfer Protocol, and the relying party **MUST** process the message as specified in [\[MS-MWBF\]](#) section 3.3.5.2.

3.2.5.1.3 Receiving a wsignin1.0 Response That Specifies a ttpindex

When the relying party receives a wsignin1.0 response that specifies the *ttpindex* parameter, it MUST evaluate the following conditions in order.

1. The *ttpindex* value does not conform to message syntax rules (for example, it is not a number; as specified in section [2.2.1.1.1](#)).
2. The *ttpindex* parameter is not equal to the length, in characters, of the aggregated result. Note that if the aggregated result is not available, it is considered to have length 0 (as specified in section [3.2.1.1.1](#)).

If the message meets one of these conditions, the relying party MUST reject the message and return an HTTP 500 response.

The relying party MUST construct a new aggregated result. If *ttpindex* is 0, the aggregated result MUST be the value of the *wresult* parameter; otherwise, the aggregated result MUST be constructed by appending the *wresult* parameter to the current aggregated result.

The relying party MUST evaluate the *ttpsize* parameter as follows:

- If the length in characters of the new aggregated result is greater than the value of the *ttpsize* parameter, the relying party MUST reject the message and return an HTTP 500 response.
- If the length, in characters, of the new aggregated result is equal to the value of the *ttpsize* parameter, the relying party MUST process the completed result as specified in section [3.2.5.1.4](#).
- If the length, in characters, of the new aggregated result is less than the value of the *ttpsize* parameter, the relying party MUST request the next portion of the result as specified in section [3.2.5.1.1](#).

3.2.5.1.4 Processing the Complete Aggregated Result

When the aggregated result is complete, the relying party MUST apply the following transforms to the aggregated result to produce an XML string.

1. Base64-decode the aggregated result to binary data (as specified in [\[RFC2045\]](#) section 6.8).
2. Decompress the result from step 1 from the zlib format (as specified in [\[RFC1950\]](#)) by using the inflate algorithm (as specified in [\[RFC1951\]](#)).
3. Interpret the binary data from step 2 as a UTF-8-encoded string (as specified in [\[RFC2279\]](#)).

If any error occurs when applying the transforms, the relying party MUST reject the message and return an HTTP 500 response.

The relying party MUST process the wsignin1.0 response (as specified in [\[MS-MWBF\]](#) section 3.3.5.2), substituting the string output from step 3 for the *wresult* parameter.

3.2.5.2 SAML 1.1 Assertion Extension

The method of evaluating security identifiers (SIDs) transmitted by using the SAML 1.1 Assertion Extension is implementation-specific. For specifications about SIDs and their semantics in Windows, see [\[MS-DTYP\].<19>](#)

3.2.6 Timer Events

There are no timer events required other than any events specified in [\[MS-MWBF\]](#) section 3.3.6; however, a timer event MAY [<20>](#) be used to manage a state associated with the aggregated result.

3.2.7 Other Local Events

There are no other local events that impact the operation of this protocol.

4 Protocol Examples

The following sections describe several operations as used in common scenarios to illustrate the function of the Query String Response Transfer Protocol and Security Assertion Markup Language (SAML) 1.1 Assertion Extension.

4.1 Query String Response Transfer Protocol

4.1.1 Annotated Example

The following is a protocol example for the Query String Response Transfer Protocol.

The Query String Response Transfer Protocol is best understood as occurring abstractly between an IP/STS and a relying party, because the changes to [\[MS-MWBF\]](#) are applied consistently whether between Requestor IP/STS and Resource IP/STS or between Resource IP/STS and Web service (WS) resource.

This annotated example shows a Query String Response Transfer Protocol exchange between a Requestor IP/STS and a Resource IP/STS. It is part of a larger network trace (see section [4.2](#)) that also uses the Query String Response Transfer Protocol between the Resource IP/STS and the Web service (WS) resource.

The following table specifies the protocol roles of the hosts.

Protocol role	Host name
IP/STS	adatumsts-7
Relying party	treysts-7

Each HTTP message is prefaced by an annotation that describes its recipient and purpose. This annotated example omits many elements of the HTTP messages. For example, implementation-specific cookies and superfluous HTTP headers are not included. The full messages are specified in section [4.1.2](#). The following parameters are specified in this document and appear in the HTTP messages below.

- *ttpindex*
 - *ttpsize*
 - *wresult*
1. Just prior to the example, the Web browser requestor made a GET request to the relying party (treysts-7).
 2. The relying party returns an HTTP 302 message that specifies a wsignin1.0 request for the IP/STS. This wsignin1.0 request includes the *ttpindex=0* parameter, which initiates the Query String Response Transfer Protocol (see section [3.2.5.1](#)). At this time, the relying party's aggregated result is empty, as specified in section [3.2.5.1.1](#).

```
HTTP/1.1 302 Found
Location:
https://adatumsts-7/adfs/ls/?wa=wsignin1.0&
wtrealm=urn%3afederation%3atreys+research&
```

```
wct=2006-07-13T07%3a32%3a21Z&
wctx=https%3a%2f%2ftreyws-test%2fclaims%2f%5chttps%3a%2f%
2ftreyws-test%2fclaims%2fDefault.aspx&ttpindex=0
```

3. The Web browser requestor relays the wsignin1.0 request to the IP/STS (adatums-7) in an HTTP GET message.

```
GET /adfs/ls/?wa=wsignin1.0&wtrealm=urn%3afederation
%3atrey+research&wct=2006-07-13T07%3a32%3a21Z&wctx=https%
3a%2f%2ftreyws-test%2fclaims%2f%5chttps%3a%2f%2ftreyws-test%
2fclaims%2fDefault.aspx&ttpindex=0 HTTP/1.1
```

4. The IP/STS engages in a series of messages outside the scope of the protocol whereby it ascertains the user identity. These messages are omitted, as they have no bearing on the Query String Response Transfer Protocol. For more details, see [\[MS-MWBF\]](#) section 3.1.5.4.3.
5. Once the user's identity has been determined, the IP/STS creates a RequestSecurityTokenResponse (RSTR), as specified in [\[MS-MWBF\]](#) section 3.1.5.4.6. The RSTR is transformed into the pending result, and the first portion is returned in a wsignin1.0 response (as specified in section [3.1.5.1.4](#)). In this message, the *wresult* parameter is the first 1,727 characters of the pending result. The *ttpsize* parameter indicates the length of the full pending result, 2,652.

```
HTTP/1.1 302 Found
Location: https://treysts-7/adfs/ls/?wa=wsignin1.0&
ttpsize=2652&ttpindex=0&wctx=https%3a%2f%
2ftreyws-test%2fclaims%2f%5chttps%3a%2f%2ftreyws-test%2fclaims%
2fDefault.aspx&wresult=eNrNWftzqsoS%
2fiuW6zGVBYg3rCR1hquAaAA1ysspHOEShVEGRPz1e9BoTNYt59R62D4NPW3311%
2f3dDM81DgFWHBXQJzb0CuyOK%2bmaA1TC%2bItSjFsHJJNigDE7bEZ5f12QFHYi2Di
4u9kByN3%2bX11IVViQkXTHYpuUX1W4Lz59HBjGfofbD89YDfZDADGMMtj1DauK1V8
bP436NAMGzD%2bvddps%2fftFuzd91ewc79iu5y7Yv1%2b4HeaDRXjAqopzt2UQCPOu
%2fd0755hp3RvwLYGrZ7zppM9NossHQTh51bOxm4vpsXSbNhuK8om8MME
%2bFjkyGCOPOoOAdfoz0bQS608SB1E4gHuTewgTEaMN
%2fpgXsJoPkWm4BSP64FuDFGOQ8DlMFfoSQKk3SSgSCvsd7q9C86F8YKP4apB0ly8i
z2avtXR59Unj7FnGewamQQQzfzogfqo%2b6n55%2bbpz4FdnHo7
%2bPahOsHmOyidUyyEqChi6M3%2buqdm31J7GUIoyC%2fQdZ8UqK5vj2Kulay0tQy
KoWL1HhnM8%2fS%2bvGB%2bondK94312%2fg8wimeeydrNq5m8OEPDc%2byv9QMB%
2bVDZhHyP%2bxfD4oDco49VGJLzmyi9Ur9PK3pzEpFdWvtYMYZg0ZZYn7
%2b5PkbDw4wTsedx8An4SpzFJhpUj7D%2fnsV3uoeQt%2fo%2fGL6xcAVC
%2f4%2bXCWk4yvSpy%2bHnj3xPGR5yN66r%2b22NTStx4A3yflDZuftzEW9eDXwDZ
%2fOxj7m4K%2bOT%2bHvUn7c%2fSP%2bEWUJKgtF7%2fxdQGUwydKL87yBVM1Rs
%2fy5Iod4kCU7inID9d8ME22G919HSf3yXN1xmJIyt5m6hVXWZbfS
%2fYeh3QlmgI5iij4OA6%2fNc%2f%2fgn7d%2bp4eBDdFKTnJm
%2fh406AaYBMiMlyj5BcmGYqha5P38ODde0w7%2fdZsUDd4vmjmA7IMu
%2fc4cpmTJQsGMKsnR2NmQY%2fNb18b4U8P08xNMRmNCb5Z%2f284YLqHG7SF
%2fj2%2bbHOC9HVzv2CHugUnxiGZif8PT1eOzibOVTPHN2GVHqWsG5S6BHgV4f3E
0eycpnEu9V8oK7ckvVtLVyZd1YUYTg1c1Gn%2fJ5011Fmx1mmaTOBae%2bMEojVHb
%2bd96NDIjO9jLvrlopNJXwsPNN3kWWtuE2Vj4t90Zram4XtYg1Y2jTyLGrUFmYHmd
V4WW87i6VIm9VO3UNaBPOiR5XrV0emvSA5kpm9SXZK7rXmHZ
%2fGWXdBd5mpuJX07ZiQ4ru0lX%2fmI6gf4De4zmQG
%2fAPOqzOUS06Nce6uXteCfVLVVCPLtLYVfVvKREAAWRWCUuVBQoOKGayCeqfdJiCMR
%2bud9E6VriS5oE5k4EIHMPyStlcinPTFFKWyM3OVTeXIfOSlVmeWcHtFBFAu6XL8C
lhjqlbGFJSGOHZPsuNFjp1kBr88yCKw%2bXA854ExFVryermwmNViTHsVzRqqEhiA
```

