

Workgroup: Web Authorization Protocol
Internet-Draft: draft-ietf-oauth-par-07
Published: 12 April 2021
Intended Status: Standards Track
Expires: 14 October 2021
Authors: T. Lodderstedt B. Campbell N. Sakimura
 yes.com Ping Identity NAT.Consulting
 D. Tonge F. Skokan
 Moneyhub Financial Technology Auth0

OAuth 2.0 Pushed Authorization Requests

Abstract

This document defines the pushed authorization request endpoint, which allows clients to push the payload of an OAuth 2.0 authorization request to the authorization server via a direct request and provides them with a request URI that is used as reference to the data in a subsequent call to the authorization endpoint.

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 14 October 2021.

Copyright Notice

Copyright (c) 2021 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

- [1. Introduction](#)
 - [1.1. Introductory Example](#)
 - [1.2. Conventions and Terminology](#)
- [2. Pushed Authorization Request Endpoint](#)
 - [2.1. Request](#)
 - [2.2. Successful Response](#)
 - [2.3. Error Response](#)
 - [2.4. Management of Client Redirect URIs](#)
- [3. The "request" Request Parameter](#)
- [4. Authorization Request](#)
- [5. Authorization Server Metadata](#)
- [6. Client Metadata](#)
- [7. Security Considerations](#)
 - [7.1. Request URI Guessing](#)
 - [7.2. Open Redirection](#)
 - [7.3. Request Object Replay](#)
 - [7.4. Client Policy Change](#)
 - [7.5. Request URI Swapping](#)
- [8. Privacy Considerations](#)
- [9. Acknowledgements](#)
- [10. IANA Considerations](#)
 - [10.1. OAuth Authorization Server Metadata](#)
 - [10.2. OAuth Dynamic Client Registration Metadata](#)
 - [10.3. OAuth URI Registration](#)
- [11. Normative References](#)
- [12. Informative References](#)
- [Appendix A. Document History](#)
- [Authors' Addresses](#)

1. Introduction

Pushed authorization requests (PAR), defined by this document, enable OAuth [[RFC6749](#)] clients to push the payload of an authorization request directly to the authorization server in exchange for a request URI value, which is used as reference to the authorization request payload data in a subsequent call to the authorization endpoint via the user-agent.

In OAuth [[RFC6749](#)] authorization request parameters are typically sent as URI query parameters via redirection in the user-agent. This is simple but also yields challenges:

*There is no cryptographic integrity and authenticity protection.
An attacker could, for example, modify the scope of access

requested or swap the context of a payment transaction by changing scope values. Although protocol facilities exist to enable clients or users to detect some such changes, preventing modifications early in the process is a more robust solution.

*There is no mechanism to ensure confidentiality of the request parameters. Although HTTPS is required for the authorization endpoint, the request data passes through the user-agent in the clear and query string data can inadvertently leak to web server logs and to other sites via referer. The impact of which can be significant, if personal identifiable information or other regulated data is sent in the authorization request (which might well be the case in identity, open banking, and similar scenarios).

*Authorization request URLs can become quite large, especially in scenarios requiring fine-grained authorization data, which might cause errors in request processing.

JWT Secured Authorization Request (JAR) [[I-D.ietf-oauth-jwsreq](#)] provides solutions for the security challenges by allowing OAuth clients to wrap authorization request parameters in a request object, which is a signed and optionally encrypted JSON Web Token (JWT) [[RFC7519](#)]. In order to cope with the size restrictions, JAR introduces the request_uri parameter that allows clients to send a reference to a request object instead of the request object itself.

This document complements JAR by providing an interoperable way to push the payload of an authorization request directly to the authorization server in exchange for a request_uri value usable at the authorization server in a subsequent authorization request.

PAR fosters OAuth security by providing clients a simple means for a confidential and integrity protected authorization request. Clients requiring an even higher security level, especially cryptographically confirmed non-repudiation, are able to use JWT-based request objects as defined by [[I-D.ietf-oauth-jwsreq](#)] in conduction with a pushed authorization request.

PAR allows the authorization server to authenticate the client before any user interaction happens. The increased confidence in the identity of the client during the authorization process allows the authorization server to refuse illegitimate requests much earlier in the process, which can prevent attempts to spoof clients or otherwise tamper with or misuse an authorization request.

Note that HTTP POST requests to the authorization endpoint via the user-agent, as described in Section 3.1 of [[RFC6749](#)] and Section 3.1.2.1 of [[OIDC](#)], could also be used to cope with the request size

limitations described above. However, it's only optional per [\[RFC6749\]](#) and, even when supported, it is a viable option for traditional web applications but is prohibitively difficult to use with mobile apps. Those apps typically invoke a custom tab with an URL that is translated into a GET request. Using POST would require the app to first open a web page under its control in the custom tab that in turn would initiate the form POST towards the authorization server. PAR is simpler to use and has additional security benefits as described above.

