

[MS-OAUTH2EX]:

OAuth 2.0 Authentication Protocol Extensions

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Revision Summary

| Date | Revision History | Revision Class | Comments |
|------------|------------------|----------------|--|
| 1/20/2012 | 0.1 | New | Released new document. |
| 4/11/2012 | 0.1 | None | No changes to the meaning, language, or formatting of the technical content. |
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| 10/1/2018 | 4.0 | Major | Significantly changed the technical content. |
| 7/20/2021 | 5.0 | Major | Significantly changed the technical content. |

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1 Introduction

OAuth 2.0 Authentication Protocol Extensions describes extensions to the OAuth 2.0 Authentication Protocol. These extensions consist of additional parameters in the request **URI** and the **JSON** objects returned in the **HTTP** response body.

Sections 1.5, 1.8, 1.9, 2, and 3 of this specification are normative. All other sections and examples in this specification are informative.

1.1 Glossary

This document uses the following terms:

Coordinated Universal Time (UTC): A high-precision atomic time standard that approximately tracks Universal Time (UT). It is the basis for legal, civil time all over the Earth. Time zones around the world are expressed as positive and negative offsets from UTC. In this role, it is also referred to as Zulu time (Z) and Greenwich Mean Time (GMT). In these specifications, all references to UTC refer to the time at UTC-0 (or GMT).

Hypertext Transfer Protocol (HTTP): An application-level protocol for distributed, collaborative, hypermedia information systems (text, graphic images, sound, video, and other multimedia files) on the World Wide Web.

Hypertext Transfer Protocol Secure (HTTPS): An extension of HTTP that securely encrypts and decrypts web page requests. In some older protocols, "Hypertext Transfer Protocol over Secure Sockets Layer" is still used (Secure Sockets Layer has been deprecated). For more information, see [\[SSL3\]](#) and [\[RFC5246\]](#).

JavaScript Object Notation (JSON): A text-based, data interchange format that is used to transmit structured data, typically in Asynchronous JavaScript + XML (AJAX) web applications, as described in [\[RFC7159\]](#). The JSON format is based on the structure of ECMAScript (Jscript, JavaScript) objects.

principal: An authenticated entity that initiates a message or channel in a distributed system.

realm: An administrative boundary that uses one set of authentication servers to manage and deploy a single set of unique identifiers. A realm is a unique logon space.

Representational State Transfer (REST): A class of web services that is used to transfer domain-specific data by using **HTTP**, without additional messaging layers or session tracking, and returns textual data, such as XML.

security token: An opaque message or data packet produced by a Generic Security Services (GSS)-style authentication package and carried by the application protocol. The application has no visibility into the contents of the **token**.

security token service (STS): A web service that issues claims and packages them in encrypted security tokens.

tenant: A protocol client or protocol server that accesses a partition in a shared service database.

token: A word in an item or a search query that translates into a meaningful word or number in written text. A token is the smallest textual unit that can be matched in a search query. Examples include "cat", "AB14", or "42".

Transmission Control Protocol (TCP): A protocol used with the Internet Protocol (IP) to send data in the form of message units between computers over the Internet. TCP handles keeping track of the individual units of data (called packets) that a message is divided into for efficient routing through the Internet.

Uniform Resource Identifier (URI): A string that identifies a resource. The URI is an addressing mechanism defined in Internet Engineering Task Force (IETF) Uniform Resource Identifier (URI): Generic Syntax [\[RFC3986\]](#).

Uniform Resource Locator (URL): A string of characters in a standardized format that identifies a document or resource on the World Wide Web. The format is as specified in [\[RFC1738\]](#).

X.509: An ITU-T standard for public key infrastructure subsequently adapted by the IETF, as specified in [\[RFC3280\]](#).

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

1.2 References

Links to a document in the Microsoft Open Specifications library point to the correct section in the most recently published version of the referenced document. However, because individual documents in the library are not updated at the same time, the section numbers in the documents may not match. You can confirm the correct section numbering by checking the [Errata](#).

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.