VgR7p9jqihVNqcYBQFsZA1HgY1PnQ10017uE4uB4smhLvZZth3SxY7QX1thxeQF0p
%2b9W%2bNmJNkfjZb%2fTGa7DDMWjyOeTmeZO7vb8EogLjTrK%2bZRq6weJlWNn02
k9F6RVHa3%2bWqcZXRkto8gHGZR5oZfYq4g72IsKhFxVavFycmf0Eas4dKvg9xCeC
SI0h1rSDYWDpzG7tcUxxz7Q5WOpisAEPGqrPDos7p1%2bKYaES4t%2bBuaQIsGJIJ
yWhmTexqyJpcka4qzWVXX

6. The Web browser requestor relays the wsignin1.0 response to the relying party (treysts-7) in an HTTP GET message.

```
GET /adfs/ls/?wa=wsignin1.0&
ttpsize=2652&ttpindex=0&wctx=https%3a%2f%2f
reyws-test%2fclaims%2f%5chttps%3a%2f%2f
%2fDefault.aspx&wresult=eNrNWftzqsos%2f
quAaAAlyssphOEShVEGRPz1e9BoTNYt59R62D4NPW3311%2f3dDM81DgFWHBXQJzb0
CuyOK%2bmaA1TC%2bItSjFsHJJNigDE7bEZ5f12QFHYi2Di4u9kByN3%2bx11IVViq
kXTHYpuUXlW4Lz59HBjGfofbD89YDfZDADGMMtj1DauK1V8bP436NAMGzD%2bvddps
%2fftFuzd91ewc79iu5y7Yv1%2b4HeaDRXjAqopzt2UQCPOu%2fd0755hp3RvwLYGr
Z7zppM9NossHQTh51bOxm4vpsXSbNhuK8om8MME%2bFjkyGCOP0oOAdfoz0bQS608
SB1E4gHuTEwqTEAMN%2fpgXsJoPkWm4BSP64FuDFGOQ8D1MFfoSQKk3SSgSCvsd7q9
C86F8YKP4apB0ly8iz2avtXR59Unj7FnGewamQQzQzfzofqo%2b6n55%2bbpz4FdnH
o7%2bPahOsHmOyidUyyEqChi6M3%2buqdm31J7GUIoyC%2fQdZ8UqK5vj2Kulay0tQ
yKoWL1HhnM8%2fS%2bvGB%2bondK94312%2fg8wimeeydrNq5m80EPDc%2byv9QMB%
2bVDZhHyP%2bxfD4oDco49VGJLzmyi9Ur9PK3pzEpFdWvtYMYZg0ZZYn7%2b5PkbDw
4wdTsedx8An4SpzFJhpuj7D%2fnsV3uoeQt%2fo%2fGL6xcAVC%2f4
%2bXCWk4yvSpy%2bHnj3xPGR5yN66r%2b22NTStx4A3yflDZuftzEW9eDXwDZ
%2fOxj7m4K%2bOT%2bHvUn7c%2fSP%2bEWUJKgtF7%2fXdQGGUwydKL87yBVMlRs
%2fy5Iod4kCU7inID9d8ME222G919HSf3yXNlxmJIiyt5m6hVXWZbfs
%2fYeh3Qlmg15iij4OA6%2fNc%2f%2fgn7d%2bp4eBDdFKTnJm%2fh406AaYBMiM1
yj5BcmGYqha5P38ODdeOw7%2fdZsUDd4vmjma7IMu%2fc4cpmTJQsGMKsnR2NmQY
%2fNb18b4U8P08xNMRmNCb5Z%2f284YLqHG7SF%2fj2%2bhHOC9HVzv2CHugUnxi
GZif8PT1eOzibOVTPHN2GVHqWsg5S6BHgV4f3E0eycpnEu9V8oK7ckvVtLVyzd1
YUYTg1clGn%2fJ5011Fmx1mmaTOBae%2bMEojVHb%2bd96NDIjO9jLvrlonNJXws
PNN3kWwtuE2Vj4t90Zram4XtYglY2jTyLGRUFmYHmdV4WW87i6ViM9VO3UNaBPOi
R5XrV0emvSA5kpm9SXZK7rXmHZ%2fGWXdBd5mpuJX07ZIqA4ru01X%2fmI6gf4De
4zmQG%2fAPQzOUS06Nce6uXteCfVLVVCPLtLYVFVkreEAWRWCuuVBqOoKGyayCe
qfdJiCMR%2bud9E6Vris5oE5k4EIHMPyStlcinPTFKWym3OVTeXIfOSlVmeWcHtf
BFAu6XL8ClhjqlbGFJSGOHZPsnfJp1kBr88yCKw%2bXA854ExFVryermwmNViTH
sVzRqqEhiAVgR7p9jqihVNqcYBQFsZA1HgY1PnQ10017uE4uB4smhLvZZth3SxY7
QX1thxeQF0p%2b9W%2bNmJNkfjZb%2fTGa7DDMWjyOeTmeZO7vb8EogLjTrK%2bZ
Rq6weJlWNn02k9F6RVHa3%2bWqcZXRkto8gHGZR5oZfYq4g72IsKhFxVavFycmf0E
as4dKvg9xCeCSIOh1rSDYWDpzG7tcUxxz7Q5WOpisAEPGqrPDos7p1%2bKYaES4t%
2bBuaQIsGJIJyWhmTexqyJpcka4qzWVXX HTTP/1.1
```

7. Because the relying party's aggregated result is empty, the *wresult* parameter becomes the aggregated result. Because the length of the *wresult* parameter was 1,727 characters, which is less than the length of the *ttpsize* parameter of 2,652 characters, the relying party needs to request more data from the IP/STS. It does this by sending an HTTP 302 with a wsignin1.0 request that includes the *ttpindex=1727* parameter. For further specifications, see section [3.2.5.1.3](#).

```
HTTP/1.1 302 Found
Location: https://adatumsts-7/adfs/ls/?wa=wsignin1.0&wtrealm=urn
%3afederation%3atreys+research&wct=2006-07-13T07%3a32%3a27Z&wctx=
```



```
https%3a%2f%2ftreyws-test%2fclaims%2f%5chttps%3a%2f%2ftreyws-test%2fclaims%2fDefault.aspx&ttindex=1727
```