1.1.1. Introductory Example

A client typically initiates an authorization request by directing the user-agent to make an HTTP request like the following to the authorization server's authorization endpoint (extra line breaks and indentation for display purposes only):

```
GET /authorize?response_type=code
    &client_id=s6BhdRkqt3&state=af0ifjsldkj
    &redirect_uri=https%3A%2F%2Fclient.example.org%2Fcb HTTP/1.1
Host: as.example.com
```

Such a request could instead be pushed directly to the authorization server by the client as follows with a POST request to the pushed authorization request endpoint (extra line breaks for display purposes only):

```
POST /as/par HTTP/1.1
Host: as.example.com
Content-Type: application/x-www-form-urlencoded
Authorization: Basic czZCaGRSa3F0Mzo3RmpmcDBaQnIxS3REUmJuZlZkbUl3

response_type=code
&client_id=s6BhdRkqt3&state=af0ifjsldkj
&redirect_uri=https%3A%2F%2Fclient.example.org%2Fcb
```

The authorization server responds with a request URI:

```
HTTP/1.1 201 Created
Cache-Control: no-cache, no-store
Content-Type: application/json

{
  "request_uri": "urn:example:bwc4JK-ESC0w8acc191e-Y1LTC2",
  "expires_in": 90
}
```

The client uses the request URI value to create the subsequent authorization request by directing the user-agent to make an HTTP request to the authorization server's authorization endpoint like

the following (extra line breaks and indentation for display purposes only):

```
GET /authorize?client_id=s6BhdRkqt3
    &request_uri=urn%3Aexample%3Abwc4JK-ESC0w8acc191e-Y1LTC2 HTTP/1.1
Host: as.example.com
```

1.2. Conventions and Terminology

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.

This specification uses the terms "access token", "authorization server", "authorization endpoint", "authorization request", "token endpoint", and "client" defined by The OAuth 2.0 Authorization Framework [[RFC6749](#)].

2. Pushed Authorization Request Endpoint

The pushed authorization request endpoint is an HTTP API at the authorization server that accepts HTTP POST requests with parameters in the HTTP request entity-body using the application/x-www-form-urlencoded format with a character encoding of UTF-8 as described in Appendix B of [[RFC6749](#)]. The pushed authorization request endpoint URL MUST use the "https" scheme.

Authorization servers supporting pushed authorization requests SHOULD include the URL of their pushed authorization request endpoint in their authorization server metadata document [[RFC8414](#)] using the pushed_authorization_request_endpoint parameter as defined in [Section 5](#).

The endpoint accepts the authorization request parameters defined in [[RFC6749](#)] for the authorization endpoint as well as all applicable extensions defined for the authorization endpoint. Some examples of such extensions include PKCE [[RFC7636](#)], Resource Indicators [[RFC8707](#)], and OpenID Connect [[OIDC](#)]. The endpoint MAY also support sending the set of authorization request parameters as a request object according to [[I-D.ietf-oauth-jwsreq](#)] and [Section 3](#).

The rules for client authentication as defined in [[RFC6749](#)] for token endpoint requests, including the applicable authentication methods, apply for the pushed authorization request endpoint as well. If applicable, the token_endpoint_auth_method client metadata [[RFC7591](#)] parameter indicates the registered authentication method for the client to use when making direct requests to the authorization server, including requests to the pushed authorization

request endpoint. Similarly, the `token_endpoint_auth_methods_supported` authorization server metadata [[RFC8414](#)] parameter lists client authentication methods supported by the authorization server when accepting direct requests from clients, including requests to the pushed authorization request endpoint.

Due to historical reasons there is potential ambiguity regarding the appropriate audience value to use when employing JWT client assertion based authentication (defined in Section 2.2 of [[RFC7523](#)] with `private_key_jwt` or `client_secret_jwt` authentication method names per Section 9 of [[OIDC](#)]). To address that ambiguity the issuer identifier URL of the authorization server according to [[RFC8414](#)] SHOULD be used as the value of the audience. In order to facilitate interoperability the authorization server MUST accept its issuer identifier, token endpoint URL, or pushed authorization request endpoint URL as values that identify it as an intended audience.

2.1. Request

A client sends the parameters that comprise an authorization request directly to the pushed authorization request endpoint. A typical parameter set might include: `client_id`, `response_type`, `redirect_uri`, `scope`, `state`, `code_challenge`, and `code_challenge_method` as shown in the example below. However, the pushed authorization request can be composed of any of the parameters applicable for use at authorization endpoint including those defined in [[RFC6749](#)] as well as all applicable extensions. The `request_uri` authorization request parameter is one exception, which MUST NOT be provided.

