

OAuth Working Group  
Internet-Draft  
Intended status: Standards Track  
Expires: May 20, 2018

M. Jones  
Microsoft  
N. Sakimura  
NRI  
J. Bradley  
Ping Identity  
November 16, 2017

## **OAuth 2.0 Authorization Server Metadata draft-ietf-oauth-discovery-08**

### Abstract

This specification defines a metadata format that an OAuth 2.0 client can use to obtain the information needed to interact with an OAuth 2.0 authorization server, including its endpoint locations and authorization server capabilities.

### Status of This Memo

This Internet-Draft is submitted in full conformance with the provisions of [BCP 78](#) and [BCP 79](#).

Internet-Drafts are working documents of the Internet Engineering Task Force (IETF). Note that other groups may also distribute working documents as Internet-Drafts. The list of current Internet-Drafts is at <https://datatracker.ietf.org/drafts/current/>.

Internet-Drafts are draft documents valid for a maximum of six months and may be updated, replaced, or obsoleted by other documents at any time. It is inappropriate to use Internet-Drafts as reference material or to cite them other than as "work in progress."

This Internet-Draft will expire on May 20, 2018.

### Copyright Notice

Copyright (c) 2017 IETF Trust and the persons identified as the document authors. All rights reserved.

This document is subject to [BCP 78](#) and the IETF Trust's Legal Provisions Relating to IETF Documents (<https://trustee.ietf.org/license-info>) in effect on the date of publication of this document. Please review these documents carefully, as they describe your rights and restrictions with respect to this document. Code Components extracted from this document must include Simplified BSD License text as described in [Section 4.e](#) of

the Trust Legal Provisions and are provided without warranty as described in the Simplified BSD License.

## Table of Contents

<a href="#">1.</a>	<a href="#">Introduction</a>	<a href="#">2</a>
<a href="#">1.1.</a>	<a href="#">Requirements Notation and Conventions</a>	<a href="#">3</a>
<a href="#">1.2.</a>	<a href="#">Terminology</a>	<a href="#">3</a>
<a href="#">2.</a>	<a href="#">Authorization Server Metadata</a>	<a href="#">3</a>
<a href="#">2.1.</a>	<a href="#">Signed Authorization Server Metadata</a>	<a href="#">7</a>
<a href="#">3.</a>	<a href="#">Obtaining Authorization Server Metadata</a>	<a href="#">8</a>
<a href="#">3.1.</a>	<a href="#">Authorization Server Metadata Request</a>	<a href="#">9</a>
<a href="#">3.2.</a>	<a href="#">Authorization Server Metadata Response</a>	<a href="#">9</a>
<a href="#">3.3.</a>	<a href="#">Authorization Server Metadata Validation</a>	<a href="#">10</a>
<a href="#">4.</a>	<a href="#">String Operations</a>	<a href="#">11</a>
<a href="#">5.</a>	<a href="#">Compatibility Notes</a>	<a href="#">11</a>
<a href="#">6.</a>	<a href="#">Security Considerations</a>	<a href="#">11</a>
<a href="#">6.1.</a>	<a href="#">TLS Requirements</a>	<a href="#">11</a>
<a href="#">6.2.</a>	<a href="#">Impersonation Attacks</a>	<a href="#">12</a>
<a href="#">6.3.</a>	<a href="#">Publishing Metadata in a Standard Format</a>	<a href="#">12</a>
<a href="#">6.4.</a>	<a href="#">Protected Resources</a>	<a href="#">12</a>
<a href="#">7.</a>	<a href="#">IANA Considerations</a>	<a href="#">13</a>
<a href="#">7.1.</a>	<a href="#">OAuth Authorization Server Metadata Registry</a>	<a href="#">14</a>
<a href="#">7.1.1.</a>	<a href="#">Registration Template</a>	<a href="#">14</a>
<a href="#">7.1.2.</a>	<a href="#">Initial Registry Contents</a>	<a href="#">14</a>
<a href="#">7.2.</a>	<a href="#">Updated Registration Instructions</a>	<a href="#">17</a>
<a href="#">7.3.</a>	<a href="#">Well-Known URI Registry</a>	<a href="#">18</a>
<a href="#">7.3.1.</a>	<a href="#">Registry Contents</a>	<a href="#">18</a>
<a href="#">8.</a>	<a href="#">References</a>	<a href="#">18</a>
<a href="#">8.1.</a>	<a href="#">Normative References</a>	<a href="#">18</a>
<a href="#">8.2.</a>	<a href="#">Informative References</a>	<a href="#">20</a>
<a href="#">Appendix A.</a>	<a href="#">Acknowledgements</a>	<a href="#">21</a>
<a href="#">Appendix B.</a>	<a href="#">Document History</a>	<a href="#">21</a>
	<a href="#">Authors' Addresses</a>	<a href="#">23</a>

## 1. Introduction

This specification generalizes the metadata format defined by "OpenID Connect Discovery 1.0" [[OpenID.Discovery](#)] in a way that is compatible with OpenID Connect Discovery, while being applicable to a wider set of OAuth 2.0 use cases. This is intentionally parallel to the way that the "OAuth 2.0 Dynamic Client Registration Protocol" [[RFC7591](#)] specification generalized the dynamic client registration mechanisms defined by "OpenID Connect Dynamic Client Registration 1.0" [[OpenID.Registration](#)] in a way that was compatible with it.

The metadata for an authorization server is retrieved from a well-known location as a JSON [[RFC7159](#)] document, which declares its



endpoint locations and authorization server capabilities. This process is described in [Section 3](#).