8. The Web browser requestor relays the wsignin1.0 request to the IP/STS (adatums-7) in an HTTP GET message.

```
GET /adfs/ls/?wa=wsignin1.0&wtrealm=urn%3afederation%3atrey+research&wct=2006-07-13T07%3a32%3a27Z&wctx=https%3a%2f%2ftreyws-test%2fclaims%2f%5chttps%3a%2f%2ftreyws-test%2fclaims%2fDefault.aspx&ttindex=1727 HTTP/1.1
```

9. The IP/STS returns the remaining 925 characters of the pending result, beginning with character 1,727. For further specifications, see section [3.1.5.1.3](#).

```
HTTP/1.1 302 Found
Location: https://treysts-7/adfs/ls/?wa=wsignin1.0&ttsize=2652&ttindex=1727&wctx=https%3a%2f%2ftreyws-test%2fclaims%2f%5chttps%3a%2f%2ftreyws-test%2fclaims%2fDefault.aspx&wresult=kqNHeG5OcCSAUgEHIEISLriGRPIJQBEM%2bnGViaAj8ERCSwkseRfLs13wPzbYkh%2bZs6Vn0YZP76zacMJFGrZbrVe%2fYXvUjtZTKE7YND8pSqH2XS543Z0Piuxye9155PixlBGZyO6WHThaJc9Xt2NPJctVWbL2TsZNZOTdPugEvtcupyOtIikMLOZI7tGhPRPtRa7wh9RP5CwuNEqvwqs7ritXKUcJsl6y291pc4gtE1qL3Zmte%2bdK88BIOrwTux%2fojel5SlqGDCC9YqeuWLyWeV5UxqSfdkNR3%2bREI0aud%2fKFVTuL%2bflnbVmTGV8LPf16dhUYvF3PalX%2fhMzVLC7xzZABdmSjOdqXMuqOK8xbKe4wL6bSWV6m2XykH791vFMvVaOs1lrkk%2fuCc7LnmQTigP58D%2fnQOyLk1eYX3x3GU8rrUsn84LO%2bcGRAtt4eNH1VDNEDcGhl%2fYOCujud%2fup3%2bZefDPvB3s91IYB7%2b3VXuK%2bwLyUR23Le07YWTLP1Dl1p62FeOiHAQuF53jLdrGTc%2b3jPFPkwJFdrk%2b9H1C7ZNDdiyLPcivfSV2bCmN6ZEmxMRJ0z3KS6G426mldQLOMYcV1WJ3zzJHR8pWVoz1ral0wbkuYqT01ed60fT1hBCVdIcNL1mwcRIKRIA9jQsGoiff4T63Xg3zIFiq6rSQ%2fRVr29y6LFoyBn2NHQ6T1oTaG%2f11Je46h3nqJM8dbELFMpNTRKW7SYduLSjlaHXZKO2mO%2fTykrVn3ny93nGygPpVKClJt3qFQfFAfe6YZ8m5m1LXDvvee6%2fvKpfLKxH87tJe4u2AtJhNDPEUXb8LbL%2fwXaBdT8Qt2sRedfow4A6k1N%2biOM3f3xwu9tyv2euTi%2bHppT9Owzebb7eAP9x8bzXPTz9gOclvYv3Iy08%2fkzz9A6cx%2fkW%3d
```

10. The Web browser requestor relays the wsignin1.0 response to the relying party (treysts-7) in an HTTP GET message.

```
GET /adfs/ls/?wa=wsignin1.0&ttsize=2652&ttindex=1727&wctx=https%3a%2f%2ftreyws-test%2fclaims%2f%5chttps%3a%2f%2ftreyws-test%2fclaims%2fDefault.aspx&wresult=kqNHeG5OcCSAUgEHIEISLriGRPIJQBEM%2bnGViaAj8ERCSwkseRfLs13wPzbYkh%2bZs6Vn0YZP76zacMJFGrZbrVe%2fYXvUjtZTKE7YND8pSqH2XS543Z0Piuxye9155PixlBGZyO6WHThaJc9Xt2NPJctVWbL2TsZNZOTdPugEvtcupyOtIikMLOZI7tGhPRPtRa7wh9RP5CwuNEqvwqs7ritXKUcJsl6y291pc4gtE1qL3Zmte%2bdK88BIOrwTux%2fojel5SlqGDCC9YqeuWLyWeV5UxqSfdkNR3%2bREI0aud%2fKFVTuL%2bflnbVmTGV8LPf16dhUYvF3PalX%2fhMzVLC7xzZABdmSjOdqXMuqOK8xbKe4wL6bSWV6m2XykH791vFMvVaOs1lrkk%2fuCc7LnmQTigP58D%2fnQOyLk1eYX3x3GU8rrUsn84LO%2bcGRAtt4eNH1VDNEDcGhl%2fYOCujud%2fup3%2bZefDPvB3s91IYB7%2b3VXuK%2bwLyUR23Le07YWTLP1Dl1p62FeOiHAQuF53jLdrGTc%2b3jPFPkwJFdrk%2b9H1C7ZND
```

```

diyLPcivfSV2bCmN6ZEmxMRJ0z3KS6G426mLDqL0MYcV1WJ3zzJHR8pWVozlral
0wbkuYqT0leD60fT1hBCVdIcNL1mwcRIKRIA9QjsGoiff4T63Xg3zIFiq6rSQ
%2fRVr29y6LFoyBn2NHQ6T1oTaG%2f1lJe46h3nqJM8dbElFMpNTRKW7SYduLS
jlaHXZKO2m0%2fTykrVn3ny93nGygPpVKClJt3qFQfFAfe6YZ8m5m1LXDvvee6
%2fvKpfLKxH87tJe4u2AtJhNDPEUXb8LbL%2fwXaBdT8Qt2sRedfow4A6k1N
%2biOM3f3xwu9tyv2euTi%2bHppT9Owzebb7eAP9x8bzXPTz9gOclvYv3Iy08
%2fkzz9A6cx%2fkW%3d HTTP/1.1

```

11. The relying party appends the *wresult* parameter to the aggregated result. The new aggregated result is 2,652 characters long, which indicates the completion of the Query String Response Transfer Protocol (see section 4.1). The relying party extracts the RSTR from the aggregated result (as specified in section 3.2.5.1.4) and processes it as specified in [MS-MWBF] section 3.3.5.2. The relying party's next action is outside the scope of the protocol, though in this case the relying party, which was a Resource IP/STS, issued a new SAML assertion and used the Query String Response Transfer Protocol to transmit it to a Web service (WS) resource.

4.1.2 Full Network Trace

The following is the full network trace for the protocol example in [Annotated Example \(section 4.1.1\)](#).

The following table specifies the protocol roles of the hosts.