The request also includes, as appropriate for the given client, any additional parameters necessary for client authentication (e.g., `client_secret`, or `client_assertion` and `client_assertion_type`). Such parameters are defined and registered for use at the token endpoint but are applicable only for client authentication. When present in a pushed authorization request, they are relied upon only for client authentication and are not germane to the authorization request itself. Any token endpoint parameters that are not related to client authentication have no defined meaning for a pushed authorization request. The `client_id` parameter is defined with the same semantics for both authorization requests and requests to the token endpoint; as a required authorization request parameter, it is similarly required in a pushed authorization request.

The client adds the parameters in `x-www-form-urlencoded` format with a character encoding of UTF-8 as described in Appendix B of [[RFC6749](#)] to the body of an HTTP POST request. If applicable, the client also adds its authentication credentials to the request

header or the request body using the same rules as for token endpoint requests.

This is illustrated by the following example (extra line breaks in the message-body for display purposes only):

```
POST /as/par HTTP/1.1
Host: as.example.com
Content-Type: application/x-www-form-urlencoded
Authorization: Basic czZCaGRSa3F0Mzo3RmpmcDBaQnIxS3REUmJuZlZkbUl3

response_type=code&state=af0ifjsldkj&client_id=s6BhdRkqt3
&redirect_uri=https%3A%2F%2Fclient.example.org%2Fcb
&code_challenge=K2-ltc83acc4h0c9w6ESC_rEMTJ3bww-uCHaoeK1t8U
&code_challenge_method=S256&scope=account-information
```

The authorization server MUST process the request as follows:

1. Authenticate the client in the same way as at the token endpoint.
2. Reject the request if the request_uri authorization request parameter is provided.
3. Validate the pushed request as it would an authorization request sent to the authorization endpoint. For example, the authorization server checks whether the redirect URI matches one of the redirect URIs configured for the client and also checks whether the client is authorized for the scope for which it is requesting access. This validation allows the authorization server to refuse unauthorized or fraudulent requests early. The authorization server MAY omit validation steps that it is unable to perform when processing the pushed request, however such checks MUST then be performed at the authorization endpoint.

The authorization server MAY allow clients with authentication credentials to establish per-authorization request redirect URIs with every pushed authorization request. Described in more detail in [Section 2.4](#), this is possible since, in contrast to [\[RFC6749\]](#), this specification gives the authorization server the the ability to authenticate clients and validate client requests before the actual authorization request is performed.

2.2. Successful Response

If the verification is successful, the server MUST generate a request URI and return a JSON response with the following members at the top level with 201 Created HTTP response code.

*request_uri : The request URI corresponding to the authorization request posted. This URI is used as reference to the respective request data in the subsequent authorization request only. The way the authorization process obtains the authorization request data is at the discretion of the authorization server and out of scope of this specification. There is no need to make the authorization request data available to other parties via this URI.

*expires_in : A JSON number that represents the lifetime of the request URI in seconds as a positive integer. The request URI lifetime is at the discretion of the authorization server but will typically be relatively short (e.g., between 5 and 600 seconds).

The format of the request_uri value is at the discretion of the authorization server but it MUST contain some part generated using a cryptographically strong pseudorandom algorithm such that it is computationally infeasible to predict or guess a valid value. The authorization server MAY construct the request_uri value using the form urn:ietf:params:oauth:request_uri:<reference-value> with <reference-value> as the random part of the URI that references the respective authorization request data. The string representation of a UUID as a URN per [\[RFC4122\]](#) is also an option for authorization servers to construct request_uri values.

The request_uri value MUST be bound to the client that posted the authorization request.

The following is an example of such a response:

```
HTTP/1.1 201 Created
Content-Type: application/json
Cache-Control: no-cache, no-store

{
  "request_uri":
    "urn:ietf:params:oauth:request_uri:bwc4JK-ESC0w8acc191e-Y1LTC2",
  "expires_in": 60
}
```


2.3. Error Response

The authorization server returns an error response with the same format as is specified for error responses from the token endpoint in Section 5.2 of [\[RFC6749\]](#) using the appropriate error code from therein or from Section 4.1.2.1 of [\[RFC6749\]](#). In those cases where Section 4.1.2.1 of [\[RFC6749\]](#) prohibits automatic redirection with an error back to the requesting client and hence doesn't define an error code, for example when the request fails due to a missing, invalid, or mismatching redirection URI, the `invalid_request` error code can be used as the default error code. Error codes defined by OAuth extension can also be used when such an extension is involved in the initial processing of authorization request that was pushed. Since initial processing of the pushed authorization request does not involve resource owner interaction, error codes related to user interaction, such as `consent_required` defined by [\[OIDC\]](#), are never returned.