This metadata can either be communicated in a self-asserted fashion by the server origin via HTTPS or as a set of signed metadata values represented as claims in a JSON Web Token (JWT) [[JWT](#)]. In the JWT case, the issuer is vouching for the validity of the data about the authorization server. This is analogous to the role that the Software Statement plays in OAuth Dynamic Client Registration [[RFC7591](#)].

The means by which the client chooses an authorization server is out of scope. In some cases, its issuer identifier may be manually configured into the client. In other cases, it may be dynamically discovered, for instance, through the use of WebFinger [[RFC7033](#)], as described in [Section 2](#) of "OpenID Connect Discovery 1.0" [[OpenID.Discovery](#)].

### **[1.1](#). Requirements Notation and Conventions**

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

All uses of JSON Web Signature (JWS) [[JWS](#)] and JSON Web Encryption (JWE) [[JWE](#)] data structures in this specification utilize the JWS Compact Serialization or the JWE Compact Serialization; the JWS JSON Serialization and the JWE JSON Serialization are not used.

### **[1.2](#). Terminology**

This specification uses the terms "Access Token", "Authorization Code", "Authorization Endpoint", "Authorization Grant", "Authorization Server", "Client", "Client Authentication", "Client Identifier", "Client Secret", "Grant Type", "Protected Resource", "Redirection URI", "Refresh Token", "Resource Owner", "Resource Server", "Response Type", and "Token Endpoint" defined by OAuth 2.0 [[RFC6749](#)], the terms "Claim Name", "Claim Value", and "JSON Web Token (JWT)" defined by JSON Web Token (JWT) [[JWT](#)], and the term "Response Mode" defined by OAuth 2.0 Multiple Response Type Encoding Practices [[OAuth.Responses](#)].

## **[2](#). Authorization Server Metadata**

Authorization servers can have metadata describing their configuration. The following authorization server metadata values



are used by this specification and are registered in the IANA "OAuth Authorization Server Metadata" registry established in [Section 7.1](#):

issuer

REQUIRED. The authorization server's issuer identifier, which is a URL that uses the "https" scheme and has no query or fragment components. This is the location where ".well-known" [RFC 5785](#) [[RFC5785](#)] resources containing information about the authorization server are published. Using these well-known resources is described in [Section 3](#). The issuer identifier is used to prevent authorization server mix-up attacks, as described in "OAuth 2.0 Mix-Up Mitigation" [[I-D.ietf-oauth-mix-up-mitigation](#)].

authorization\_endpoint

URL of the authorization server's authorization endpoint [[RFC6749](#)]. This is REQUIRED unless no grant types are supported that use the authorization endpoint.

token\_endpoint

URL of the authorization server's token endpoint [[RFC6749](#)]. This is REQUIRED unless only the implicit grant type is supported.

jwks\_uri

OPTIONAL. URL of the authorization server's JWK Set [[JWK](#)] document. The referenced document contains the signing key(s) the client uses to validate signatures from the authorization server. This URL MUST use the "https" scheme. The JWK Set MAY also contain the server's encryption key(s), which are used by clients to encrypt requests to the server. When both signing and encryption keys are made available, a "use" (public key use) parameter value is REQUIRED for all keys in the referenced JWK Set to indicate each key's intended usage.

registration\_endpoint

OPTIONAL. URL of the authorization server's OAuth 2.0 Dynamic Client Registration endpoint [[RFC7591](#)].

scopes\_supported

RECOMMENDED. JSON array containing a list of the OAuth 2.0 [[RFC6749](#)] "scope" values that this authorization server supports. Servers MAY choose not to advertise some supported scope values even when this parameter is used.

response\_types\_supported

REQUIRED. JSON array containing a list of the OAuth 2.0 "response\_type" values that this authorization server supports. The array values used are the same as those used with the



"response\_types" parameter defined by "OAuth 2.0 Dynamic Client Registration Protocol" [[RFC7591](#)].

response\_modes\_supported

OPTIONAL. JSON array containing a list of the OAuth 2.0 "response\_mode" values that this authorization server supports, as specified in OAuth 2.0 Multiple Response Type Encoding Practices [[OAuth.Responses](#)]. If omitted, the default is "["query", "fragment"]". The response mode value "form\_post" is also defined in OAuth 2.0 Form Post Response Mode [[OAuth.Post](#)].

grant\_types\_supported

OPTIONAL. JSON array containing a list of the OAuth 2.0 grant type values that this authorization server supports. The array values used are the same as those used with the "grant\_types" parameter defined by "OAuth 2.0 Dynamic Client Registration Protocol" [[RFC7591](#)]. If omitted, the default value is "["authorization\_code", "implicit"]".

token\_endpoint\_auth\_methods\_supported

OPTIONAL. JSON array containing a list of client authentication methods supported by this token endpoint. Client authentication method values are used in the "token\_endpoint\_auth\_method" parameter defined in [Section 2 of \[RFC7591\]](#). If omitted, the default is "client\_secret\_basic" -- the HTTP Basic Authentication Scheme specified in [Section 2.3.1](#) of OAuth 2.0 [[RFC6749](#)].

token\_endpoint\_auth\_signing\_alg\_values\_supported

OPTIONAL. JSON array containing a list of the JWS signing algorithms ("alg" values) supported by the token endpoint for the signature on the JWT [[JWT](#)] used to authenticate the client at the token endpoint for the "private\_key\_jwt" and "client\_secret\_jwt" authentication methods. This metadata entry MUST be present if either of these authentication methods are specified in the "token\_endpoint\_auth\_methods\_supported" entry. No default algorithms are implied if this entry is omitted. Servers SHOULD support "RS256". The value "none" MUST NOT be used.

service\_documentation

OPTIONAL. URL of a page containing human-readable information that developers might want or need to know when using the authorization server. In particular, if the authorization server does not support Dynamic Client Registration, then information on how to register clients needs to be provided in this documentation.

ui\_locales\_supported





OPTIONAL. Languages and scripts supported for the user interface, represented as a JSON array of [BCP47](#) [[RFC5646](#)] language tag values. If omitted, the set of supported languages and scripts is unspecified.