Protocol role	Host name
Requestor IP/STS	adatumsts-7
Resource IP/STS	treysts-7
Web service (WS) resource	treyws-test

HTTP requests are prefaced by a line with three right-angle brackets (">>>") and the name of the host to which the request was sent. Requests are followed by the HTTP response, which is prefaced by a line with three left-angle brackets ("<<<"). The final three HTTP messages (HTTP 302, HTTP GET, and HTTP 200 OK) are an internal implementation detail and shown for completeness only. These messages are not necessary for interoperability.

```

>>> treyws-test (WS Resource)
GET /claims/ HTTP/1.1
<<<
HTTP/1.1 302 Found
Location: https://treysts-7/adfs/ls/?wa=wsignin1.0&wreply=https
%3a%2f%2ftreyws-test%2fclaims%2f&wct=2006-07-13T07%3a32%3a21Z&wctx
=https%3a%2f%2ftreyws-test%2fclaims%2fDefault.aspx&ttpindex=0
>>> treysts-7 (Resource IP/STS)
GET /adfs/ls/?wa=wsignin1.0&wreply=https%3a%2f%2ftreyws-test
%2fclaims%2f&wct=2006-07-13T07%3a32%3a21Z&wctx=https%3a%2f%
2ftreyws-test%2fclaims%2fDefault.aspx&ttpindex=0 HTTP/1.1
<<<
HTTP/1.1 302 Found
Location: https://adatumsts-7/adfs/ls/?wa=wsignin1.0&wtrealm=
urn%3afederation%3atreys+research&wct=2006-07-13T07%3a32%3a21Z&wctx=
https%3a%2f%2ftreyws-test%2fclaims%2f%5chttps%3a%2f%2ftreyws-test%
2fclaims%2fDefault.aspx&ttpindex=0
Set-Cookie: _TTPRealm=urn:federation:adatum; path=/adfs/ls/;

```

```

secure; HttpOnly
>>> adatumsts-7 (Requestor IP/STS)
GET /adfs/ls/?wa=wsignin1.0&wtrealm=urn%3afederation%3atrey+
research&wct=2006-07-13T07%3a32%3a21Z&wctx=https%3a%2f%2ftreyws-
test%2fclaims%2f%5chttps%3a%2f%2ftreyws-test%2fclaims%2fDefault.aspx
&ttpindex=0 HTTP/1.1
<<<
HTTP/1.1 302 Found
Location: /adfs/ls/auth/integrated/?wa=wsignin1.0&wtrealm=urn
%3afederation%3atrey+research&wct=2006-07-13T07%3a32%3a21Z&wctx=
https%3a%2f%2ftreyws-test%2fclaims%2f%5chttps%3a%2f%2ftreyws-test
%2fclaims%2fDefault.aspx&ttpindex=0
>>> adatumsts-7 (Requestor IP/STS)
GET /adfs/ls/auth/integrated/?wa=wsignin1.0&wtrealm=urn%
3afederation%3atrey+research&wct=2006-07-13T07%3a32%3a21Z&wctx=
https%3a%2f%2ftreyws-test%2fclaims%2f%5chttps%3a%2f%2ftreyws-test
%2fclaims%2fDefault.aspx&ttpindex=0 HTTP/1.1
<<<
HTTP/1.1 401 Unauthorized
WWW-Authenticate: Negotiate
WWW-Authenticate: NTLM
>>> adatumsts-7 (Requestor IP/STS)
GET /adfs/ls/auth/integrated/?wa=wsignin1.0&wtrealm=urn%3afederation
%3atrey+research&wct=2006-07-13T07%3a32%3a21Z&wctx=https%3a%2f
%2ftreyws-test%2fclaims%2f%5chttps%3a%2f%2ftreyws-test%2fclaims
%2fDefault.aspx&ttpindex=0 HTTP/1.1
Authorization: Negotiate TlRMTVNTUAABAAAAB4IIogAAAAAAAAAAAAAAAAAAAA
FAs4OAAADw==
<<<
HTTP/1.1 401 Unauthorized
WWW-Authenticate: Negotiate TlRMTVNTUAACAAAAEAAQADgAAAAFgomilZ0tC7za4
J0AAAAAAAAAAAAQBBAFIAAAABQLODgAAAA9BAEQARgBTAFYATQAtAEEAAgAQAEERABGAF
MAVgBNAC0AQQABABYAQQBEAEAVABVAE0AUwBUAFMALQA3AAQA0gBhAGQAZgBzAHYAbQA
tAGEALgBuAHQAdABlAHMAdAAuAG0AaQBjAHIAbwBzAG8AZgB0AC4AYwBvAG0AAwBSAGEA
ZABhAHQAdQBtAHMAdABzAC0ANwAuAGEAZABmAHMAdgBtAC0AYQAuAG4AdAB0AGUAcwB0A
C4AbQBpAGMAcgvBvAHMAbwBmAHQALgBjAG8AbQAFADoAYQBkAGYAcwB2AG0ALQBhAC4Abg
B0AHQAZQBzAHQALgBtAGkAYwByAG8AcwBvAGYAdAAuAGMAbwBtAAAAAA=
>>> adatumsts-7 (Requestor IP/STS)
GET /adfs/ls/auth/integrated/?wa=wsignin1.0&wtrealm=urn%3afederation
%3atrey+research&wct=2006-07-13T07%3a32%3a21Z&wctx=https%3a%2f%2ftre
yws-test%2fclaims%2f%5chttps%3a%2f%2ftreyws-test%2fclaims%2fDefault.
aspx&ttpindex=0 HTTP/1.1
Authorization: Negotiate TlRMTVNTUAADAAAAAGAAAYIAAAAAAYABgAmAAAAABAAEABI
AAAAGgAaAFgAAAAOAA4AcgAAAAAAACwAAAABYKIogUCzg4AAAAAPYQBkAGYAcwB2AG0AL
QBhAGEAZABtAGkAbgBpAHMAdABYAGEAdABvAHIASgBTAEIALQBEBEUAvgBRfvjBrWkBSQ
AAAAAAAAAAAAAAAAAADZmf/wdoShwGwc7CBcPFNGdUHCLSDZPUU=
<<<
HTTP/1.1 401 Unauthorized
WWW-Authenticate: Negotiate
WWW-Authenticate: NTLM
>>> adatumsts-7 (Requestor IP/STS)
GET /adfs/ls/auth/integrated/?wa=wsignin1.0&wtrealm=urn%3afederation
%3atrey+research&wct=2006-07-13T07%3a32%3a21Z&wctx=https%3a%2f%2ftre
yws-test%2fclaims%2f%5chttps%3a%2f%2ftreyws-test%2fclaims%2fDefault.
aspx&ttpindex=0 HTTP/1.1
Authorization: Negotiate YIIFRwYgKwYBBQUCoIIFOzCCBTegJDAiBgkqhkiC9xI
BAGIGCSqGSIB3EgECAGYKKwYBBAGCNwICCqKCBQOEggUJYIIFBQYJKoZIhvcSAQICAQB
uggTOMIIE8KADAgEFOQMCAQ6iBwMFACAAAACjggQDYID/zCCA/ugAwIBBaEfGx1BREZ

```

TVk0tQS5OVFRFU1QuTU1DUk9TT0ZULkNPTaIeMBygAwIBAgEVMBMBBehUVFAbC2FkYXR
1bXN0cy03o4IDstCCA62gAwIBF6EDAgECooIDnwSCA5syDvJHfsRntPFOoUy00/THHoA
eX2fGtOND8DenGhkYzdIHU4r98+vIgvn+8iO6qyZR8r8ZPpqiHEltafOXWnBCckq8XES
ARWj4oX1LNja0i+zoylvQlvoj8FRVxwiE0Jta5bLNQA+luMhrRot2F3VAyEZK5kXQFDz
7G9PuBSyHk6nwd9gORXk5AiHlX7HOG03RHe4hYoJ7jTkt9g7lm0wq7Rvtsn1vvzW6E1
an3UZBjak61OlhlkH/zC4YYFKIRtnL2ES1Q2teVeRSOMLzyRJu46n4SEY2I5X3J+5Svq
+oAwkWUq9B41xqBFEafIl/4Vc9jwgmmDg8UUvdjiCa4qaAWrsv2JuxiDxHYwYQyEiuTC
AmZx+AniZ4IAAnQATA/iQV0YEKMcUkwBH6YVz3sz/Sw7KOWmuq8lzhbmgpQdU7GtBkkG7
Dj3e3uQffYLUw5AFkxDJlb1y+q/TBaOtwq/kUfWKTcg1TziW13wNyy3CmShctPX1xsJU
SUMJJ5uVYm9g17cv0CnaCRM4TJV1Qd+eWcuX1wcMrujg2ktZZHAgmk8VxfqjruYwJbw
OGqa1Z6OuxTid9k3Rxt1kwBICtWqPgeHsDQ3nMOPpHXF1TNqPQvYmKOnCNeJASqAJ34m
Ohw4D/Q3qfj9PI6DWlfxoldBM6ALUJ/rpXHGyV3z5EJKLPYqRYPyAm9hRWmmu4/SIALR
+5rZHWb5vRp4jLiHDGb12ReqIPhMvP6CUVJGggbIjyvRx5VoYCIu+uRPP3GFej6C4eX9
fMrwqN3ktk76bRWZf9HKb9VHuYX/k+tMlktf2VrYAifyQf8oJxMq9XON+Iej3KvqyP3d
ZgZfaw9389iITrdX4YnzFwKaf/ot/dLyGrgqWxR/xMTYzmMgPjGGm8ZVHj6M/CZugh7e
mVzS2WrZVFwZk2fufFovcgxHc5hzuWav4VtxDOKWp1UDnr8DmAK3T65dJ8AsgKpfKaxn
vbZo+0jDWFZVErgGqqnJCefuOU9QDm/oAftGgaruQrAUdeAJVUrfNE6rott6jMXECVIO
IxtdbAtugbtNhw/9f61Tc0xY+7y/tmY+N5MK1Y/my8a/jJ0+DjFR1UJXUWJMDKun0ITt
lxaAmjjAmGsgmkhV6MoAd7JDQ3je3oogKcz2rfAavRzt/Gy8Zhvb+QKNFEMWpKq7wXm
fUa9w/z6V6q3VHomzipcSGUkr2RQRpnTcIBopGZcY/kbV1G9RqSB0zCB0KADAgEXooH
IBIHFGXJTTuh/3yxOaGfythDxT33t4KCBiNzQ/SLH5M/iH4oxfgtJNBj5tNM3rXlrkY+
36tO0GgJlJUTaaBS5P0Fms5lHiR9PbK4nY7n335HcDVJQXBFiudOkqGU3U80Kuh6UPrS+
ihacMygHCR5E0lDglTqvE0braoRR0ctlEvnmbMQG6sajBRt800sqEjulDL77U7W0Aa9I
jDWGreZ+nTzu/rhy+Ab0e2tjjgQ8+T+77FUHeYy4B61w7+y5QgnHBbuSP/KAIXaa=
<<<

