Notification of Revoked Access Tokens in the ACE Framework

draft-tiloca-ace-revoked-tokens-notification-06

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Recap

- **An Access Token may be revoked, before expiration**
  - Client/RS has been compromised, or decommissioned
  - Changed access policies or outcome of their evaluation
  - Changed ACE profile to use

- **Token introspection at the AS is available only for the RS**
  - Validate one Access Token at the time

- **<u>Contribution</u>: new interface at the Authorization Server (AS)**
  - The AS maintains one Token Revocation List (TRL) resource
  - The TRL contains the hashes of <u>revoked</u>, not-yet-expired tokens
  - C/RS can GET or <u>GET-Observe</u> from the TRL
  - C/RS retrieve only their own pertaining portion of the TRL

- **Benefits**
  - Complement token introspection
  - No need for new endpoints at C or RS

How it works

- **Token hashes computed as per RFC 6920 (binary format)**
  - Hash input: what is in ‘access_token’ of the AS response from */token*

- **TRL resource at the AS**
  - CBOR array of Token hashes
  - Add token hashes when Tokens are revoked
  - Remove token hashes when revoked Tokens expire

- **Interaction**
  - C and RS get the URL to the TRL endpoint upon registration
  - C and RS obtain only hashes of their own pertaining Tokens
  - A registered Administrator gets all Token hashes in the TRL

Modes of operation

› **Common features**

  – Response limited to the portion of the TRL pertaining the requester
  – TRL filtering based on authenticated identity of the requester (secure session)

› **Full Query -** ***GET [Observe: 0] coaps://example.as.com/revoke/trl***

  – Get all the pertaining token hashes in the TRL
  – The AS MUST support it

› **Diff Query -** ***GET [Observe: 0] coaps://example.as.com/revoke/trl?diff=3***

  – Get the N most recent, pertaining updates to the TRL
  – The AS MAY support it

› **STP-based query** – Appendix B

  – Extends the two modes above, using the Series Transfer Pattern (STP)
  – Enables trasferring of TRL updates in chunks, from a “resumption point”
  – Based on a review from Carsten Bormann and on input from Ben Kaduk

Updates from -04, -05 and -06

- **Early clarifications**, at protocol overview
  - What the different modes of operations offer
  - The registration process at the AS is out of scope in ACE
- Added **error handling** at the AS
- Optional **“pmax” attribute** when observing, see *draft-ietf-core-conditional-attributes*
  - No more than pmax seconds between two consecutive observe notifications
- **Response format and processing for the STP-based query mode**
  - New content format *application/ace-trl+cbor* and new registry “Token Revocation List”
  - Response payload as a CBOR map
- Addressed **comments on -04 from Michael Richardson** [1] – Thanks!
  - Observation as subscription; difference from per-Token introspection; requirements for C/RS
- **Editorial improvements** in IANA considerations

[1] https://mailarchive.ietf.org/arch/msg/ace/TYfW7aT8dR7sXDvIcJfHOVTJWeA/

Summary and next steps

- **Notification of revoked Access Token**
  - GET or GET-Observe; for both Client and Resource Server
  - (i) Full query; (ii) Diff query; (iii) Query with Series Transfer Pattern (STP)

- **Version -06 is stable and incorporates:**
  - Error handling and response payload in the STP-based query mode
  - Comments from Michael Richardson on -04
  - Review from Carsten Bormann and comments from Ben Kaduk on -01
  - Earlier review from Travis Spencer and comments from Jim Schaad