#### op\_policy\_uri

OPTIONAL. URL that the authorization server provides to the person registering the client to read about the authorization server's requirements on how the client can use the data provided by the authorization server. The registration process SHOULD display this URL to the person registering the client if it is given. As described in [Section 5](#), despite the identifier "op\_policy\_uri", appearing to be OpenID-specific, its usage in this specification is actually referring to a general OAuth 2.0 feature that is not specific to OpenID Connect.

#### op\_tos\_uri

OPTIONAL. URL that the authorization server provides to the person registering the client to read about the authorization server's terms of service. The registration process SHOULD display this URL to the person registering the client if it is given. As described in [Section 5](#), despite the identifier "op\_tos\_uri", appearing to be OpenID-specific, its usage in this specification is actually referring to a general OAuth 2.0 feature that is not specific to OpenID Connect.

#### revocation\_endpoint

OPTIONAL. URL of the authorization server's OAuth 2.0 revocation endpoint [[RFC7009](#)].

#### revocation\_endpoint\_auth\_methods\_supported

OPTIONAL. JSON array containing a list of client authentication methods supported by this revocation endpoint. The valid client authentication method values are those registered in the IANA "OAuth Token Endpoint Authentication Methods" registry [[IANA.OAuth.Parameters](#)]. If omitted, the default is "client\_secret\_basic" -- the HTTP Basic Authentication Scheme specified in [Section 2.3.1](#) of OAuth 2.0 [[RFC6749](#)].

#### revocation\_endpoint\_auth\_signing\_alg\_values\_supported

OPTIONAL. JSON array containing a list of the JWS signing algorithms ("alg" values) supported by the revocation endpoint for the signature on the JWT [[JWT](#)] used to authenticate the client at the revocation endpoint for the "private\_key\_jwt" and "client\_secret\_jwt" authentication methods. This metadata entry MUST be present if either of these authentication methods are specified in the "revocation\_endpoint\_auth\_methods\_supported"



entry. No default algorithms are implied if this entry is omitted. The value "none" MUST NOT be used.

`introspection_endpoint`

OPTIONAL. URL of the authorization server's OAuth 2.0 introspection endpoint [[RFC7662](#)].

`introspection_endpoint_auth_methods_supported`

OPTIONAL. JSON array containing a list of client authentication methods supported by this introspection endpoint. The valid client authentication method values are those registered in the IANA "OAuth Token Endpoint Authentication Methods" registry [[IANA.OAuth.Parameters](#)] or those registered in the IANA "OAuth Access Token Types" registry [[IANA.OAuth.Parameters](#)]. (These values are and will remain distinct, due to [Section 7.2](#).) If omitted, the set of supported authentication methods MUST be determined by other means.

`introspection_endpoint_auth_signing_alg_values_supported`

OPTIONAL. JSON array containing a list of the JWS signing algorithms ("alg" values) supported by the introspection endpoint for the signature on the JWT [[JWT](#)] used to authenticate the client at the introspection endpoint for the "private\_key\_jwt" and "client\_secret\_jwt" authentication methods. This metadata entry MUST be present if either of these authentication methods are specified in the "introspection\_endpoint\_auth\_methods\_supported" entry. No default algorithms are implied if this entry is omitted. The value "none" MUST NOT be used.

`code_challenge_methods_supported`

OPTIONAL. JSON array containing a list of PKCE [[RFC7636](#)] code challenge methods supported by this authorization server. Code challenge method values are used in the "code\_challenge\_method" parameter defined in [Section 4.3 of \[RFC7636\]](#). The valid code challenge method values are those registered in the IANA "PKCE Code Challenge Methods" registry [[IANA.OAuth.Parameters](#)]. If omitted, the authorization server does not support PKCE.

Additional authorization server metadata parameters MAY also be used. Some are defined by other specifications, such as OpenID Connect Discovery 1.0 [[OpenID.Discovery](#)].

## **[2.1](#). Signed Authorization Server Metadata**

In addition to JSON elements, metadata values MAY also be provided as a "signed\_metadata" value, which is a JSON Web Token (JWT) [[JWT](#)] that asserts metadata values about the authorization server as a bundle. A set of claims that can be used in signed metadata are defined in



[Section 2](#). The signed metadata **MUST** be digitally signed or MACed using JSON Web Signature (JWS) [[JWS](#)] and **MUST** contain an "iss" (issuer) claim denoting the party attesting to the claims in the signed metadata. Consumers of the metadata **MAY** ignore the signed metadata if they do not support this feature. If the consumer of the metadata supports signed metadata, metadata values conveyed in the signed metadata **MUST** take precedence over the corresponding values conveyed using plain JSON elements.

Signed metadata is included in the authorization server metadata JSON object using this **OPTIONAL** member:

signed\_metadata

A JWT containing metadata values about the authorization server as claims. This is a string value consisting of the entire signed JWT. A "signed\_metadata" metadata value **SHOULD NOT** appear as a claim in the JWT.

### **3. Obtaining Authorization Server Metadata**

Authorization servers supporting metadata **MUST** make a JSON document containing metadata as specified in [Section 2](#) available at a path formed by concatenating a well-known URI string to the authorization server's issuer identifier. By default, the well-known URI string used is `"/.well-known/oauth-authorization-server"`. This path **MUST** use the "https" scheme. The syntax and semantics of ".well-known" are defined in [RFC 5785](#) [[RFC5785](#)]. The well-known URI path suffix used **MUST** be registered in the IANA "Well-Known URIs" registry [[IANA.well-known](#)].