HTTP/1.1 302 Found

Date: Thu, 13 Jul 2006 07:32:27 GMT

Server: Microsoft-IIS/6.0

X-Powered-By: ASP.NET

WWW-Authenticate: Negotiate oYGgMIGdoAMKAQChCwYJKoZigvcSAQICooGIBIGFYI
GCBgkqhkiG9xIBAgICAG9zMHGgAwIBBaEDAgEPomUwY6ADAgEXolwEWjj9oljcrPxx9ipQ
kjQo69bf5SYXFD7mxzAlpl8q5jKcV4ETZcXVawsYxvnHGV/wTsl/yg8CHMZNZ8D07cNqsp
IEUkG6joNvB9NQAga4q5441JbEVAblZpZ/9w==

Location: https://treysts-7/adfs/ls/?wa=wsignin1.0&httpsize=2652&httpsind
ex=0&wctx=https%3a%2f%2ftreyws-test%2fclaims%2f%5chttps%3a%2f%2ftreyws
-test%2fclaims%2fdefault.aspx&wresult=eNrNWftzqsos%2fuiW6zGVBYg3rCRlhq
uAaaAlyssphOESHVEGRPz1e9BoTNYt59R62D4NPW3311%2f3dDM81DgfWHBXQJzb0CuyOK
%2bmaA1TC%2bItSjFshJJNigde7bEZ5f12QFHYi2Di4u9kByN3%2bX11IVviqkXTHYpuUX
1W4Lz59HBjGfofbD89YdFDZADGMMtj1DauK1V8bP436NAMGzD%2bvddps%2fftFuzd9lew
c79iu5y7Yv1%2b4HeaDRXjAqopzt2UQCPou%2fd0755hp3RvWLYGrZ7zppM9NossHQTQh5
1bOxm4vpsXSbNhuK8om8MME%2bFjkyGCOP0oOAdfoz0bQS6O8SB1E4gHuTewgTEaMN%2fp
gXsJoPkWm4BSP64FuDFGOQ8D1MFfoSQKk3SSgSCvsd7q9C86F8YKP4apB0ly8iz2avtXR5
9Unj7FnGewamQQZfzofgqf%2b6n55%2bbpz4FdnHo7%2bPahOsHmOyidUyyEqChi6M3%2
buqgdM31J7GUIoyC%2fQdZ8UqK5vj2Kulay0tQyKoWL1HhnM8%2fs%2bvGB%2bondK94312
%2fg8wimeeydrNq5m8OEPDc%2byv9QMB%2bVDZhHyP%2bxfD4oDco49VGJLzmyi9Ur9PK3
pzEpFdWvtYMYZg0ZZYn7%2b5PkbDw4wdTsedx8An4SpzFJhpuj7D%2fnsV3uoeQt%2fo%2
fGL6xcAVC%2f4%2bXCWk4yvSpy%2bHnj3xPGR5yN66r%2b22NTStx4A3yflDZuftzEW9eD
XwDZ%2fOxj7m4K%2bOT%2bHvUn7c%2fSP%2bEWUJKgtF7%2fXdQGQUwydKL87yBVM1Rs%2
fy5Iod4kCU7inID9d8ME222G919HSf3yXN1xmJIiyt5m6hVXWZbfS%2fYEh3QlmqI5iij4
OA6%2fNc%2f%2fgn7d%2bP4eBDDFKTnJm%2fh406AaYBMiMlyj5BcmGYqha5P38ODde0w7
%2fdZsUDD4vmjma7IMu%2fc4cpmTJQsGMKsnR2NmQY%2fNb18b4U8P08xNMRmNCb5Z%2f2
84YLqHG7SF%2fj2%2bhHOC9HVzv2CHugUnxiGZif8PT1eOzibOVTPhN2GVHqWsG5S6BHGV
4f3E0eycpnEu9V8oK7ckvVtLVyzd1YUYTg1c1Gn%2fJ5011FmxlmmaTOBae%2bMEojVHb
%2bd96NDIj09jLvrlopNJXwsPNN3kWwtuE2Vj4t90Zram4XtYg1Y2jTyLGrUFmYHmdV4WW
87i6VIm9V03UNaBPOiR5XrV0emvSA5kpm9SXZK7rXmHZ%2fGWXdBd5mpuJX07ZIqA4ru01
X%2fmI6gf4De4zmQG%2fAPOqzOUS06Nce6uXteCfVLVVCPLtLYVfVvREEAWRWCuUvBqOoK
GyayCeQfdJiCMR%2bud9E6Vris5oE5k4EIHPyStlcinPTFKWYm3OVTeXiFOSlVmeWcHtf
BFAu6XL8ClhjqlbGFJSGOHZPsnUFJp1kBr88yCKw%2bXA854ExFVryermwNViThsVzRqQ

