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OAuth 2.0 Refresh Token and Authorization Expiration
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Abstract

This specification extends OAuth 2.0 [RFC6749] by adding new token endpoint response parameters to specify refresh token expiration and user authorization expiration.

About This Document

This note is to be removed before publishing as an RFC.

The latest revision of this draft can be found at <https://drafts.oauth.net/rt-expiration/draft-ietf-oauth-refresh-token-expiration.html>. Status information for this document may be found at <https://datatracker.ietf.org/doc/draft-ietf-oauth-refresh-token-expiration/>.

Discussion of this document takes place on the Web Authorization Protocol Working Group mailing list (<mailto:oauth@ietf.org>), which is archived at <https://mailarchive.ietf.org/arch/browse/oauth/>. Subscribe at <https://www.ietf.org/mailman/listinfo/oauth/>.

Source for this draft and an issue tracker can be found at <https://github.com/oauth-wg/rt-expiration>.

Status of This Memo

This Internet-Draft is submitted in full conformance with the provisions of BCP 78 and BCP 79.

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1. Introduction

RFC6749 defines the OAuth 2.0 protocol, part of which is the ability for a client to receive a refresh token that may be repeatedly exchanged for more access tokens. OAuth 2.0 does not contain any normative language around expiration or lack thereof for refresh tokens, mentioning only that they are "typically long-lasting".

In the years since the publication of OAuth 2.0, in response to changing security and privacy landscapes, many authorization servers have begun to issue shorter-lived refresh tokens for two main reasons:

- * The authorization server or user may decide that the access being granted is too sensitive to allow indefinite access (e.g. mail or health data).
- * The authorization server enforces a maximum duration that refresh tokens may be held without being exchanged on the token endpoint.

Clients may wish to implement special handling for expiring refresh tokens. For example, if the user has granted expiring access, the client may notify the user that they will need to reauthorize access before a certain date to avoid interruption of service.

2. 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 BCP 14 [RFC2119] [RFC8174] when, and only when, they appear in all capitals, as shown here.

3. Terminology

This specification uses terminology defined in [RFC6749]. The following terms are used throughout this document:

Resource owner and user May be used interchangeably to refer to the entity capable of granting access to a protected resource.

Client, application, and relying party May be used interchangeably to refer to the application making protected resource requests on behalf of the resource owner and with its authorization.

Authorization The resource owner's permission grant for a client to access protected resources on their behalf, as described in [RFC6749] Sec 4.1.1.

Access token A credential used by the client to access protected resources on behalf of the resource owner, as referenced in [RFC6749] Sec 1.4. Access tokens represent proof of authorization.

Refresh token A credential used by the client to obtain new access tokens without prompting the user, as referenced in [RFC6749] Sec 1.5. Refresh tokens do not grant authorization or renew authorization, they only provide a mechanism for obtaining new access tokens within the bounds of an existing authorization.

4. Concepts

There are two mechanisms that can affect refresh token expiration.

4.1. Authorization expiration

When granting authorization for an application to access their data as referenced in [RFC6749] Sec 4.1.1, the user may opt to time-limit that authorization, especially if the data is sensitive or they aren't sure how long they'll continue using the application. The authorization server itself may also impose mandatory limits on authorization duration.

4.2. Refresh token timeout

Authorization servers may wish to define a maximum amount of time clients can hold a refresh token without exchanging it. Beyond the security benefit provided by expiring credentials, this also provides a convenient mechanism for authorization servers to ensure there aren't ancient valid credentials out in the wild, which could complicate tasks like refresh token key rotation.

5. Refresh token expiration

The refresh token **MUST NOT** expire later than the user authorization expires. It **MAY** expire earlier if the authorization server also enforces a maximum duration between refresh token exchanges.

If the user renews their authorization, the authorization server **SHOULD** update the expiration time of existing refresh tokens if their lifetime was truncated due to user authorization expiration. (This is especially true if the authorization was updated out of band as discussed in User Experience Considerations (Section 8).) The authorization server **MUST NOT** accept expired refresh tokens for any purpose, even if it has no way to update the expiration time of existing refresh tokens.

Access tokens MUST NOT expire later than the user authorization expires. If the user renews their authorization, the authorization server MAY update the expiration time of existing access tokens if possible. Resource servers MUST NOT accept expired access tokens for any purpose, even if the authorization server has no way to update the expiration time of existing access tokens.

6. Token endpoint response

This specification introduces two new response parameters.

6.1. Successful response

`refresh_token_timeout`

The time in seconds that the refresh token may be held by the client without exchanging. For example, the value 604800 denotes that the refresh token will expire in one week from the time the response was generated. This value SHALL NOT exceed the value in `authorization_expires_in`.