Different applications utilizing OAuth authorization servers in application-specific ways may define and register different well-known URI path suffixes used to publish authorization server metadata as used by those applications. For instance, if the Example application uses an OAuth authorization server in an Example-specific way, and there are Example-specific metadata values that it needs to publish, then it might register and use the "example-configuration" URI path suffix and publish the metadata document at the path formed by concatenating `"/.well-known/example-configuration"` to the authorization server's issuer identifier. Alternatively, many such applications will use the default well-known URI string `"/.well-known/oauth-authorization-server"`, which is the right choice for general-purpose OAuth authorization servers, and not register an application-specific one.

An OAuth 2.0 application using this specification **MUST** specify what well-known URI string it will use for this purpose. The same authorization server **MAY** choose to publish its metadata at multiple



well-known locations relative to its issuer identifier, for example, publishing metadata at both `"/.well-known/example-configuration"` and `"/.well-known/oauth-authorization-server"`.

Some OAuth applications will choose to use the well-known URI path suffix `"openid-configuration"` and publish the metadata document at the path formed by concatenating `"/.well-known/openid-configuration"` to the authorization server's issuer identifier. As described in [Section 5](#), despite the identifier `"/.well-known/openid-configuration"`, appearing to be OpenID-specific, its usage in this specification is actually referring to a general OAuth 2.0 feature that is not specific to OpenID Connect.

### **3.1. Authorization Server Metadata Request**

An authorization server metadata document **MUST** be queried using an HTTP `"GET"` request at the previously specified path.

The client would make the following request when the issuer identifier is `"https://example.com"` and the well-known URI path suffix is `"oauth-authorization-server"` to obtain the metadata, since the issuer identifier contains no path component:

```
GET /.well-known/oauth-authorization-server HTTP/1.1
Host: example.com
```

If the issuer identifier value contains a path component, any terminating `"/"` **MUST** be removed before appending `"/.well-known/"` and the well-known URI path suffix. The client would make the following request when the issuer identifier is `"https://example.com/issuer1"` and the well-known URI path suffix is `"oauth-authorization-server"` to obtain the metadata, since the issuer identifier contains a path component:

```
GET /issuer1/.well-known/oauth-authorization-server HTTP/1.1
Host: example.com
```

Using path components enables supporting multiple issuers per host. This is required in some multi-tenant hosting configurations. This use of `".well-known"` is for supporting multiple issuers per host; unlike its use in [RFC 5785](#) [[RFC5785](#)], it does not provide general information about the host.

### **3.2. Authorization Server Metadata Response**

The response is a set of claims about the authorization server's configuration, including all necessary endpoints and public key location information. A successful response **MUST** use the 200 OK HTTP





status code and return a JSON object using the "application/json" content type that contains a set of claims as its members that are a subset of the metadata values defined in [Section 2](#). Other claims MAY also be returned.

Claims that return multiple values are represented as JSON arrays. Claims with zero elements MUST be omitted from the response.

An error response uses the applicable HTTP status code value.

The following is a non-normative example response:

```
HTTP/1.1 200 OK
Content-Type: application/json

{
  "issuer":
    "https://server.example.com",
  "authorization_endpoint":
    "https://server.example.com/authorize",
  "token_endpoint":
    "https://server.example.com/token",
  "token_endpoint_auth_methods_supported":
    ["client_secret_basic", "private_key_jwt"],
  "token_endpoint_auth_signing_alg_values_supported":
    ["RS256", "ES256"],
  "userinfo_endpoint":
    "https://server.example.com/userinfo",
  "jwks_uri":
    "https://server.example.com/jwks.json",
  "registration_endpoint":
    "https://server.example.com/register",
  "scopes_supported":
    ["openid", "profile", "email", "address",
     "phone", "offline_access"],
  "response_types_supported":
    ["code", "code token"],
  "service_documentation":
    "http://server.example.com/service_documentation.html",
  "ui_locales_supported":
    ["en-US", "en-GB", "en-CA", "fr-FR", "fr-CA"]
}
```

### **3.3. Authorization Server Metadata Validation**

The "issuer" value returned MUST be identical to the authorization server's issuer identifier value that was concatenated with the well-known URI path suffix to create the URL used to retrieve the



metadata. If these values are not identical, the data contained in the response MUST NOT be used.

#### **4. String Operations**

Processing some OAuth 2.0 messages requires comparing values in the messages to known values. For example, the member names in the metadata response might be compared to specific member names such as "issuer". Comparing Unicode [[UNICODE](#)] strings, however, has significant security implications.

Therefore, comparisons between JSON strings and other Unicode strings MUST be performed as specified below:

1. Remove any JSON applied escaping to produce an array of Unicode code points.
2. Unicode Normalization [[USA15](#)] MUST NOT be applied at any point to either the JSON string or to the string it is to be compared against.
3. Comparisons between the two strings MUST be performed as a Unicode code point to code point equality comparison.

#### **5. Compatibility Notes**

The identifiers `"/.well-known/openid-configuration"`, `"op_policy_uri"`, and `"op_tos_uri"` contain strings referring to the OpenID Connect [[OpenID.Core](#)] family of specifications that were originally defined by "OpenID Connect Discovery 1.0" [[OpenID.Discovery](#)]. Despite the reuse of these identifiers that appear to be OpenID-specific, their usage in this specification is actually referring to general OAuth 2.0 features that are not specific to OpenID Connect.