EhiAVgR7p9jqihVNqcYBQFsZA1HgY1PnQ10017uE4uB4smhLvZZth3SxY7QX1thxeQF0p%
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6AqYO+TOEyD6Bcu60ydLV0+obPz5NRb+Fu1wrzj80U3H5jFCXxKAli/ejKRh+LyZKRmTe
Wl+u1rf4XXZyuGOKEnb5S8W/9/PBA+oT05IPcpuadzpfR1d79Qh3lPTgx9eub+E50eGt1
c3LrGxS37XJsQ1FOHY3CcYXGs13G6z6YOPfHeI5+Zh7Z0/b4XHtW7AbEoL4iJrQsO19G8
FWPjEOXucHh2zoXm6b12Fy4necauw8UiWlmtg7NkkLbbLp
VeMrLV4Q4m7cxVetM4thbPOVoyulYuadla4HusGhSzAd2FKfZCLMUAsu6wPU7X22jbbHK1
mhzjrXXTW4GEGqNm1pxm2M5BwYG7VptxL2NLnwh5odKbY6VSdb7eWWyDvyzyNU3LKPy2ywn
wztEvkJ5Z/PKO4sONkUR2a0ggPjog1zhga+M5JakNn1Q/gbnC9B5f3cMdgHM5SwPjLkER
LDWTCEXjJW4MAxxkLfnUN4Xa4kPHGy25x3cKWApJzN9S1oapZSaNYg10QVxm2Xu0252j
TeOA+2wOB9fcEDzRjss1jb+4s71FL9IvD4Jw4DCYAjvzVA7q92gr8agCxWongugNAfBka
tmOb8dCeglSXNQJTJhpJpS4
HRyYepDcLRqegbl3qlFNnyLC21sKWtUNEensSYtJj14KfYlenUNJyPNWY4XE9UeTlIG50
tna7enEnbcoYGXaq0xDLRY2XhmNs8u3obNxpYxOp6QvXK9sXoYAVjUzsZx0Nm0PXJ2Fnb
W0XnlREnmAwDRABQy31f9jtQkkF97or5gGdyY0DrMOiJ/OB9zoLRG1Dd6iVWEI7yTNk0
RUMTaL2AL1IxfP+OFXmgCEABOZ+vpFHeEoHv5FQkZUTWSnBydJA7+bCsnc1OeH41kPShm
brpZ13zOpIz8bRDgYxevZsWTUfjtSs31TA0DRAa05HLHuBzTdD43vWdkhsrjYda4pHK8Q
3YMuozOZvvLpFc43dhBrnLXpPmV+wwNyfaIM9nR14hAyibcsC6Q9AZF9x2bavsy16wUGj
vN1jLVg2ucIR2Cpd6sWnqpzU2S1s6ZvU97TNpg9XTRs5PCzk40JFprOh+tKC2JsU11URT
ZEhliXl/IPGGQ/tmxm8tgQ+3; path=/claims; secure; HttpOnly
Set-Cookie: _WebSsoAuth0=vPDongOyasChyToiOY0bV9+Ba5vkc5xVY1G4s1R35cD7


```

RUxWGxg/NLoAIdgGEVye95Owd7Kl848cpbNYrs1lu9g0zokt/4hr100CbXU3l6XCHe5nm
wbHji09oN/Uz98ioH1EW8ZOxw4O2vuh2rXn+lzamRyvW2nBHEFM9hrZerZq2q6cEUmIsB
kuGGulKc4zSViW1icEU2y1NqW2vdjqGAoA7e1xoKThMu35ess3+Po0kLHKdfeqGc11/zy
mA0bXGq3jUGluTIN3R4rtQMDjMasIXrcjDoZ5irf9bmSFxqUbu5P5KGREL0cCWhIkud2s
lqrbWLLZzcU7uCGYLbkiMg697aKmToEuFLuJOSmWZ0E4+XLEj0y1BheMyllYBAmp93izX
p93LVH3Eg44JKxZaLs/S3ide7VWbNmH887GirrEGnAGnZ2THI6roWip05XTPLTNQBQkX
DOvgh2xgXrnYbbNXA29K0dZ+Zwujls6/4LHaqfJ+bNcpumzGPC/pi9j7vK/b/x69+bsI8T
; path=/claims; secure; HttpOnly
>>> treyws-test (WS Resource)
GET /claims/Default.aspx HTTP/1.1
Cookie: _WebSsoAuth=eNrNV9uSosoS/RXDeTR6wLsY3R2nAEFQUBAVfdlRQnFRqViuIn
79LrRlunVozOmzYx62T0WYKnPlyiSrfE5gtO+DJEfXGhJceawU8aX6V7fTQM32pvlU73bZ
p5bndJ64Taf+xPVYBEOPE0e6mVa0oSZIhBScpXOlLtcGynSe2+1RvWmy332z0G73lGyZ+qW
Yx7nvIRTEsg/TTGBWVGCUIxk5QrWhwS+IFihP67qVap4YQfzScoz10+iXpmy8CkzDpYxih
pJ86/RnQxv36d7YP73lUX5+vKQoEu2FpSC06SxNkkRj9iivFTPAkBl5aUn6P6d0xb15B5o
YIO8hESRqHTun/EegT5DVI00PSZ5gy5zx5SukWxtndMEqYZ+Yj9NPzf/fOfMrrHs89haUL
6HpJXy9z0gWO+hNutJ8ky4KnZgkxEvfFaT6+qLA0IVPfj0zn73d/ROyC2ntPTKESfDFEA
3DiTkoSt5JNzIrnRfnYCCIC5f02Jd7pA9+H3q8pfYmThognIbOlessHSmK6HPlo/03bdm1
lf4I1lAaEPenJoUfQP08xC7Jk3sLzLLNFjnp25NO01FxS7QXorgikTiCNHpZelr6xAlQBj
PvVKeEWMN3EvV3FphP9eorcKMqH7TYMCXxf27af3dI9Jb/R+d3VR4EmN/pclctP220yVL0
+cW/J42PPCuPVbntPqIYLgHrkuHRL9+DI5QAd9gWT1c4wF3GfoFf6e9Sf0Z+v/4i2QKC
K4XP9Zlhp1TCT0lzfPMJVjkh3+LMmyfyrgcIjJCcX/bpa0DaMwTb90k/nldzULfUybKH4b
vQ9ieZ5/z5tXPnQqsQzLMRTgJqH/rXrbhdxy9L0+CxATTL/kfXh5N6AqYO+TOEyD6Bcu60
ydLV0+obPz5NRb+Fulwrzj80U3H5jFCXxKAli/ejKRh+LyZKRmTeWl+ulrF4XXZyuGOKEn
b5S8W/9/PBA+oT05IPcpuadzpfRld79Qh3lPTgx9eub+E50eGt1c3LrGxS37XJsQ1FOHY3
CcYXGs13G6z6YOPfHeI5+Zh7Z0/b4XHTW7AbEoL4iJrQsO19G8FWPjEOXucHh2zoXm6b12
Fy4necauw8UiWlmtg7NkkLbbLpVeMrLV4Q4m7cxVetM4thbpOVoyulYuadla4HusGhSzAd
2FKfZCLMUsAu6wPU7X22jbHKlmzjrZXXTW4GEqNm1pxm2M5BwYG7VptxL2NLnwh5odKbY6
VSdb7eWWyDvyzyNU3LKy2ywnwhTeVkJ5Z/PK04sONkUR2a0ggPjog1zhga+M5JakNn1Q/g
bnC9B5f3cMdqHM5SwpJLkERLDWTCeXjJW4MAxxkLfnUN4Xa4kPHGy25xf3ckWApJzN9S1o
apZSaNYg10QVXm2Xu0252jTeOA+2wOB9fcEDzRJss1jb+4s7lFL9IvD4Jw4DCYAJvzVA7q
92gr8agCwWongugNAfBkatmOb8dCeglSXNQJTJhpJpS4HRYepDcLRqegb13qlFNNyLC21s
KWtuNEensSYtJj14KfY1enUNJyPNWY4XE9UeTlIG50tna7enEnbcoYGXaq0xDLRY2XhmNs
8u3obNxpYxOp6QvXK9sXoYAVjUzsZx0Nm0PXJ2FnbW0Xn1REnmAwDgRABQy31f9jTQkkF9
7or5gGdyY0DrMOiJ/OB9zoLRG1Dd6iVWEI7yTNk0RUMTaL2AL1IxfP+OFXmgCEABOZ+vpF
HeEOHv5FQkZUTWSnBydJA7+bCsnc10eH41kPShmbrpZl3zOpIz8bRDgYxevZsWTUfjtSs3
1TA0DRaa05HLHuBzTdD43vWdkhsrjYda4pHK8Q3YMuozOZvvLpFc43dhBrnLXpPmV+wwNy
faIM9nR14hAyibcsC6Q9AZF9x2bavsy16wUGjvN1jLVg2ucIR2Cpd6sWnqpzU2Sls6zvU9
7TNpg9XTRs5PCzk40JFprOh+tkC2JsU11URTZEh1iXl/IPGGQ/tmxm8tgQ+3; _WebSsoA
uth0=vpDongOyasChyToiOY0bV9+Ba5vkc5xVY1G4slR35cD7RUxWGxg/NLoAIdgGEVye9
5Owd7Kl848cpbNYrs1lu9g0zokt/4hr100CbXU3l6XCHe5nmwbHji09oN/Uz98ioH1EW8Z
Oxw4O2vuh2rXn+lzamRyvW2nBHEFM9hrZerZq2q6cEUmIsBkuGGulKc4zSViW1icEU2y1N
qw2vdjqGAoA7e1xoKThMu35ess3+Po0kLHKdfeqGc11/zymA0bXGq3jUGluTIN3R4rtQMD
jMasIXrcjDoZ5irf9bmSFxqUbu5P5KGREL0cCWhIkud2slqrbWLLZzcU7uCGYLbkiMg697
aKmToEuFLuJOSmWZ0E4+XLEj0y1BheMyllYBAmp93izXp93LVH3Eg44JKxZaLs/S3ide7V
WbNmH887GirrEGnAGnZ2THI6roWip05XTPLTNQBQkXDOvgh2xgXrnYbbNXA29K0dZ+Zwu
jls6/4LHaqfJ+bNcpumzGPC/pi9j7vK/b/x69+bsI8T
<<<
HTTP/1.1 200 OK
[Application specific content]