`authorization_expires_in`

The lifetime in seconds of the user's authorization for the scopes contained in the issued or presented refresh token. For example, the value 2629800 denotes that the authorization will expire in one month from the time the response was generated. This value MAY exceed that of `refresh_token_timeout`.

If finite, the authorization server MUST return these values whenever the token endpoint response contains the `refresh_token` field. The authorization server MAY return these values even if the response contains no `refresh_token` field, in which case the values correspond to the presented `refresh_token`. This can be useful in the following example cases:

- * For `refresh_token_timeout`, the authorization server could have updated the existing refresh token lifetime in place.
- * For `authorization_expires_in`, the user's authorization lifetime could have been modified out of band.
- * In all cases, it can be convenient for the client to receive these values in each response.

6.1.1. Relationship of authorization_expires_in to scopes

Though authorization_expires_in is returned from the token endpoint when refresh tokens are used, it corresponds to the user's authorization for _scopes_ (or finer-grained access through RAR [RFC9396]) rather than individual tokens. The authorization server SHOULD ensure consistent lifetimes across multiple refresh tokens for the same scopes.

Tying authorization lifetime to scopes means it's possible to have some access valid for one duration and other access valid for a different duration. For example, a user could grant indefinite access for the openid scope and short-lived access for a calendar scope. In situations like this, it is RECOMMENDED that the authorization server return the minimum time that any access granted by the refresh token is valid. This does run some risk of the client asking the user to reauthorize prematurely. In the previous example, the client might ask the user to reauthorize the openid scope because it received an authorization_expires_in value corresponding to the short-lived calendar scope.

If clients are requesting multiple scopes that can have different lifetimes, they will ultimately need to make their own tradeoffs to decide how and when to ask the user for reauthorization. This specification's goal is simply to provide them with more information to make this decision.

6.1.2. Indefinite Expiration

Omitted values indicate that there is no fixed upper bound on the lifetime of the credential or authorization. If the authorization server has not declared its support for refresh token lifetime in the Authorization Server Metadata, omitted response fields could indicate either indefinite validity or simply lack of support for this specification. However, indefinite expiration and lack of information about expiration should be handled by the client in the same way. That is to say, the client must always handle refresh token invalidation not caused by expiration, such as by explicit user revocation. Clients MUST NOT make any assumptions that omitted response fields in one response imply their omission in later responses too.

Rather than omitting a response value, an authorization server may choose to return a large arbitrary value, e.g. 315569520 for 10 years. This avoids any ambiguity around support for indefinite values while achieving a similar practical effect. Clients MUST treat all large values as literals and MUST NOT make any assumptions about which may be considered indefinite.

6.2. Error response

The existing `invalid_grant` error code already explicitly covers token expiration and should be sufficient. Upon receiving this error code the client SHOULD start a new authorization grant flow.

6.3. Example

Suppose an authorization server enforces that refresh tokens must be exchanged at least once every 7 days, and a user has granted authorization to an application for access for 10 days. The initial authorization code grant (Day 0) will result in the following response values:

```
refresh_token_timeout: 604800 // 7 days
authorization_expires_in: 864000 // 10 days
```

A refresh token grant on Day 2 will result in the following response values:

```
refresh_token_timeout: 604800 // 7 days
authorization_expires_in: 691200 // 8 days
```

A refresh token grant on Day 7 will result in the following response values:

```
refresh_token_timeout: 259200 // 3 days
authorization_expires_in: 259200 // 3 days
```

If instead, the client held the initial refresh token for 8 days (i.e. exceeding `refresh_token_timeout` but not `authorization_expires_in`), the refresh token grant will fail:

```
error: invalid_grant
error_description: "expired refresh token"
```

Note that the error description text is non-normative and for illustrative purposes only.

7. Update to Authorization Server Metadata

Support for the expiring refresh tokens SHOULD be declared in the OAuth 2.0 Authorization Server Metadata [RFC8414] with the following metadata:

```
refresh_token_expiration_types_supported
  OPTIONAL. JSON array of supported expiration types. The possible values
  are "authorization" and "token_timeout".
```

If the authorization server omits expiration time response fields to indicate indefinite validity, it MUST declare `refresh_token_expiration_types_supported` in its metadata to indicate to the client that it's aware of this spec.

8. User Experience Considerations

While clients must be able to gracefully handle tokens' expiring at any time, the user experience may suffer if there's an unintended interruption of service. This degradation of experience would most likely be felt by users of clients running in the background, such as task or travel management apps that rely on access to a user's calendar or inbox.