[IETF-DRAFT-JWT-LATEST] Jones, M., Bradley, J., and Sakimura, N., "JSON Web Token (JWT) draft-ietf-oauth-json-web-token-08", draft-ietf-oauth-json-web-token-08, May 2013, <http://datatracker.ietf.org/doc/draft-ietf-oauth-json-web-token/>

[IETF-DRAFT-OAuth2.0] Hammer-Lahav, E., Ed., Recordon, D., and Hardt, D., "The OAuth 2.0 Authorization Protocol", draft-ietf-oauth-v2-22, <http://tools.ietf.org/html/draft-ietf-oauth-v2-23>

[MS-SPS2SAUTH] Microsoft Corporation, "[OAuth 2.0 Authentication Protocol: SharePoint Profile](#)".

[RFC2119] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", BCP 14, RFC 2119, March 1997, <http://www.rfc-editor.org/rfc/rfc2119.txt>

[RFC2818] Rescorla, E., "HTTP Over TLS", RFC 2818, May 2000, <http://www.rfc-editor.org/rfc/rfc2818.txt>

[RFC3986] Berners-Lee, T., Fielding, R., and Masinter, L., "Uniform Resource Identifier (URI): Generic Syntax", STD 66, RFC 3986, January 2005, <http://www.rfc-editor.org/rfc/rfc3986.txt>

[RFC793] Postel, J., Ed., "Transmission Control Protocol: DARPA Internet Program Protocol Specification", RFC 793, September 1981, <http://www.rfc-editor.org/rfc/rfc793.txt>

1.2.2 Informative References

[MS-OXPROTO] Microsoft Corporation, "[Exchange Server Protocols System Overview](#)".

[MS-XOAUTH] Microsoft Corporation, "[OAuth 2.0 Authorization Protocol Extensions](#)".

[RFC2616] Fielding, R., Gettys, J., Mogul, J., et al., "Hypertext Transfer Protocol -- HTTP/1.1", RFC 2616, June 1999, <http://www.rfc-editor.org/rfc/rfc2616.txt>

1.3 Overview

This document describes extensions to the OAuth 2.0 Authentication Protocol. These extensions consist of additional parameters in the request **URI** and the JSON objects returned in the HTTP response body, as described in [\[RFC2616\]](#). These extensions provide additional functionality, such as finer granularity of token expiry periods, which is incremental over what is provided by the base specification.

1.4 Relationship to Other Protocols

This protocol extends and relies on the **OAuth 2.0 Authentication Protocol**, as specified by [\[MS-SPS2SAUTH\]](#). This protocol is related to the **OAuth 2.0 Authorization Protocol Extensions** as described in [\[MS-XOAUTH\]](#).

For conceptual background information and overviews of the relationships and interactions between this and other protocols, see [\[MS-OXPROTO\]](#).

1.5 Prerequisites/Preconditions

Applications using these extensions will have their **principal** identifiers registered as members of the **realm** managed by the **security token service (STS)** and are able to authenticate to it by exchanging secrets (public key material carried in **X.509** certificates). The applications will also trust tokens issued by the STS. These preconditions are established during deployment of new **tenants**.

1.6 Applicability Statement

These extensions are used in OAuth 2.0 Authentication requests for obtaining an access **token** for use with **REST** bases service requests.

1.7 Versioning and Capability Negotiation

None.

1.8 Vendor-Extensible Fields

None.

1.9 Standards Assignments

None.

2 Messages

2.1 Transport

This protocol transports messages over **TCP**, as specified in [\[RFC793\]](#), and does not pass any specific parameters to the transport. This protocol uses **HTTPS**, as specified in [\[RFC2818\]](#), to secure the **security tokens**.

2.2 Message Syntax

Parameters in these extensions are either transmitted in the request body in **URL**-encoded form or in the response as part of a JSON object. Tokens returned in conjunction with use of this protocol conform to the JSON Web Token (JWT) specification [\[IETFDRRAFT-JWT-LATEST\]](#).

XML based serialization is not used with these extensions or underlying protocols.