```

4.2 SAML 1.1 Assertion Extension

Below is an SAML assertion fragment that illustrates the message syntax of the Security Assertion Markup Language (SAML) 1.1 Assertion Extension elements in the advice element, as specified in section [2.2.2](#).

```

<saml:Advice xmlns:ads="urn:microsoft:federation">
  <ads:WindowsIdentifiers>
    AAAAAEAAAABBAABAAAAABRUAAAVU+0xvWJxlC9CDm4GAAAA9AEAAAYCAAHAgaACAIAA
    AECAAAAaGAA
  </ads:WindowsIdentifiers>
  <ads:CookieInfoHash>
    K6GNTL15/jljype53+PFRAiOfek=
  </ads:CookieInfoHash>
  <ads:WindowsUserIdentifier>
    S-1-5-21-837636885-2507236029-1846428367-500
  </ads:WindowsUserIdentifier>
  <ads:WindowsUserName>
    ADFSVM-A\Administrator
  </ads:WindowsUserName>
</saml:Advice>

```

The raw octets of the [WindowsIdentifiers \(section 3.1.5.2.1.5\)](#) binary structure, after base64 decoding is as follows:

```

00 00 00 00 01 00 00 00 01 04 00 00 00 00 00 05 15 00 00 00 15 53 ED
31 BD 62 71 95 CF 42 0E 6E 06 00 00 00 F4 01 00 00 06 02 00 00 07 02
00 00 08 02 00 00 01 02 00 00 00 02 00 00

```

The octet stream is structured as follows (see section [2.2.2.2](#)):

```

00 00 00 00  WindowsIdentifierFlags = 0
                TryLocalAccount = 0
                NoUserSid = 0
01 00 00 00  PackedSidsCount = 1 (0x00000001)
                PackedSids1
                DomainSid
01          Revision = 1 (0x01)
    04          SubAuthorityCount = 4 (0x04)
        00 00          IdentifierAuthority[0..1] = {0, 0, ...
00 00 00 05          IdentifierAuthority[2..5] = 0, 0, 0, 5
                        (0x05)}
15 00 00 00          SubAuthority1 = 21 (0x00000015)
15 53 ED 31          SubAuthority2 = 837636885 (0x31ED5315)
BD 62 71 95          SubAuthority3 = 2507236029 (0x957162BD)
CF 42 0E 6E          SubAuthority4 = 1846428367 (0x6E0E42CF)
06 00 00 00          RidCount = 6 (0x00000006)
F4 01 00 00          Rid1 = 500 (0x000001F4)
06 02 00 00          Rid2 = 518 (0x00000206)
07 02 00 00          Rid3 = 519 (0x00000207)
08 02 00 00          Rid4 = 520 (0x00000208)
01 02 00 00          Rid5 = 513 (0x00000201)
00 02 00 00          Rid6 = 512 (0x00000200)

```

The SIDs encoded in the structure are as follows:

- S-1-5-21-837636885-2507236029-1846428367-500
- S-1-5-21-837636885-2507236029-1846428367-518

- S-1-5-21-837636885-2507236029-1846428367-519
- S-1-5-21-837636885-2507236029-1846428367-520
- S-1-5-21-837636885-2507236029-1846428367-513
- S-1-5-21-837636885-2507236029-1846428367-512

5 Security

The following sections specify security considerations for implementers of the [Microsoft Web Browser Federated Sign-On Protocol Extensions](#).

5.1 Security Considerations for Implementers

Security considerations for the Microsoft Web Browser Federated Sign-On Protocol Extensions are specified in the following subsections. Additionally, the security considerations outlined in [\[MS-MWBF\]](#) section 5 apply to the Microsoft Web Browser Federated Sign-On Protocol Extensions.

5.1.1 Data Integrity

Data integrity concerns, as described in [\[MS-MWBF\]](#) section 5.1.1, apply to the extensions specified in this document. Of particular concern are the SAML advice elements specified by the SAML 1.1 Assertion Extension. These elements are included in the SAML assertion, which is signed to prevent tampering (see [\[MS-MWBF\]](#) section 2.2.4.2.2).

5.1.2 Privacy

The privacy considerations in [\[MS-MWBF\]](#) section 5.1.5 apply to the extensions in this document. The extensions also introduce new privacy concerns.

The Query String Response Transfer Protocol is used to communicate security tokens from one party to another by using the query string of the HTTP request URL. The use of Secure Sockets Layer/Transport Layer Security (SSL/TLS) prevents the exposure of user information outside the services participating in the protocol (see [\[MS-MWBF\]](#) section 5.1.3); however, a GET message might provide a lesser degree of confidentiality than a POST message due to URL tracking concerns. For example, Web browser requestor implementations might track URL history or Web proxy servers might log URLs.

The SAML 1.1 Assertion Extension provides a method for including SIDs in a SAML assertion. These SIDs MAY identify user identity, capabilities, or affiliations. For this reason, SIDs SHOULD NOT be included indiscriminately; rather, their distribution SHOULD be limited to specific relying parties.[<21>](#)

5.1.3 Authorization Validation and Filtering

When processing SIDs from an IP/STS, relying parties must ensure that the IP/STS is authorized to issue SIDs that fall under a particular set of sub-authorities. This is similar to namespace collision concerns with UPN and EmailAddress claims (as specified in [\[MS-MWBF\]](#) section 5.1.6).[<22>](#)

5.2 Index of Security Parameters

Because Microsoft Web Browser Federated Sign-On Protocol Extensions is an authentication protocol, the security details are in the message processing rules section.

Security parameter	Section
WindowsUserIdentifier	2.2.2.1
WindowsUserName	2.2.2.1
WindowsIdentifiers	2.2.2.1

6 Appendix A: Windows Behavior

The information in this specification is applicable to the following versions of Windows:

- Windows Server 2008
- Windows Server 2003

Exceptions, if any, are noted below. Unless otherwise specified, any statement of optional behavior in this specification prescribed using the terms SHOULD or SHOULD NOT implies Windows behavior in accordance with the SHOULD or SHOULD NOT prescription. Unless otherwise specified, the term MAY implies that Windows does not follow the prescription.

[<1> Section 1.5:](#) The Windows implementation of the SAML 1.1 Assertion Extension is integrated with Windows **Active Directory**. All SIDs that are transmitted in the SAML assertion correspond to Active Directory accounts. In order to transmit SIDs between a Requestor IP/STS and a Resource IP/STS that reside in different **forests**, the Requestor IP/STS forest must be a **trusted forest** of the Resource IP/STS forest.

[<2> Section 1.5:](#) Local configuration is used to modify several of the Windows behaviors described in this document. In all cases, the local configuration must exist before the protocol is initiated. Specific instances where local configuration is used are listed below.

By default, an IP/STS does not issue security tokens with SIDs (see section [3.1.5.2](#)). The issuance of SIDs (that is, including the [WindowsUserIdentifier \(section 3.1.5.2.1.3\)](#), [WindowsUserName \(section 3.1.5.2.1.4\)](#), and [WindowsIdentifiers \(section 3.1.5.2.1.5\)](#) elements in issued SAML assertions) can be enabled for specific relying parties by using local configuration.

By default, when a user authenticates to a Resource IP/STS by using a security token from a Requestor IP/STS (see section [3.1.5.2](#)), any SIDs in the SAML assertion are ignored (that is, the [WindowsUserIdentifier \(section 3.1.5.2.1.3\)](#), [WindowsUserName \(section 3.1.5.2.1.4\)](#), and [WindowsIdentifiers \(section 3.1.5.2.1.5\)](#) elements). Processing these SIDs (as described in section [3.1.5.2](#)) can be enabled for specified Requestor IP/STSS using local configuration. In this case, the local configuration also specifies a Windows **domain** associated with the IP/STS, so that SID filtering may be performed (as specified in section [5.1.3](#)).