#### **6. Security Considerations**

##### **6.1. TLS Requirements**

Implementations MUST support TLS. Which version(s) ought to be implemented will vary over time and depend on the widespread deployment and known security vulnerabilities at the time of implementation. The authorization server MUST support TLS version 1.2 [[RFC5246](#)] and MAY support additional transport-layer security mechanisms meeting its security requirements. When using TLS, the client MUST perform a TLS/SSL server certificate check, per [RFC 6125](#) [[RFC6125](#)]. Implementation security considerations can be found in Recommendations for Secure Use of TLS and DTLS [[BCP195](#)].



To protect against information disclosure and tampering, confidentiality protection **MUST** be applied using TLS with a ciphersuite that provides confidentiality and integrity protection.

## **6.2.    Impersonation Attacks**

TLS certificate checking **MUST** be performed by the client, as described in [Section 6.1](#), when making an authorization server metadata request. Checking that the server certificate is valid for the issuer identifier URL prevents man-in-middle and DNS-based attacks. These attacks could cause a client to be tricked into using an attacker's keys and endpoints, which would enable impersonation of the legitimate authorization server. If an attacker can accomplish this, they can access the resources that the affected client has access to using the authorization server that they are impersonating.

An attacker may also attempt to impersonate an authorization server by publishing a metadata document that contains an "issuer" claim using the issuer identifier URL of the authorization server being impersonated, but with its own endpoints and signing keys. This would enable it to impersonate that authorization server, if accepted by the client. To prevent this, the client **MUST** ensure that the issuer identifier URL it is using as the prefix for the metadata request exactly matches the value of the "issuer" metadata value in the authorization server metadata document received by the client.

## **6.3.    Publishing Metadata in a Standard Format**

Publishing information about the authorization server in a standard format makes it easier for both legitimate clients and attackers to use the authorization server. Whether an authorization server publishes its metadata in an ad-hoc manner or in the standard format defined by this specification, the same defenses against attacks that might be mounted that use this information should be applied.

## **6.4.    Protected Resources**

Secure determination of appropriate protected resources to use with an authorization server for all use cases is out of scope of this specification. This specification assumes that the client has a means of determining appropriate protected resources to use with an authorization server and that the client is using the correct metadata for each authorization server. Implementers need to be aware that if an inappropriate protected resource is used by the client, that an attacker may be able to act as a man-in-the-middle proxy to a valid protected resource without it being detected by the authorization server or the client.



The ways to determine the appropriate protected resources to use with an authorization server are in general, application-dependent. For instance, some authorization servers are used with a fixed protected resource or set of protected resources, the locations of which may be well known, or which could be published as metadata values by the authorization server. In other cases, the set of resources that can be used with an authorization server can be dynamically changed by administrative actions. Many other means of determining appropriate associations between authorization servers and protected resources are also possible.

## **7. IANA Considerations**

The following registration procedure is used for the registry established by this specification.

Values are registered on a Specification Required [[RFC8126](#)] basis after a two-week review period on the `oauth-ext-review@ietf.org` mailing list, on the advice of one or more Designated Experts. However, to allow for the allocation of values prior to publication, the Designated Experts may approve registration once they are satisfied that such a specification will be published.

Registration requests sent to the mailing list for review should use an appropriate subject (e.g., "Request to register OAuth Authorization Server Metadata: example").

Within the review period, the Designated Experts will either approve or deny the registration request, communicating this decision to the review list and IANA. Denials should include an explanation and, if applicable, suggestions as to how to make the request successful. Registration requests that are undetermined for a period longer than 21 days can be brought to the IESG's attention (using the `iesg@ietf.org` mailing list) for resolution.

Criteria that should be applied by the Designated Experts includes determining whether the proposed registration duplicates existing functionality, determining whether it is likely to be of general applicability or whether it is useful only for a single application, and whether the registration makes sense.

IANA must only accept registry updates from the Designated Experts and should direct all requests for registration to the review mailing list.

It is suggested that multiple Designated Experts be appointed who are able to represent the perspectives of different applications using this specification, in order to enable broadly-informed review of





registration decisions. In cases where a registration decision could be perceived as creating a conflict of interest for a particular Expert, that Expert should defer to the judgment of the other Experts.

### **7.1.    OAuth Authorization Server Metadata Registry**

This specification establishes the IANA "OAuth Authorization Server Metadata" registry for OAuth 2.0 authorization server metadata names. The registry records the authorization server metadata member and a reference to the specification that defines it.

#### **7.1.1.    Registration Template**

Metadata Name:

The name requested (e.g., "issuer"). This name is case-sensitive. Names may not match other registered names in a case-insensitive manner unless the Designated Experts state that there is a compelling reason to allow an exception.

Metadata Description:

Brief description of the metadata (e.g., "Issuer identifier URL").

Change Controller:

For Standards Track RFCs, list the "IESG". For others, give the name of the responsible party. Other details (e.g., postal address, email address, home page URI) may also be included.

Specification Document(s):

Reference to the document or documents that specify the parameter, preferably including URIs that can be used to retrieve copies of the documents. An indication of the relevant sections may also be included but is not required.

#### **7.1.2.    Initial Registry Contents**

- o Metadata Name: "issuer"
- o Metadata Description: Authorization server's issuer identifier URL
- o Change Controller: IESG
- o Specification Document(s): [Section 2](#) of [[ this specification ]]
  
- o Metadata Name: "authorization\_endpoint"
- o Metadata Description: URL of the authorization server's authorization endpoint
- o Change Controller: IESG
- o Specification Document(s): [Section 2](#) of [[ this specification ]]
  
- o Metadata Name: "token\_endpoint"



- o Metadata Description: URL of the authorization server's token endpoint
- o Change Controller: IESG
- o Specification Document(s): [Section 2](#) of [[ this specification ]]
  
- o Metadata Name: "jwks\_uri"
- o Metadata Description: URL of the authorization server's JWK Set document
- o Change Controller: IESG
- o Specification Document(s): [Section 2](#) of [[ this specification ]]
  
