Key Management for OSCORE Groups in ACE

draft-ietf-ace-key-groupcomm-oscore-02

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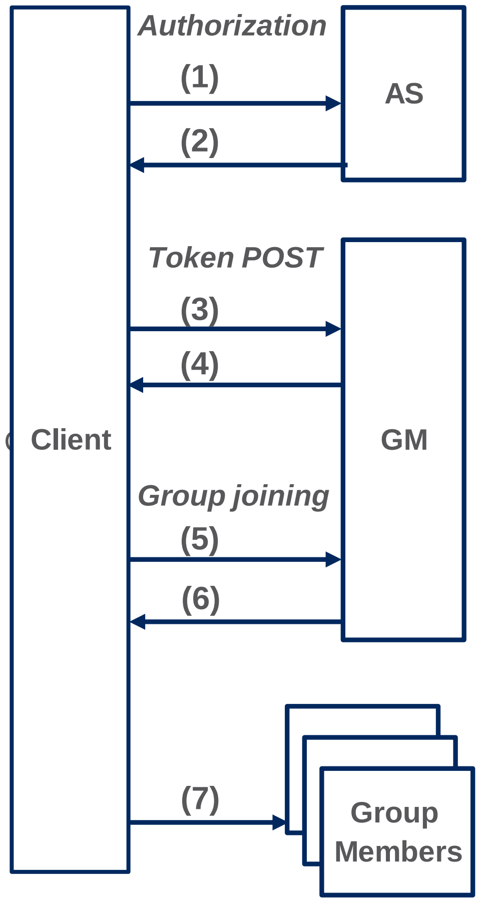
Recap

- Message content and exchanges for:
  - Joining an OSCORE group through its Group Manager (GM)
  - Provisioning keying material to joining nodes and groups (rekeying)

- Build on *draf-ietf-ace-key-groupcomm*
  - Agnostic of the ACE profile used by C and GM

- Out of Scope:
  - Authorizing access to resources at group members
  - Actual secure communication in the OSCORE group



Selected updates from -01

- Review from Jim (-01) and Ludwig (-02) – Thanks a lot!

- Renaming
  - Roles: “requester”, “responder”, “monitor”
  - Profile name: “group_oscore_app”

- Consistency with *ace-key-groupcomm*
  - ‘type’ parameter in any request to a Join Resource
  - Renamed and revised parameter ‘signed_info’

- Provisioning & checking of public keys at the GM
  - Consistency with signature parameters and expected key encoding
  - Check for possible public key already owned for that joining node

Selected updates from -01

- Agreement on signatures
  - ‘sign_info’ , i.e. signature algorithm and parameters
  - ‘pub_key_enc’, i.e. encoding of public keys
  - Used in Token POST response and/or Join Response

2 Open Points follow on this

- Proof-of-possession of private key
  - The Client gets a nonce in response to the Token POST
  - The Client signs the nonce with its own private key
  - The signature is included in ‘client_cred_verify’ of the Join Request

1 Open Point follows on this

Open point #1

› The Client has to agree with the GM about
  – Countersignature algorithm and parameters
  – Countersignature key parameters
  – Countersignature key encoding, e.g. COSE_Key

› We are defining three approaches
  1. Ask during the Token POST, with ‘sign_info’ and ‘pub_key_enc’
  2. Trial & error, with ‘sign_info’ and ‘pub_key_enc’ in a Join Response
  3. Early group discovery with the CoRE RD and link target attributes [1]

› Do we agree on … ?
  – Keeping all the three approaches
  – Avoid recommending/mandating some

[1] *draft-tiloca-core-oscore-discovery*

Open point #2

- We are admitting one public key encoding
  - COSE Key, from RFC 8152
  - Registered in “ACE Public Key Encoding Values” [2]

- Right now, we have no more encodings to register

- Do we agree on admitting possible future encodings?
  - What would be a good registration policy?

[2] *draft-ietf-ace-key-groupcomm*

Open point #3

› Proof-of-possession of the Client's private key
  – The Client gets a nonce in response to the Token POST, as 'cnonce'
  – The Client signs the nonce with its own private key
  – The signature is included in 'client_cred_verify' of the Join Request

› Signing process
  – Now referring to COSE
  – In fact, it is fine to just sign a byte stream

› Proposal to sign more data, and avoid oracle:
  – Add a further client-generated nonce in the Join Request
  – The signature in the Join Request covers both nonces

As also addressed in ace-key-groupcomm

› Do we agree that nothing more is needed to be signed?

Open point #4

- Section 7 "Group Rekeying Process"
  - `In order to rekey the OSCORE group, the Group Manager distributes a new Group ID of the group and a new OSCORE Master Secret for that group. When doing so, the Group Manager may take a` **`best effort`** `to preserve the same unchanged Sender IDs for all group members.`

- Should it be required (MUST/SHOULD) instead?
  - Pros: avoid side effects on public key retrieval and signature verification

- Reasons to keep it best effort
  - Pros: flexible refactoring of Sender ID space, e.g. if many nodes leave
  - ???

- Note: a node can ask for individual rekeying
  - E.g. , the sequence number wraps-around
  - The GM may assign a new Sender ID, rather than rekeying the whole group

Implementation

- RISE: ongoing development in Californium:
  - Build on the ACE implementation
  - Aligned with -01, i.e. basic functionalities
  - Work in progress to support -02 and different ACE profiles
  - https://bitbucket.org/lseitz/ace-java/

- Other ongoing implementations:
  - From Peter van der Stok
  - From Jim

- Early tests during the Hackathon
  - Exchange of Join Request/Response over OSCORE

Summary

› Latest major updates
  – Parameters for agreements on signature information
  – Proof-of-possession of Clients’ private keys, i.e. sign a nonce

› Open points to address
  – Which agreement methods for signature information ?
  – Other public key encodings than “COSE_Key” ?
  – More data to protect/involve during PoP of private keys
  – Preservation of same Sender IDs after a group rekeying

› Next steps
  – Simplify/shorten the document
  – Process comments from Ludwig
  – Get more reviews and run interop tests

Thank you!

Comments/questions?

https://github.com/ace-wg/ace-key-groupcomm-oscore

Backup

Join Response message

- Structure of the **Join Response** message
  - 'kty' , "Group_OSCORE_Security_Context object"
  - 'k' , Group_OSCORE_Security_Context object
    - 'ms' , OSCORE Master Secret
    - 'clientID' , Sender ID of the joining node (if present)
    - 'hkdf' , KDF algorithm (if present)
    - ' alg' , AEAD algorithm (if present)
    - 'salt' , OSCORE Master Salt (if present)
    - 'contextID' , Group ID
    - 'rpl' , Replay Window Type and Size (if present)
    - 'cs_alg' , signature algorithm
    - 'cs_params' , signature parameters (if present)
    - 'cs_key_params', signature key parameters (if present)
    - 'cs_key_enc', public key encoding (if present)
  - 'profile' , "coap_group_oscore_app"
  - 'exp' , lifetime of the derived OSCORE Context
  - 'pub_keys' , public keys of group members (if present)

… … …

Defined in ace-key-groupcomm together with IANA Registry

Extends the CBOR-encoded OSCORE Security Context Object of the OSCORE profile

Defined in the OSCORE Profile

Defined here and added to "OSCORE Security Context Parameters" Registry

Defined in ace-key-groupcomm together with IANA Registry