If the client is required to use signed request objects, either by authorization server or client policy (see [\[I-D.ietf-oauth-jwsreq\]](#), section 10.5), the authorization server MUST only accept requests complying with the definition given in [Section 3](#) and MUST refuse any other request with HTTP status code 400 and error code `invalid_request`.

In addition to the above, the pushed authorization request endpoint can also make use of the following HTTP status codes:

- *405: If the request did not use the POST method, the authorization server responds with an HTTP 405 (Method Not Allowed) status code.
- *413: If the request size was beyond the upper bound that the authorization server allows, the authorization server responds with an HTTP 413 (Payload Too Large) status code.
- *429: If the number of requests from a client during a particular time period exceeds the number the authorization server allows, the authorization server responds with an HTTP 429 (Too Many Requests) status code.

The following is an example of an error response from the pushed authorization request endpoint:

HTTP/1.1 400 Bad Request
Content-Type: application/json
Cache-Control: no-cache, no-store

```
{  
  "error": "invalid_request",  
  "error_description":  
    "The redirect_uri is not valid for the given client"  
}
```

2.4. Management of Client Redirect URIs

While OAuth 2.0 [[RFC6749](#)] allows clients to use unregistered redirect_uri values in certain circumstances, or for the authorization server to apply its own matching semantics to the redirect_uri value presented by the client at the authorization endpoint, the OAuth Security BCP [[I-D.ietf-oauth-security-topics](#)] as well as OAuth 2.1 [[I-D.ietf-oauth-v2-1](#)] require an authorization server exactly match the redirect_uri parameter against the set of redirect URIs previously established for a particular client. This is a means for early detection of client impersonation attempts and prevents token leakage and open redirection. As a downside, this can make client management more cumbersome since the redirect URI is typically the most volatile part of a client policy.

The exact matching requirement MAY be relaxed when using pushed authorization requests for clients that have established authentication credentials with the authorization server. This is possible since, in contrast to a traditional authorization request, the authorization server authenticates the client before the authorization process starts and thus ensures it is interacting with the legitimate client. The authorization server MAY allow such clients to specify redirect_uri values that were not previously registered with the authorization server. This will give the client more flexibility (e.g. to mint distinct redirect URI values per authorization server at runtime) and can simplify client management. It is at the discretion of the authorization server to apply restrictions on supplied redirect_uri values, e.g. the authorization server MAY require a certain URI prefix or allow only a query parameter to vary at runtime.

Note: The ability to set up transaction specific redirect URIs is also useful in situations where client ids and corresponding credentials and policies are managed by a trusted 3rd party, e.g. via client certificates containing client permissions. Such an externally managed client could interact with an authorization server trusting the respective 3rd party without the need for an additional registration step.

3. The "request" Request Parameter

Clients MAY use the request parameter as defined in JAR [[I-D.ietf-oauth-jwsreq](#)] to push a request object JWT to the authorization server. The rules for processing, signing, and encryption of the request object as defined in JAR [[I-D.ietf-oauth-jwsreq](#)] apply. When the application/x-www-form-urlencoded HTTP entity-body request parameter is used, the request object MUST contain all the authorization request parameters as claims of the JWT. Additional request parameters as required by the given client authentication method are to be included as 'application/x-www-form-urlencoded' parameters in the HTTP request entity-body (e.g. Mutual TLS client authentication [[RFC8705](#)] uses the client_id HTTP request parameter while JWT assertion based client authentication [[RFC7523](#)] uses client_assertion and client_assertion_type).

The following is an example of a pushed authorization request using a signed request object. The client is authenticated by its client secret using the HTTP Basic Authentication scheme specified in Section 2.3.1 of [[RFC6749](#)] (extra line breaks for display purposes only):

```
POST /as/par HTTP/1.1
Host: as.example.com
Content-Type: application/x-www-form-urlencoded
Authorization: Basic czZCaGRSa3F0Mzo3RmpmcDBaQnIxS3REUmJuZlZkbUl3

request=eyJraWQ0IjRmMmJkYyIsImFsZyI6IlJTMjU2In0.eyJpc3MiOiJzNkJoZ
FJrcXQzIiwiaXVkiOiJoaHR0cHM6Ly9zZXJ2ZXIuZXhhbXBsZS5jb20iLCJyZXNwb2
5zZV90eXB1Ijoiy29kZSIsImNsaWVudF9pZCI6InM2QmhmUmtxdDMiLCJyZWRpcmV
jdF91cmkiOiJodHRwczovL2NsaWVudC5leGFtcGxlLm9yZy9jYiIsInNjb3BlIjoI
YWlzIiwic3RhdGU0IjJhZjBpZmpzbGRraiiIsImNvZGVfY2hhbGxlbmdlIjoisZItb
HRjODNhY2M0aDBjOxc2RVNDX3JFTVRKM2J3dy11Q0hhb2VLMXQ4VSIsImNvZGVfY2
hhbGxlbmdlX21ldGhvZCI6IlMyNTYifQ.049ffUxRPdNkn3TRYDvbEYVr1CeAL64u
W4FenV3n9WlaFIRHeFblzv-wlEtMm8-tusGxeE9z3ek6FxxhvvLEqEpjthXnyXqqy
Jfq3k9GSf5ay74ml_0D6lHE1hy-kVwg7SgoPQ-GB1xQ9NRhF3EKS7UZIrhUhbFUCF0
MsRLbmtIvalYbQH_Ef3UKDL0GiU7exhVFTPEyQUTM9FF-u3K-zX-F005_brYxNGLh
Vk01G8MjqQnn2HpAzlBd5179WTzTYhKmhTiwzH-qlBBI_9GLJmE3K0ipko9TfSpa2
6H4J0lMyfZF10PCJwkByS0xZFJ2sTo3Gkk488RQohhgt1I0onw
&client_id=s6BhdRkqt3
```