- o Metadata Name: "registration\_endpoint"
- o Metadata Description: URL of the authorization server's OAuth 2.0 Dynamic Client Registration Endpoint
- o Change Controller: IESG
- o Specification Document(s): [Section 2](#) of [[ this specification ]]
  
- o Metadata Name: "scopes\_supported"
- o Metadata Description: JSON array containing a list of the OAuth 2.0 "scope" values that this authorization server supports
- o Change Controller: IESG
- o Specification Document(s): [Section 2](#) of [[ this specification ]]
  
- o Metadata Name: "response\_types\_supported"
- o Metadata Description: JSON array containing a list of the OAuth 2.0 "response\_type" values that this authorization server supports
- o Change Controller: IESG
- o Specification Document(s): [Section 2](#) of [[ this specification ]]
  
- o Metadata Name: "response\_modes\_supported"
- o Metadata Description: JSON array containing a list of the OAuth 2.0 "response\_mode" values that this authorization server supports
- o Change Controller: IESG
- o Specification Document(s): [Section 2](#) of [[ this specification ]]
  
- o Metadata Name: "grant\_types\_supported"
- o Metadata Description: JSON array containing a list of the OAuth 2.0 grant type values that this authorization server supports
- o Change Controller: IESG
- o Specification Document(s): [Section 2](#) of [[ this specification ]]
  
- o Metadata Name: "token\_endpoint\_auth\_methods\_supported"
- o Metadata Description: JSON array containing a list of client authentication methods supported by this token endpoint
- o Change Controller: IESG
- o Specification Document(s): [Section 2](#) of [[ this specification ]]
  
- o Metadata Name: "token\_endpoint\_auth\_signing\_alg\_values\_supported"



- o Metadata Description: JSON array containing a list of the JWS signing algorithms supported by the token endpoint for the signature on the JWT used to authenticate the client at the token endpoint
- o Change Controller: IESG
- o Specification Document(s): [Section 2](#) of [[ this specification ]]
  
- o Metadata Name: "service\_documentation"
- o Metadata Description: URL of a page containing human-readable information that developers might want or need to know when using the authorization server
- o Change Controller: IESG
- o Specification Document(s): [Section 2](#) of [[ this specification ]]
  
- o Metadata Name: "ui\_locales\_supported"
- o Metadata Description: Languages and scripts supported for the user interface, represented as a JSON array of [BCP47](#) language tag values
- o Change Controller: IESG
- o Specification Document(s): [Section 2](#) of [[ this specification ]]
  
- o Metadata Name: "op\_policy\_uri"
- o Metadata Description: URL that the authorization server provides to the person registering the client to read about the authorization server's requirements on how the client can use the data provided by the authorization server
- o Change Controller: IESG
- o Specification Document(s): [Section 2](#) of [[ this specification ]]
  
- o Metadata Name: "op\_tos\_uri"
- o Metadata Description: URL that the authorization server provides to the person registering the client to read about the authorization server's terms of service
- o Change Controller: IESG
- o Specification Document(s): [Section 2](#) of [[ this specification ]]
  
- o Metadata Name: "revocation\_endpoint"
- o Metadata Description: URL of the authorization server's OAuth 2.0 revocation endpoint
- o Change Controller: IESG
- o Specification Document(s): [Section 2](#) of [[ this specification ]]
  
- o Metadata Name: "revocation\_endpoint\_auth\_methods\_supported"
- o Metadata Description: JSON array containing a list of client authentication methods supported by this revocation endpoint
- o Change Controller: IESG
- o Specification Document(s): [Section 2](#) of [[ this specification ]]



- o Metadata Name:  
"revocation\_endpoint\_auth\_signing\_alg\_values\_supported"
- o Metadata Description: JSON array containing a list of the JWS signing algorithms supported by the revocation endpoint for the signature on the JWT used to authenticate the client at the revocation endpoint
- o Change Controller: IESG
- o Specification Document(s): [Section 2](#) of [[ this specification ]]
  
- o Metadata Name: "introspection\_endpoint"
- o Metadata Description: URL of the authorization server's OAuth 2.0 introspection endpoint
- o Change Controller: IESG
- o Specification Document(s): [Section 2](#) of [[ this specification ]]
  
- o Metadata Name: "introspection\_endpoint\_auth\_methods\_supported"
- o Metadata Description: JSON array containing a list of client authentication methods supported by this introspection endpoint
- o Change Controller: IESG
- o Specification Document(s): [Section 2](#) of [[ this specification ]]
  
- o Metadata Name:  
"introspection\_endpoint\_auth\_signing\_alg\_values\_supported"
- o Metadata Description: JSON array containing a list of the JWS signing algorithms supported by the introspection endpoint for the signature on the JWT used to authenticate the client at the introspection endpoint
- o Change Controller: IESG
- o Specification Document(s): [Section 2](#) of [[ this specification ]]
  
- o Metadata Name: "code\_challenge\_methods\_supported"
- o Metadata Description: PKCE code challenge methods supported by this authorization server
- o Change Controller: IESG
- o Specification Document(s): [Section 2](#) of [[ this specification ]]

## **[7.2.](#) Updated Registration Instructions**

This specification adds to the instructions for the Designated Experts of the following IANA registries, both of which are in the "OAuth Parameters" registry [[IANA.OAuth.Parameters](#)]:

- o OAuth Access Token Types
- o OAuth Token Endpoint Authentication Methods

IANA has added a link to this specification in the Reference sections of these registries. [[ RFC Editor: The above sentence is written in the past tense as it would appear in the final specification, even





though these links won't actually be created until after the IESG has requested publication of the specification. Please delete this note after the links are in place. ]]

For these registries, the designated experts must reject registration requests in one registry for values already occurring in the other registry. This is necessary because the "introspection\_endpoint\_auth\_methods\_supported" parameter allows for the use of values from either registry. That way, because the values in the two registries will continue to be mutually exclusive, no ambiguities will arise.