- **Next steps**
  - STP-based query mode in the document body

- **WG adoption ?**

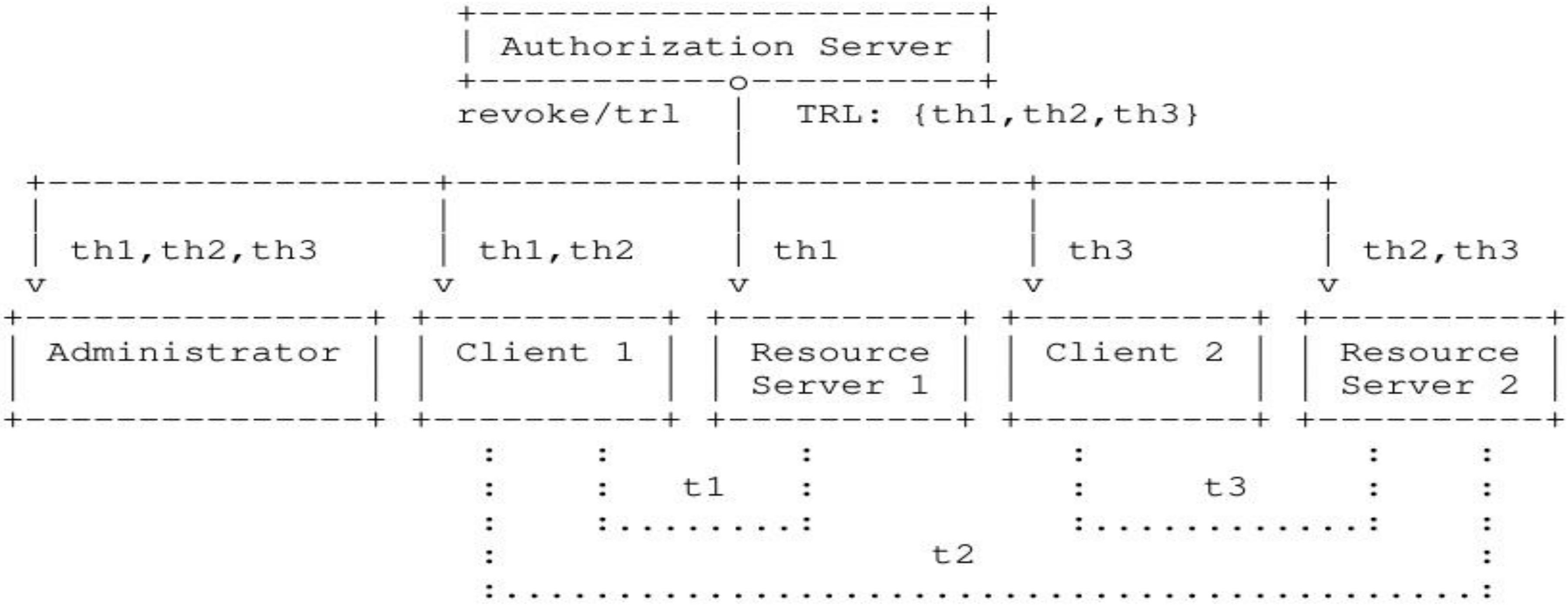
Thank you!

Comments/questions?

https://gitlab.com/crimson84/draft-tiloca-ace-revoked-token-notification

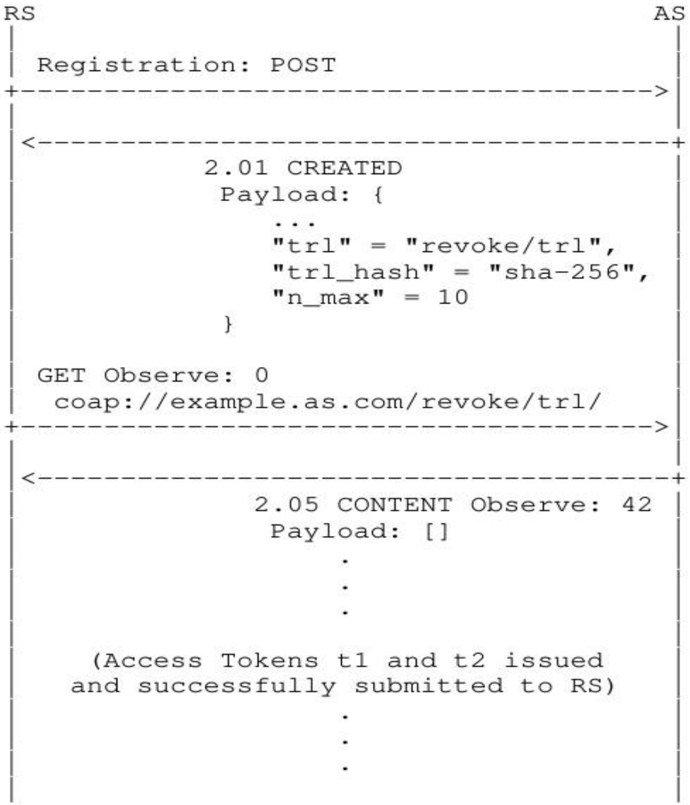
Backup

Protocol overview



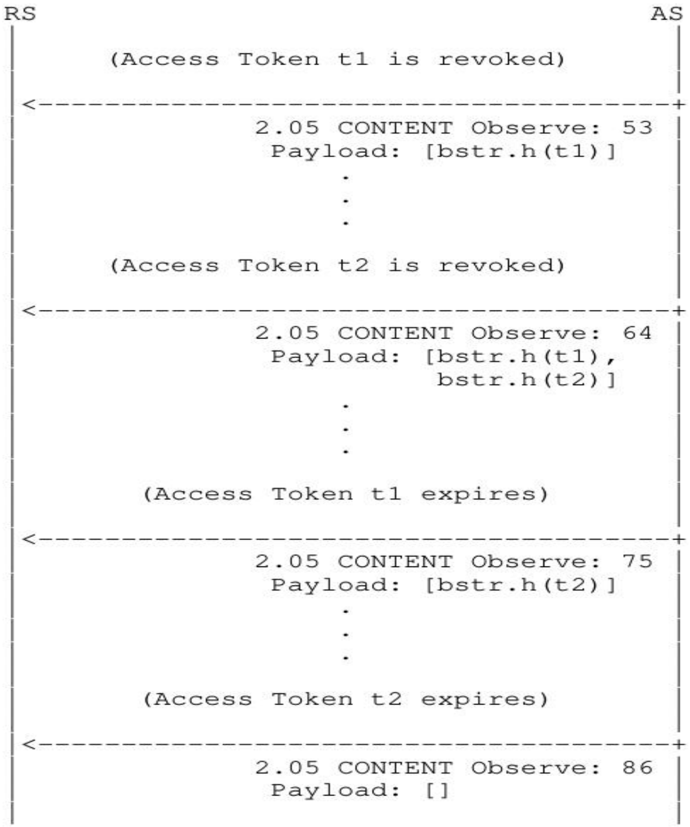
```
                  +----------------------+
                  | Authorization Server |
                  +-----------o----------+
                  revoke/trl  |  TRL: {th1,th2,th3}
                              |
 +-------------+--------------+------------+------------+
 |             |              |            |            |
 | th1,th2,th3 | th1,th2      | th1        | th3        | th2,th3
 v             v              v            v            v
+-----------+ +--------+ +--------+ +--------+ +--------+
| Administrator | | Client 1 | | Resource | | Client 2 | | Resource |
|           | |        | | Server 1 | |        | | Server 2 |
+-----------+ +--------+ +--------+ +--------+ +--------+
               :   :       :        :          :   :
               :   :  t1   :        :    t3    :   :
               :   :.......:        :..........:   :
               :              t2                   :
               :...................................:
```