The authorization server MUST take the following steps beyond the processing rules defined in [Section 2.1](#):

1. If applicable, decrypt the request object as specified in JAR [[I-D.ietf-oauth-jwsreq](#)], section 6.1.
2. Validate the request object signature as specified in JAR [[I-D.ietf-oauth-jwsreq](#)], section 6.2.

3. If the client has authentication credentials established with the authorization server, reject the request if the authenticated client_id does not match the client_id claim in the request object. Additionally requiring the iss claim to match the client_id is at the discretion of authorization server.

The following RSA key pair, represented in JWK [RFC7517] format, can be used to validate or recreate the request object signature in the above example (extra line breaks and indentation within values for display purposes only):

```
{
  "kty": "RSA",
  "kid": "k2bdc",
  "n": "y9Lqv4fCp6Ei-u2-ZCKq83YvbFEk6JMs_pSj76eMkddWRuWX2aBKGHAtKlE
    5P7_vn__PCKZWePt3vGkB6ePgZAFu08NmKemwE5bQI0e6kIChtt_6KzT50a
    aXDFI6qCLJmk51Cc4VYFaxggevMncYrzaW_50mZ1yGSFIQzLYP8bijAHGVj
    dEFgZaZEN9lsn_GdWLaJpHrB3R0lS50E45wxr1g9xMncVb8qDPuXZarvghL
    L0Hz0uYRadBJVowZowDNTpKpk2RklZ7QaB07XDv3uR7s_sf2g-bAjSYxYUG
    sqkNA9b3xVw53am_UZZ3tZbFTIh557JICWKHlwj5uzeJXaw",
  "e": "AQAB",
  "d": "LNwG_pCKrwowALpCpRdc0KlSVqylSurZhE6CpkRiE9cpDgGKI09CxPlX0L
    zjqxXuQc8MdMqRQZTnAwgd7HH0B6gncrruV3NewI-XQV0ckldTjqNf0Tz1V
    Rs-jE-57KAXI3YBIhu-_0YpIDzdk_wBuAk661Svn0GsPQe7m9DoxdzenQu9
    0_soewUh1PzRrTH0EeIqYI715rwi3TYaSzowBmEPD2fICyj18FF0MPy_SQz
    k3noVUUizfzLnnJiWy_p63QBCMqjRoSHHdMnI4z9iVpIwJWQ3j05n_2lC2-
    cSgwjmKsFzDBbQNJc7qMG1N6EssJUwgGJxz1eAUFF0w4YAAQ",
  "qi": "J-mG0swR4FTy3atrcQ7dd0hhYn1E9QndN-
    -sDG4EQ00RnFj6wIefCvwIc4
    7hCtVeFnCTPYJNc_JyV-mU-9v1zS5GSNuyR5qdpsMZxUMpEvQcwKt23ffPZ
    YGaQfKyEesmf_wi8fFcE68H9REQjnniKrXm7w2-IuG_IrVJA90x-uU",
  "q": "4hlMYAGa0dvogdK1jnxQ7J_Lqpqi99e-AeoFvoYpMPhthChTzwFZ09lQmUo
    BpMqVQTws_s7vWgmt7ZAB3ywkurf0pV7BD0fweJiUzrWk4KJjxtmP_auuxr
    jvm3s2FUGn6f0wRY9Z8Hj9A7C72DnYCjuZiJQMYCWDsZ8-d-L1a-s",
  "p": "5sd9Er3I2FFT9R-gy84_oakEyCmgw036B_nfYEE0CwpSvi2z7UcIVK3bSEL
    5WCW6BNGB3HDWhq8aYPirwQnqm0K9mX1E-4xM10WWZ-rP3XjYpQeS0Snru5
    LFVWsAzi-FX7B0qBibSAXLdEGXcXa44l08iecbPD3xduq5V_1YoE",
  "dq": "Nz2PF3XM6bEc4XsluKZ070ErdYdKgdtIJReUR7Rno_t0Zpejw1PGBYVW19
    zpAeYtCT82jxroB2XqhLxGeMxEPQpsz2qTKLSe4BgHY2m12uxSDGdjcsrbb
    NoKUKaN1CuyZszhw11n0AT_bEN14bJgQj_Fh0UESQj5YBBUJt5gr_k",
  "dp": "Zc877jirkkL0tyTs2vxyNe9KnMNA0idlUc2tE_-0gAL4Lpo1hSwKcKtKwe
    ZJ-gkqt1hT-dwNx_0Xtg_-NXsadMRMwJnzBMwYAfjApUkfQABc0yUCJJl3
    KozRCugf1WXku9GZAH2_x8PUopdNUEa70ISowPRh04HANKX4fkjWAE"
}
```