2.2.1 Common URI Parameters

The following parameters are used in conjunction with the OAuth 2.0 Authentication Protocol, as specified in [\[MS-SPS2SAUTH\]](#):

| URI Parameter | Type | Location/Usage | Description |
|---------------|-----------------------------------|---|---|
| Resource | string, URI value expected | Request body, URL-encoded | Indicates the target resource that the caller wants to talk to. Value is expected to be URI format as defined in [RFC3986] . This parameter MUST be present. |
| not_before | string, URI value expected | Response body in JSON object | A token returned in the OAuth parameter <i>access_token</i> , as specified in [IETFDRRAFT-OAuth2.0] , as part of this response is not valid before the time specified in this parameter. This parameter MUST be present. |
| expires_on | string, UTC value expected | Response body in JSON object | A token returned in the OAuth parameter <i>access_token</i> as part of this response will no longer be valid at the time specified in this parameter. This parameter MUST be present. |
| realm | string, URI value expected | Request body, URL-encoded or Response body in JSON object | Indicates the realm that the caller is part of. This parameter is optional. |
| created_on | string, UTC value expected | Request body, URL-encoded or Response body in JSON object | A token returned in the OAuth parameter <i>access_token</i> as part of this was created at the time specified in this parameter. This parameter is optional. |
| expires_in | string, int value expected | Response body in JSON object | The lifetime of the token returned in the OAuth parameter <i>access_token</i> as part of this response |

| URI Parameter | Type | Location/Usage | Description |
|---------------|------|----------------|---|
| | | | specified in seconds. This parameter is optional. |

Preliminary

3 Protocol Details

3.1 Common Details

This specification defines additional parameters for use with OAuth 2.0 Authentication Protocol messages specified in [\[MS-SPS2SAUTH\]](#).

These parameters convey additional semantics related to the access **token** being requested and about the access token returned as part of these messages. This specification does not define any additional messages over the base specification.

3.1.1 Abstract Data Model

The following parameters are used in conjunction with the OAuth 2.0 Authentication Protocol.

Mandatory parameters when using the extensions defined in this specification.

Parameter name: resource

Parameter usage location: Request body, URL encoded

Type: string, URI value expected

Semantics: This parameter indicates the target resource that the caller wants to talk to. Value is expected to be URI format as defined in RFC 3986

Parameter name: not_before

Parameter usage location: Response body in JSON object

Type: string, UTC value expected

Semantics: Token returned in the OAuth parameter access_token as part of this response is not valid before the time specified in this parameter.

Parameter name: expires_on

Parameter usage location: Response body in JSON object

Type: string, UTC value expected

Semantics: Token returned in the OAuth parameter access_token as part of this response will no longer be valid at the time specified in this parameter.

Optional parameters when using the extensions defined in this specification.

Parameter name: realm

Parameter usage location: Request body, URL encoded or Response body in JSON object

Type: string

Semantics: Indicates the realm that the caller is part of.

Parameter name: created_on

Parameter usage location: Request body, URL-encoded or Response body in JSON object

Type: string, UTC value expected

Semantics: Token returned in the OAuth parameter `access_token` as part of this was created at the time specified in this parameter.

Parameter name: `expires_in`

Parameter usage location: Response body in JSON object

Type: string, int value expected.

Semantics: Lifetime of the token returned in the OAuth parameter `access_token` as part of this response specified in seconds.

3.1.2 Timers

None.

3.1.3 Initialization

Connections made using the underlying OAuth 2.0 Authentication Protocol (specified in [\[MS-SPS2SAUTH\]](#)) are what initiate use of the extensions defined in this specification.

3.1.4 Higher-Layer Triggered Events

None.

3.1.5 Message Processing Events and Sequencing Rules

The **token** request contains the elements indicated in section [3.1.1](#).

3.1.5.1 Protected Resource

This resource indicates the protected resource that the user is trying to get access to.

3.1.5.1.1 Request Access

For gaining access to a resource, an access **token** with the elements mentioned in section [3.1.1](#) need to be presented.

3.1.5.1.1.1 Request Body

Refer to the section [4.1](#).