If an application recognizes that its access is nearing expiration, it can proactively prompt the user for reauthorization next time they're "in the loop" (e.g. using a parameter like `prompt=consent` from [OpenID]), or even communicate to the user out of band that their granted access is expiring.

Another option an authorization server could provide to the user is a management surface where the user can go proactively extend the lifetime of their own grant, which would update the lifetime of the client's refresh token(s) in place. The client would discover the extended expiration on its next refresh token grant request.

9. Security Considerations

While it is possible to allow refresh token expiration to exceed that of user authorization expiration if the authorization server checks both timestamps when validating a refresh token, this is a potentially dangerous source of bugs in systems with complicated user authorization models. By requiring refresh tokens to expire no later than user authorization expires, there is less risk of bugs that accidentally provide data access to the client beyond the term of the user's authorization.

Authorization servers implementing token rotation on every refresh [RFC 9700] Sec 4.14 may wish to enforce a maximum duration that a refresh token may be held without rotation, and this specification allows that duration to be communicated as part of the API rather than relying on documentation.

Clients may wish to maintain multiple refresh tokens with different access in order to separate different lifetimes across different scopes. For example, a short-lived token to access financial data and a long-lived token to access basic user info. There is a tradeoff here, both in complexity of token management and also in increased friction for the user to authorize multiple tokens.

10. Privacy Considerations

Allowing users to time-limit their authorization is a privacy improvement. While this was already doable in regular OAuth implementations, the potential interruption of service for the user may have discouraged implementation of the feature. This specification provides a standardized way to mitigate that concern and should lead to greater adoption of time-limited authorization.

11. IANA Considerations

11.1. OAuth Parameters Registration

This specification registers the following OAuth parameter definitions in the IANA OAuth Parameters registry.

11.1.1. Registry Contents

- * Name: refresh_token_timeout
 - Parameter Usage Location: token response
 - Change Controller: IETF
 - Reference: This document
- * Name: authorization_expires_in
 - Parameter Usage Location: token response
 - Change Controller: IETF
 - Reference: This document

11.2. OAuth Authorization Server Metadata Registration

This specification registers the following Authorization Server Metadata definitions in the IANA OAuth Authorization Server Metadata registry.

11.2.1. Registry Contents

- * Metadata Name: refresh_token_expiration_types_supported
 - Metadata Description: What types of refresh token expiration are supported by the authorization server
 - Change Controller: IETF
 - Reference: This document

11.3. Change History

Delete this section before publication.

- * May 8, 2026:
 - Incorporate Vanshaj's review:
 - o Add language on backwards compatibility for definite duration becoming finite.
 - o refresh_token_expiration_types_supported "credential" value renamed to "token_timeout".
 - o Simplified example
 - o Linking UX considerations from RT expiration section
- * Feb 27, 2026:
 - Address Issues 4, 5, 6 from George to discuss tradeoffs around managing multiple tokens or scopes with different expirations, as well as out of band reauthorization by the user.
 - Rewording and clarification based on Dan's suggestions on the list.

12. References

12.1. Normative References

- [RFC2119] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", BCP 14, RFC 2119, DOI 10.17487/RFC2119, March 1997, <<https://www.rfc-editor.org/rfc/rfc2119>>.

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- [RFC8174] Leiba, B., "Ambiguity of Uppercase vs Lowercase in RFC 2119 Key Words", BCP 14, RFC 8174, DOI 10.17487/RFC8174, May 2017, <<https://www.rfc-editor.org/rfc/rfc8174>>.
- [RFC8414] Jones, M., Sakimura, N., and J. Bradley, "OAuth 2.0 Authorization Server Metadata", RFC 8414, DOI 10.17487/RFC8414, June 2018, <<https://www.rfc-editor.org/rfc/rfc8414>>.
- [RFC9700] Lodderstedt, T., Bradley, J., Labunets, A., and D. Fett, "Best Current Practice for OAuth 2.0 Security", BCP 240, RFC 9700, DOI 10.17487/RFC9700, January 2025, <<https://www.rfc-editor.org/rfc/rfc9700>>.

12.2. Informative References

- [OpenID] Sakimura, N., Bradley, J., Jones, M., de Medeiros, B., and C. Mortimore, "OpenID Connect Core 1.0", November 2014, <https://openid.net/specs/openid-connect-core-1_0.html>.
- [RFC9396] Lodderstedt, T., Richer, J., and B. Campbell, "OAuth 2.0 Rich Authorization Requests", RFC 9396, DOI 10.17487/RFC9396, May 2023, <<https://www.rfc-editor.org/rfc/rfc9396>>.

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