4. Authorization Request

The client uses the `request_uri` value returned by the authorization server to build an authorization request as defined in [[I-D.ietf-oauth-jwsreq](#)]. This is shown in the following example where the client directs the user-agent to make the following HTTP request (extra line breaks and indentation for display purposes only):

```
GET /authorize?client_id=s6BhdRkqt3&request_uri=urn%3Aietf%3Aparams
    %3Aoauth%3Arequest_uri%3Abwc4JK-ESC0w8acc191e-Y1LTC2 HTTP/1.1
Host: as.example.com
```

Since parts of the authorization request content, e.g. the `code_challenge` parameter value, are unique to a particular authorization request, the client **MUST** only use a `request_uri` value once. Authorization servers **SHOULD** treat `request_uri` values as one-time use but **MAY** allow for duplicate requests due to a user reloading/refreshing their user-agent.

The authorization server **MUST** validate authorization requests arising from a pushed request as it would any other authorization request. The authorization server **MAY** omit validation steps that it performed when the request was pushed, provided that it can validate that the request was a pushed request, and that the request or the authorization server's policy has not been modified in a way that would affect the outcome of the omitted steps.

Authorization server policy **MAY** dictate, either globally or on a per-client basis, that pushed authorization requests are the only means for a client to pass authorization request data. In this case, the authorization server will refuse, using the `invalid_request` error code, to process any request to the authorization endpoint that does not have a `request_uri` parameter with a value obtained from the pushed authorization request endpoint.

Note: authorization server and clients **MAY** use metadata as defined in [Section 5](#) and [Section 6](#) to signal the desired behavior.

5. Authorization Server Metadata

The following authorization server metadata [[RFC8414](#)] parameters are introduced to signal the server's capability and policy with respect to pushed authorization requests.

pushed_authorization_request_endpoint The URL of the pushed authorization request endpoint at which a client can post an

authorization request in exchange for a request_uri value usable at the authorization server.

require_pushed_authorization_requests Boolean parameter indicating whether the authorization server accepts authorization request data only via the pushed authorization request method. If omitted, the default value is false.

Note that the presence of pushed_authorization_request_endpoint is sufficient for a client to determine that it may use the pushed authorization request flow. A request_uri value obtained from the PAR endpoint is usable at the authorization endpoint regardless of other authorization server metadata such as request_uri_parameter_supported or require_request_uri_registration.

6. Client Metadata

The Dynamic Client Registration Protocol [[RFC7591](#)] defines an API for dynamically registering OAuth 2.0 client metadata with authorization servers. The metadata defined by [RFC7591], and registered extensions to it, also imply a general data model for clients that is useful for authorization server implementations even when the Dynamic Client Registration Protocol isn't in play. Such implementations will typically have some sort of user interface available for managing client configuration. The following client metadata parameter is introduced by this document to indicate whether pushed authorization requests are required for the given client.

require_pushed_authorization_requests Boolean parameter indicating whether the only means of initiating an authorization request the client is allowed to use is a pushed authorization request. If omitted, the default value is false.

7. Security Considerations

7.1. Request URI Guessing

An attacker could attempt to guess and replay a valid request URI value and try to impersonate the respective client. The authorization server MUST consider the considerations given in JAR [[I-D.ietf-oauth-jwsreq](#)], section 10.2, clause (d) on request URI entropy.

7.2. Open Redirection

An attacker could try register a redirect URI pointing to a site under his control in order to obtain authorization codes or launch other attacks towards the user. The authorization server MUST only

accept new redirect URIs in the pushed authorization request from authenticated clients.

7.3. Request Object Replay

An attacker could replay a request URI captured from a legitimate authorization request. In order to cope with such attacks, the authorization server SHOULD make the request URIs one-time use.