When a user authenticates to a Resource IP/STS by using a security token from a Requestor IP/STS (as specified in section [3.1.5.2](#)), claims can be mapped to SIDs based on local configuration. In this case, the local configuration also specifies the desired value of the TryLocalAccount flag (as specified in [WindowsIdentifierFlags Structure \(section 2.2.2.2.1\)](#)).

A special algorithm is used to determine when the Query String Response Protocol is used (as specified in section [3.2.5.1.1](#)). This algorithm uses local configuration to force the use of the protocol and for the FileExtensionBypassList.

[<3> Section 1.6:](#) All Windows behavior documented in this specification applies to Windows Server 2003 R2 and Windows Server 2008. The Windows behavior does not apply to Windows Vista, because the software that implements the protocol extensions described in this document is included only as part of Windows Server.

[<4> Section 1.9:](#) The following URIs are used as local assignments in fields specified by the SAML 1.1 Assertion Extension: "urn:federation:activedirectory" and "urn:microsoft:federation".

[<5> Section 2.2.2.1:](#) Support for this field is conditional, as specified in [CookieInfoHash Element \(section 3.1.5.2.1.2\)](#).

<6> [Section 2.2.2.1: WindowsUserName Element \(section 3.1.5.2.1.4\)](#) specifies how Windows constructs the [WindowsUserName](#) value.

<7> [Section 3.1.1.1.1](#): The pending result is maintained in secure session cookies written using Set-Cookie headers (as specified in [\[RFC2965\]](#)), which are added to the HTTP 302 response to the Web browser requestor.

<8> [Section 3.1.1.1.2](#): The recommended value is used.

<9> [Section 3.1.2](#): There are no new timers. The pending result is stored by using secure session cookies (see section [3.1.1.1.1](#)).

<10> [Section 3.1.5.2.1.1](#): The IP/STS only includes this element when it is a Resource IP/STS. The value identifies Active Directory (AD), a **Lightweight Directory Access Protocol (LDAP)** service, or a security realm. If the user authenticated by using Active Directory, the [ClaimSource \(section 3.1.5.2.1.1\)](#) value is "urn:federation:activedirectory". If the user authenticated by using an LDAP service, the [ClaimSource \(section 3.1.5.2.1.1\)](#) value is a URI associated with the LDAP service, for example "LDAP://ldap.example.com". If the user authenticated by using a SAML assertion from a Requestor IP/STS, the [ClaimSource \(section 3.1.5.2.1.1\)](#) value is the value of the Security Assertion Markup Language (SAML) issuer. For more information about user authentication, see [\[MS-MWBF\]](#) section 3.1.5.4.3.

<11> [Section 3.1.5.2.1.2](#): The IP/STS includes the [CookieInfoHash \(section 3.1.5.2.1.2\)](#) element when an authentication cookie is issued at the same time as a SAML assertion. The authentication cookie is a Base64-encoded binary structure. Windows includes the Base64-encoded SHA-1 hash value (as specified in [\[FIPS180\]](#)) of the raw octets.

<12> [Section 3.1.5.2.1.3](#): By default, the IP/STS does not include the [WindowsUserIdentifier \(section 3.1.5.2.1.3\)](#) element. It can be enabled for specific relying parties (see section [1.5](#)). A Requestor IP/STS populates this field only if the user authenticated by using Active Directory (AD). A Resource IP/STS populates this field only if the user authenticated by using a security token from a Requestor IP/STS, in which case the value, if present, is copied from that security token.

<13> [Section 3.1.5.2.1.4](#): By default, the IP/STS does not include the [WindowsUserName \(section 3.1.5.2.1.4\)](#) element. It can be enabled for specific relying parties (see section [1.5](#)). Windows constructs the user name by including the **NetBIOS** domain name (as it is always available in this context) and Active Directory (AD) account name, separated by a backslash (for example, "DOMAIN\user name"). A Requestor IP/STS populates this field only if the user authenticated by using Active Directory (AD). A Resource IP/STS populates this field only if the user authenticated by using a security token from a Requestor IP/STS, in which case the value, if present, is copied from that security token.

<14> [Section 3.1.5.2.1.5](#): By default, the IP/STS does not include the [WindowsIdentifiers \(section 3.1.5.2.1.5\)](#) element. It can be enabled for specific relying parties (see section [1.5](#)).

A Requestor IP/STS populates this field only if the user authenticated by using Active Directory (AD). In this case, a [WindowsIdentifiers \(section 3.1.5.2.1.5\)](#) binary structure is constructed that contains a subset of the security identifiers (SIDs) associated with the AD account. The subset consists of the user SIDs, the **global group** SIDs, and the **universal group** SIDs. That structure is Base64-encoded and included in this field.

A Resource IP/STS populates this field only if the user authenticated by using a security token from a Requestor IP/STS. If the Security Assertion Markup Language (SAML) assertion issued by the Requestor IP/STS contains a **WindowsIdentifiers** field, its value is copied to this field. Otherwise, the Resource IP/STS maps claims from the SAML assertion of the Requestor IP/STS to SIDs based on local configuration (see section [1.5](#)). If any claims are mapped to SIDs, those SIDs are encoded

in a [WindowsIdentifiers \(section 3.1.5.2.1.5\)](#) binary structure with the NoUserSid flag set to 1 and the TryLocalAccount flag set based on local configuration (see section [1.5](#)). The structure is Base64-encoded and included in the **WindowsIdentifiers** field.

[<15> Section 3.1.6:](#) There are not any new timer events. The pending result is stored by using secure session cookies (see section [3.1.1.1.1](#)).

[<16> Section 3.2.1.1.1:](#) The aggregated result is maintained in secure session cookies written using Set-Cookie headers (as specified in [\[RFC2965\]](#)), which are added to the HTTP 302 response to the Web browser requestor.

[<17> Section 3.2.2:](#) There are no new timers. The aggregated result is stored using secure session cookies (see section [3.2.1.1.1](#)).

[<18> Section 3.2.5.1.1:](#) A special algorithm (described below) determines whether to use the Query String Response Transfer Protocol or not.

The algorithm is presented in pseudocode.

Let KnownClients be a constant set composed of the following strings, which specify **user agent** string fragments that are known to identify user agents that do not support scripting:

- "MS FrontPage"
- "Microsoft Office"
- "Test for Web Form Existence"
- "Microsoft Data Access Internet Publishing Provider"
- "Microsoft-WebDAV"

Let FileExtensionBypassList be a set of strings retrieved from local configuration (see section [1.5](#)) that identify file name extensions.

The algorithm follows:

```
IF local configuration forces Query String Response Transfer
Protocol
OR User-Agent is empty
OR User-Agent is in KnownClients
OR NOT User-Agent contains "Mozilla"
OR NOT Http-Verb is in (GET,POST) THEN
    Use Query String Response Transfer Protocol
ELSE
    IF local machine state indicates Windows Sharepoint Services
    AND NOT Request-URL's file extension is in
FileExtensionBypassList THEN
        Use Query String Response Transfer Protocol
    ELSE
        Use the base protocol specified in [MS-MWBF]
    END IF
END IF
```

[<19> Section 3.2.5.2:](#) By default, the Resource IP/STS ignores these fields and processes the security token as though the extension elements are absent. Their processing can be enabled for specific Requestor IP/STs (as specified in section [1.5](#)). Section [3.1.5.2.1](#) specifies how the

Resource IP/STS includes the fields. The Web service resource uses the fields to provide authorization services to a Web-based application on the same machine by using methods that are outside the scope of this protocol.

[<20> Section 3.2.6:](#) There are no new timer events. The aggregated result is stored by using secure session cookies (as specified in section [3.1.1.1.1](#)).

[<21> Section 5.1.2:](#) The inclusion of SIDs can be enabled for specific relying parties (as specified in section [1.5](#)).

[<22> Section 5.1.3:](#) A relying party that accepts security identifiers from an identity provider/security token service (IP/STS) in another security realm performs SID filtering based on local configuration that associates the IP/STS with a Windows domain (as specified in section [1.5](#)). For more information about SID filtering, see [\[MS-PAC\]](#) section 4.2.2.

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