Example with Full Query



```
RS                                      AS
|                                        |
| Registration: POST                     |
+--------------------------------------->|
|                                        |
|<---------------------------------------+
|           2.01 CREATED                 |
|            Payload: {                  |
|               ...                      |
|               "trl" = "revoke/trl",    |
|               "trl_hash" = "sha-256",  |
|               "n_max" = 10             |
|            }                           |
|                                        |
| GET Observe: 0                         |
|  coap://example.as.com/revoke/trl/     |
+--------------------------------------->|
|                                        |
|<---------------------------------------+
|              2.05 CONTENT Observe: 42  |
|               Payload: []              |
|                    .                   |
|                    .                   |
|                    .                   |
|                                        |
|    (Access Tokens t1 and t2 issued     |
|   and successfully submitted to RS)    |
|                    .                   |
|                    .                   |
|                    .                   |
|                                        |
```

Example with Full Query (ctd.)



```
RS                                             AS
|                                               |
|        (Access Token t1 is revoked)           |
|                                               |
|<----------------------------------------------+
|                 2.05 CONTENT Observe: 53      |
|                  Payload: [bstr.h(t1)]        |
|                            .                  |
|                            .                  |
|                            .                  |
|                                               |
|        (Access Token t2 is revoked)           |
|                                               |
|<----------------------------------------------+
|                 2.05 CONTENT Observe: 64      |
|                  Payload: [bstr.h(t1),        |
|                            bstr.h(t2)]        |
|                            .                  |
|                            .                  |
|                            .                  |
|                                               |
|          (Access Token t1 expires)            |
|                                               |
|<----------------------------------------------+
|                 2.05 CONTENT Observe: 75      |
|                  Payload: [bstr.h(t2)]        |
|                            .                  |
|                            .                  |
|                            .                  |
|                                               |
|          (Access Token t2 expires)            |
|                                               |
|<----------------------------------------------+
|                 2.05 CONTENT Observe: 86      |
|                  Payload: []                  |
|                                               |
```

Types of TRL queries

- **Common features**
  - Limited to the portion of the TRL pertaining the requester
  - TRL filtering based on authenticated identity of the requester (secure session)

- **Full Query – *GET [Observe: 0] coaps://example.as.com/revoke/trl***
  - Request for all pertaining token hashes in the TRL
  - Return a CBOR array, with the Token hashes as elements

- **Diff Query – *GET [Observe: 0] coaps://example.as.com/revoke/trl?diff=3***
  - Request for the latest N updates to the pertaining portion of the TRL list
  - Build N entries as CBOR arrays. Each entry refers to an update and has:
    - An element "deleted", with a CBOR array of Token hashes.
    - An element "added", with a CBOR array of Token hashes.
  - Return a CBOR array with the N arrays as element, in reverse chronological order

- **STB-based Query – Appendix B**
  - Builds on and extends the Full Query and Diff Query modes
  - Uses the Series Transfer Pattern (STB), to enable transfers in chunks from a "resumption point"

STP-based query mode

- **Rather than the N most recent TRL updates …**
  - Get N updates from “where we stopped last time”
  - Revert to Full Query if not possible, e.g., information loss/removal at the AS

- **Use the Series Transfer Pattern (STP) and its “Cursor” pattern**
  - Both (a) Full Query and (b) Diff Query requests return also a cursor
  - (a) Pointer to the most recent, pertaining TRL update
  - (b) Pointer to the most recent TRL update included in the response

- **In this “enhanced Diff Query” mode**
  - A follow-up request may resume from after the cursor
  - Adjacent batches of TRL updates are possible, limiting excessive latencies

- **Handled corner cases**
  - No updates, or no updates after the cursor
  - Requested updates have been deleted as too old