7.4. Client Policy Change

The client policy might change between the lodging of the request object and the authorization request using a particular request object. It is therefore recommended that the authorization server check the request parameter against the client policy when processing the authorization request.

7.5. Request URI Swapping

An attacker could capture the request URI from one request and then substitute it into a different authorization request. For example, in the context of OpenID Connect, an attacker could replace a request URI asking for a high level of authentication assurance with one that requires a lower level of assurance. Clients SHOULD make use of PKCE, a unique state parameter, or the OIDC "nonce" parameter in the pushed request object to prevent this attack.

8. Privacy Considerations

OAuth 2.0 is a complex and flexible framework with broad ranging privacy implications due to the very nature of it having one entity intermediate user authorization to data access between two other entities. The privacy considerations of all of OAuth are beyond the scope of this document, which only defines an alternative way of initiating one message sequence in the larger framework. Using pushed authorization requests, however, may improve privacy by reducing the potential for inadvertent information disclosure due to passing authorization request data directly between client and authorization server over a secure connection in the message-body of an HTTP request rather than in the query component of a URL that passes through the user-agent in the clear.

9. Acknowledgements

This specification is based on the work towards [Pushed Request Object](#) conducted at the Financial-grade API working group at the OpenID Foundation. We would like to thank the members of the WG for their valuable contributions.

We would like to thank Vladimir Dzhuvinov, Aaron Parecki, Justin Richer, Sascha Preibisch, Daniel Fett, Michael B. Jones, Annabelle Backman, Joseph Heenan, Sean Glencross, Maggie Hung, Neil Madden, Karsten Meyer zu Selhausen, and Takahiko Kawasaki for their valuable feedback on this draft.

10. IANA Considerations

10.1. OAuth Authorization Server Metadata

This specification requests registration of the following values in the IANA "OAuth Authorization Server Metadata" registry of [[IANA.OAuth.Parameters](#)] established by [[RFC8414](#)].

Metadata Name: pushed_authorization_request_endpoint

Metadata Description: URL of the authorization server's pushed authorization request endpoint

Change Controller: IESG

Specification Document(s): [Section 5](#) of [[this document]]

Metadata Name: require_pushed_authorization_requests

Metadata Description: Indicates whether the authorization server accepts authorization request only via the pushed authorization request method.

Change Controller: IESG

Specification Document(s): [Section 5](#) of [[this document]]

10.2. OAuth Dynamic Client Registration Metadata

This specification requests registration of the following value in the IANA "OAuth Dynamic Client Registration Metadata" registry of [[IANA.OAuth.Parameters](#)] established by [[RFC7591](#)].

Metadata Name: require_pushed_authorization_requests

Metadata Description: Indicates whether the client is required to use the pushed authorization request method to initiate authorization requests.

Change Controller: IESG

Specification Document(s): [Section 6](#) of [[this document]]

10.3. OAuth URI Registration

This specification requests registration of the following value in the "OAuth URI" registry of [[IANA.OAuth.Parameters](#)] established by [[RFC6755](#)].

URN: urn:ietf:params:oauth:request_uri:

Common Name: A URN Sub-Namespaces for OAuth Request URIs.

Change Controller: IESG

Specification Document(s): [Section 2.2](#) of [[this document]]

11. Normative References

- [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/info/rfc8414>>.
- [I-D.ietf-oauth-jwsreq] Sakimura, N., Bradley, J., and M. Jones, "The OAuth 2.0 Authorization Framework: JWT Secured Authorization Request (JAR)", Work in Progress, Internet-Draft, draft-ietf-oauth-jwsreq-30, 10 September 2020, <<https://tools.ietf.org/html/draft-ietf-oauth-jwsreq-30>>.
- [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/info/rfc2119>>.
- [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/info/rfc8174>>.
- [OIDC] Sakimura, N., Bradley, J., Jones, M., de Medeiros, B., and C. Mortimore, "OpenID Connect Core 1.0 incorporating errata set 1", 8 November 2014, <http://openid.net/specs/openid-connect-core-1_0.html>.
- [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>>.

12. Informative References

- [RFC7523] Jones, M., Campbell, B., and C. Mortimore, "JSON Web Token (JWT) Profile for OAuth 2.0 Client Authentication and Authorization Grants", RFC 7523, DOI 10.17487/RFC7523, May 2015, <<https://www.rfc-editor.org/info/rfc7523>>.
- [RFC8705] Campbell, B., Bradley, J., Sakimura, N., and T. Lodderstedt, "OAuth 2.0 Mutual-TLS Client Authentication and Certificate-Bound Access Tokens", RFC 8705, DOI 10.17487/RFC8705, February 2020, <<https://www.rfc-editor.org/info/rfc8705>>.
- [RFC6755] Campbell, B. and H. Tschofenig, "An IETF URN Sub-Namespace for OAuth", RFC 6755, DOI 10.17487/RFC6755, October 2012, <<https://www.rfc-editor.org/info/rfc6755>>.