### **7.3. Well-Known URI Registry**

This specification registers the well-known URI defined in [Section 3](#) in the IANA "Well-Known URIs" registry [[IANA.well-known](#)] established by [RFC 5785](#) [[RFC5785](#)].

#### **7.3.1. Registry Contents**

- o URI suffix: "oauth-authorization-server"
- o Change controller: IESG
- o Specification document: [Section 3](#) of [[ this specification ]]
- o Related information: (none)

## **8. References**

### **8.1. Normative References**

- [BCP195]    Sheffer, Y., Holz, R., and P. Saint-Andre,  
"Recommendations for Secure Use of Transport Layer  
Security (TLS) and Datagram Transport Layer Security  
(DTLS)", [BCP 195](#), [RFC 7525](#), DOI 10.17487/RFC7525, May  
2015, <<http://www.rfc-editor.org/info/bcp195>>.
- [IANA.OAuth.Parameters]  
IANA, "OAuth Parameters",  
<<http://www.iana.org/assignments/oauth-parameters>>.
- [JWE]       Jones, M. and J. Hildebrand, "JSON Web Encryption (JWE)",  
[RFC 7516](#), DOI 10.17487/RFC7516, May 2015,  
<<http://tools.ietf.org/html/rfc7516>>.
- [JWK]       Jones, M., "JSON Web Key (JWK)", [RFC 7517](#),  
DOI 10.17487/RFC7517, May 2015,  
<<http://tools.ietf.org/html/rfc7517>>.



- [JWS]        Jones, M., Bradley, J., and N. Sakimura, "JSON Web Signature (JWS)", [RFC 7515](#), DOI 10.17487/RFC7515, May 2015, <<http://tools.ietf.org/html/rfc7515>>.
  
- [JWT]        Jones, M., Bradley, J., and N. Sakimura, "JSON Web Token (JWT)", [RFC 7519](#), DOI 10.17487/RFC7519, May 2015, <<http://tools.ietf.org/html/rfc7519>>.
  
- [OAuth.Post]        Jones, M. and B. Campbell, "OAuth 2.0 Form Post Response Mode", April 2015, <[http://openid.net/specs/oauth-v2-form-post-response-mode-1\\_0.html](http://openid.net/specs/oauth-v2-form-post-response-mode-1_0.html)>.
  
- [OAuth.Responses]        de Medeiros, B., Ed., Scurtescu, M., Tarjan, P., and M. Jones, "OAuth 2.0 Multiple Response Type Encoding Practices", February 2014, <[http://openid.net/specs/oauth-v2-multiple-response-types-1\\_0.html](http://openid.net/specs/oauth-v2-multiple-response-types-1_0.html)>.
  
- [RFC2119]        Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", [BCP 14](#), [RFC 2119](#), DOI 10.17487/RFC2119, March 1997, <<http://www.rfc-editor.org/info/rfc2119>>.
  
- [RFC5246]        Dierks, T. and E. Rescorla, "The Transport Layer Security (TLS) Protocol Version 1.2", [RFC 5246](#), DOI 10.17487/RFC5246, August 2008, <<https://www.rfc-editor.org/info/rfc5246>>.
  
- [RFC5646]        Phillips, A., Ed. and M. Davis, Ed., "Tags for Identifying Languages", [BCP 47](#), [RFC 5646](#), DOI 10.17487/RFC5646, September 2009, <<https://www.rfc-editor.org/info/rfc5646>>.
  
- [RFC5785]        Nottingham, M. and E. Hammer-Lahav, "Defining Well-Known Uniform Resource Identifiers (URIs)", [RFC 5785](#), DOI 10.17487/RFC5785, April 2010, <<https://www.rfc-editor.org/info/rfc5785>>.
  
- [RFC6125]        Saint-Andre, P. and J. Hodges, "Representation and Verification of Domain-Based Application Service Identity within Internet Public Key Infrastructure Using X.509 (PKIX) Certificates in the Context of Transport Layer Security (TLS)", [RFC 6125](#), DOI 10.17487/RFC6125, March 2011, <<https://www.rfc-editor.org/info/rfc6125>>.
  
- [RFC6749]        Hardt, D., Ed., "The OAuth 2.0 Authorization Framework", [RFC 6749](#), DOI 10.17487/RFC6749, October 2012, <<https://www.rfc-editor.org/info/rfc6749>>.



- [RFC7009] Lodderstedt, T., Ed., Dronia, S., and M. Scurtescu, "OAuth 2.0 Token Revocation", [RFC 7009](#), DOI 10.17487/RFC7009, August 2013, <<https://www.rfc-editor.org/info/rfc7009>>.
- [RFC7033] Jones, P., Salgueiro, G., Jones, M., and J. Smarr, "WebFinger", [RFC 7033](#), DOI 10.17487/RFC7033, September 2013, <<https://www.rfc-editor.org/info/rfc7033>>.
- [RFC7159] Bray, T., Ed., "The JavaScript Object Notation (JSON) Data Interchange Format", [RFC 7159](#), DOI 10.17487/RFC7159, March 2014, <<https://www.rfc-editor.org/info/rfc7159>>.
- [RFC7591] Richer, J., Ed., Jones, M., Bradley, J., Machulak, M., and P. Hunt, "OAuth 2.0 Dynamic Client Registration Protocol", [RFC 7591](#), DOI 10.17487/RFC7591, July 2015, <<https://www.rfc-editor.org/info/rfc7591>>.
- [RFC7636] Sakimura, N., Ed., Bradley, J., and N. Agarwal, "Proof Key for Code Exchange by OAuth Public Clients", [RFC 7636](#), DOI 10.17487/RFC7636, September 2015, <<https://www.rfc-editor.org/info/rfc7636>>.
- [RFC7662] Richer, J., Ed., "OAuth 2.0 Token Introspection", [RFC 7662](#), DOI 10.17487/RFC7662, October 2015, <<https://www.rfc-editor.org/info/rfc7662>>.
- [RFC8126] Cotton, M., Leiba, B., and T. Narten, "Guidelines for Writing an IANA Considerations Section in RFCs", [BCP 26](#), [RFC 8126](#), DOI 10.17487/RFC8126, June 2017, <<https://www.rfc-editor.org/info/rfc8126>>.
- [UNICODE] The Unicode Consortium, "The Unicode Standard", <<http://www.unicode.org/versions/latest/>>.
- [USA15] Davis, M. and K. Whistler, "Unicode Normalization Forms", Unicode Standard Annex 15, June 2015, <<http://www.unicode.org/reports/tr15/>>.