3.1.5.1.1.2 Response Body

Refer to the section [4.2](#).

3.1.5.1.1.3 Processing Details

None.

3.1.6 Timer Events

None.

3.1.7 Other Local Events

None.

Preliminary

4.3 Example request to receive a bearer challenge

The following is an example request to receive a bearer challenge.

```
POST https://example.com/api/SP.OAuth.NativeClient/Authenticate HTTP/1.1
Content-Type: application/x-www-form-urlencoded
Host: example.com
Expect: 100-continue
Authorization: Bearer
```

4.4 Response with bearer challenge

The following is an example response.

```
HTTP/1.1 200 OK
Cache-Control: public, no-store, max-age=0
Pragma: no-cache
Expires: Fri, 18 Nov 2011 22:28:59 GMT
Date: Fri, 18 Nov 2011 22:28:59 GMT
WWW-Authenticate: Bearer realm="750751f7-55c4-4af5-a44a-08137eb1c2de",client id="00000003-0000-0ff1-ce00-000000000000",trusted issuers="00000003-0000-0ff1-ce00-000000000000@750751f7-55c4-4af5-a44a-08137eb1c2de"
```

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5 Security

5.1 Security Considerations for Implementers

It is recommended that security considerations described in underlying specifications and in profiles referencing this extension specification be considered when using these extensions.

5.2 Index of Security Parameters

None.

Preliminary

6 Appendix A: Full JSON Schema

For ease of implementation, the following is the full JSON schema for this protocol.

```
"not_before" : {
  "type" : "string",
  "format" : "date-time"
},
"expires_on" : {
  "type" : "string",
  "format" : "date-time"
},
"realm" : {
  "type" : "string",
  "format" : "uri"
},
"created on" : {
  "type" : "string",
  "format" : "date-time"
},
"expires in" : {
  "type" : "integer"
}
}
```

Preliminary

7 Appendix B: Product Behavior

The information in this specification is applicable to the following Microsoft products or supplemental software. References to product versions include updates to those products.

- Microsoft Lync Client 2013/Skype for Business
- Microsoft Lync Server 2013
- Microsoft Exchange Server 2013
- Microsoft SharePoint Server 2013
- Microsoft SharePoint Foundation 2013
- Microsoft Skype for Business 2016
- Microsoft Skype for Business Server 2015
- Microsoft Exchange Server 2016
- Microsoft SharePoint Server 2016
- Microsoft Skype for Business Server 2019
- Microsoft Exchange Server 2019
- Microsoft SharePoint Server 2019
- Microsoft SharePoint Server Subscription Edition Preview

Exceptions, if any, are noted in this section. If an update version, service pack or Knowledge Base (KB) number appears with a product name, the behavior changed in that update. The new behavior also applies to subsequent updates unless otherwise specified. If a product edition appears with the product version, behavior is different in that product edition.

Unless otherwise specified, any statement of optional behavior in this specification that is prescribed using the terms "SHOULD" or "SHOULD NOT" implies product behavior in accordance with the SHOULD or SHOULD NOT prescription. Unless otherwise specified, the term "MAY" implies that the product does not follow the prescription.

8 Change Tracking

This section identifies changes that were made to this document since the last release. Changes are classified as Major, Minor, or None.

The revision class **Major** means that the technical content in the document was significantly revised. Major changes affect protocol interoperability or implementation. Examples of major changes are:

- A document revision that incorporates changes to interoperability requirements.
- A document revision that captures changes to protocol functionality.

The revision class **Minor** means that the meaning of the technical content was clarified. Minor changes do not affect protocol interoperability or implementation. Examples of minor changes are updates to clarify ambiguity at the sentence, paragraph, or table level.

The revision class **None** means that no new technical changes were introduced. Minor editorial and formatting changes may have been made, but the relevant technical content is identical to the last released version.

The changes made to this document are listed in the following table. For more information, please contact dochelp@microsoft.com.

| Section | Description | Revision class |
|--|-------------------------------------|----------------|
| Z Appendix B: Product Behavior | Updated list of supported products. | Major |

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