[RFC7519]

Jones, M., Bradley, J., and N. Sakimura, "JSON Web Token (JWT)", RFC 7519, DOI 10.17487/RFC7519, May 2015, <<https://www.rfc-editor.org/info/rfc7519>>.

[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>>.

[RFC8707]

Campbell, B., Bradley, J., and H. Tschofenig, "Resource Indicators for OAuth 2.0", RFC 8707, DOI 10.17487/RFC8707, February 2020, <<https://www.rfc-editor.org/info/rfc8707>>.

[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>>.

[RFC4122]

Leach, P., Mealling, M., and R. Salz, "A Universally Unique Identifier (UUID) URN Namespace", RFC 4122, DOI 10.17487/RFC4122, July 2005, <<https://www.rfc-editor.org/info/rfc4122>>.

[I-D.ietf-oauth-v2-1]

Hardt, D., Parecki, A., and T. Lodderstedt, "The OAuth 2.1 Authorization Framework", Work in Progress, Internet-Draft, draft-ietf-oauth-v2-1-00, 30 July 2020, <<https://tools.ietf.org/html/draft-ietf-oauth-v2-1-00>>.

[I-D.ietf-oauth-security-topics]

Lodderstedt, T., Bradley, J., Labunets, A., and D. Fett, "OAuth 2.0 Security Best Current Practice", Work in Progress, Internet-Draft, draft-ietf-oauth-security-topics-16, 5 October 2020, <<https://tools.ietf.org/html/draft-ietf-oauth-security-topics-16>>.

[RFC7517]

Jones, M., "JSON Web Key (JWK)", RFC 7517, DOI 10.17487/RFC7517, May 2015, <<https://www.rfc-editor.org/info/rfc7517>>.

[IANA.OAuth.Parameters]

IANA, "OAuth Parameters", <<http://www.iana.org/assignments/oauth-parameters>>.

Appendix A. Document History

[[To be removed from the final specification]]

-07

- *updated references

-06

- *Add a note clarifying that the presence of `pushed_authorization_request_endpoint` is sufficient for a client to know that it can use the PAR flow

-05

- *Mention use of `invalid_request` error code for cases, like a bad `redirect_uri`, that don't have a more specific one

-04

- *Edits to address WGLC comments

- *Replace I-D.ietf-oauth-mtls reference with now published RFC8705

- *Moved text about redirect URI management from introduction into separate section

-03

- *Editorial updates

- *Mention that https is required for the PAR endpoint

- *Add some discussion of browser form posting an authz request vs. the benefits of PAR for any application

- *Added text about motivations behind PAR - integrity, confidentiality and early client auth

- *Better explain one-time use recommendation of the `request_uri`

- *Drop the section on special error responses for request objects

- *Clarify authorization request examples to say that the client directs the user-agent to make the HTTP GET request (vs. making the request itself)

-02

- *Update Resource Indicators reference to the somewhat recently published RFC 8707

- *Added metadata in support of pushed authorization requests only feature

- *Update to comply with draft-ietf-oauth-jwsreq-21, which requires client_id in the authorization request in addition to the request_uri

- *Clarified timing of request validation

- *Add some guidance/options on the request URI structure

- *Add the key used in the request object example so that a reader could validate or recreate the request object signature

- *Update to draft-ietf-oauth-jwsreq-25 and added note regarding require_signed_request_object

-01

- *Use the newish RFC v3 XML and HTML format

- *Added IANA registration request for pushed_authorization_request_endpoint

- *Changed abbrev to "OAuth PAR"

-00 (WG draft)

- *Reference RFC6749 sec 2.3.1 for client secret basic rather than RFC7617

- *further clarify that a request object JWT contains all the authorization request parameters while client authentication params, if applicable, are outside that JWT as regular form encoded params in HTTP body

-01

- *List client_id as one of the basic parameters

- *Explicitly forbid request_uri in the processing rules

- *Clarification regarding client authentication and that public clients are allowed

- *Added option to let clients register per-authorization request redirect URIs

- *General clean up and wording improvements

-00

- *first draft

Authors' Addresses

Torsten Lodderstedt
yes.com

Email: torsten@lodderstedt.net

Brian Campbell
Ping Identity

Email: bcampbell@pingidentity.com

Nat Sakimura
NAT.Consulting

Email: nat@sakimura.org

Dave Tonge
Moneyhub Financial Technology

Email: dave@tonge.org

Filip Skokan
Auth0

Email: panva.ip@gmail.com