## **8.2. Informative References**

- [I-D.ietf-oauth-mix-up-mitigation]  
Jones, M., Bradley, J., and N. Sakimura, "OAuth 2.0 Mix-Up Mitigation", [draft-ietf-oauth-mix-up-mitigation-01](#) (work in progress), July 2016.
- [IANA.well-known]  
IANA, "Well-Known URIs", <<http://www.iana.org/assignments/well-known-uris>>.



[OpenID.Core]

Sakimura, N., Bradley, J., Jones, M., de Medeiros, B., and C. Mortimore, "OpenID Connect Core 1.0", November 2014, <[http://openid.net/specs/openid-connect-core-1\\_0.html](http://openid.net/specs/openid-connect-core-1_0.html)>.

[OpenID.Discovery]

Sakimura, N., Bradley, J., Jones, M., and E. Jay, "OpenID Connect Discovery 1.0", November 2014, <[http://openid.net/specs/openid-connect-discovery-1\\_0.html](http://openid.net/specs/openid-connect-discovery-1_0.html)>.

[OpenID.Registration]

Sakimura, N., Bradley, J., and M. Jones, "OpenID Connect Dynamic Client Registration 1.0", November 2014, <[http://openid.net/specs/openid-connect-registration-1\\_0.html](http://openid.net/specs/openid-connect-registration-1_0.html)>.

## **Appendix A.   Acknowledgements**

This specification is based on the OpenID Connect Discovery 1.0 specification, which was produced by the OpenID Connect working group of the OpenID Foundation. This specification standardizes the de facto usage of the metadata format defined by OpenID Connect Discovery to publish OAuth authorization server metadata.

The authors would like to thank the following people for their reviews of this specification: Shwetha Bhandari, Brian Campbell, Brian Carpenter, William Denniss, Vladimir Dzhuvinov, Donald Eastlake, Samuel Erdtman, George Fletcher, Dick Hardt, Phil Hunt, Tony Nadalin, Mark Nottingham, Eric Rescorla, Justin Richer, Hannes Tschofenig, and Hans Zandbelt.

## **Appendix B.   Document History**

[[ to be removed by the RFC Editor before publication as an RFC ]]

-08

- o Changed the "authorization\_endpoint" to be REQUIRED only when grant types are supported that use the authorization endpoint.
- o Added the statement, to provide historical context, that this specification standardizes the de facto usage of the metadata format defined by OpenID Connect Discovery to publish OAuth authorization server metadata.





- o Applied clarifications suggested by Mark Nottingham about when application-specific well-known suffixes are and are not appropriate.

- o Acknowledged additional reviewers.

-07

- o Applied clarifications suggested by EKR.

-06

- o Incorporated resolutions to working group last call comments.

-05

- o Removed the "protected\_resources" element and the reference to [draft-jones-oauth-resource-metadata](#).

-04

- o Added the ability to list protected resources with the "protected\_resources" element.
- o Added ability to provide signed metadata with the "signed\_metadata" element.
- o Removed "Discovery" from the name, since this is now just about authorization server metadata.

-03

- o Changed term "issuer URL" to "issuer identifier" for terminology consistency, paralleling the same terminology consistency change in the mix-up mitigation spec.

-02

- o Changed the title to OAuth 2.0 Authorization Server Discovery Metadata.
- o Made "jwks\_uri" and "registration\_endpoint" OPTIONAL.
- o Defined the well-known URI string `"/.well-known/oauth-authorization-server"`.
- o Added security considerations about publishing authorization server discovery metadata in a standard format.



- o Added security considerations about protected resources.
- o Added more information to the "grant\_types\_supported" and "response\_types\_supported" definitions.
- o Referenced the working group Mix-Up Mitigation draft.
- o Changed some example metadata values.
- o Acknowledged individuals for their contributions to the specification.

-01

- o Removed WebFinger discovery.
- o Clarified the relationship between the issuer identifier URL and the well-known URI path relative to it at which the discovery metadata document is located.

-00

- o Created the initial working group version based on [draft-jones-oauth-discovery-01](#), with no normative changes.

#### Authors' Addresses

Michael B. Jones  
Microsoft

Email: [mbj@microsoft.com](mailto:mbj@microsoft.com)  
URI: <http://self-issued.info/>

Nat Sakimura  
Nomura Research Institute, Ltd.

Email: [n-sakimura@nri.co.jp](mailto:n-sakimura@nri.co.jp)  
URI: <http://nat.sakimura.org/>

John Bradley  
Ping Identity

Email: [ve7jtb@ve7jtb.com](mailto:ve7jtb@ve7jtb.com)  
URI: <http://www.thread-safe.com/>

