Joining OSCORE groups in ACE

draft-tiloca-ace-oscoap-joining-03

Marco Tiloca, RISE SICS
Jiye Park, Universität Duisburg-Essen

IETF 101, ACE WG, London, March 19th, 2018

Action points from IETF100

1. Define the exact content of exchanged messages
   - Aligned with the guidelines in *draft-ietf-core-oscore-groupcomm*

2. Address similarities with the Pub-Sub profile of ACE
   - Both drafts address key provisioning for group communication
   - Avoid defining multiple sets of messages for the same goal

Result

- Build on the generic formats in *draft-palombini-ace-key-groupcomm*
- Finalize the message content for joining OSCORE groups
- The Group Manager acts as the “KDC” of the generic scenario
- There is no participant node acting as “Dispatcher”

C -> AS Authorization Request

- The "**scope**" parameter includes:
  - The Group Identifier (Gid) of the OSCORE group to join.
  - The role(s) that the joining node wishes to have in the group.
- The "**aud**" parameter is set to the address of the GM
- The "**get_pub_keys**" parameter is present if:
  - The GM stores the public keys of group members
  - The joining node wants those public keys at joining time

"get_pub_keys" is defined in *draft-palombini-ace-key-groupcomm*

AS -> C Authorization Response

- Access Token as in *draft-palombini-ace-key-groupcomm*
- The "**exp**" parameter must be present
- The "**scope**" parameter is present if:
  - The joining node is authorized for different roles than in the request
- The "**profile**" parameter is present
  - The joining node and GM establish a secure channel accordingly

C -> GM (RS) Join Request

- After Token Post and processing on the GM
- The "**get_pub_keys**" parameter:
  - Is included if present also in the Authorization Request.
- The "**client_cred**" parameter (optional) includes:
  - Public key or certificate of the joining node
  - Exact content depends on the GM storing public keys or not
  - Omitted if the GM already acquired the public key or certificate
- The "**pub_keys_repos**" parameter (optional):
  - May be present if "client_cred" is present and includes a certificate
  - It includes a list of repos storing the joining node's certificate

GM (RS) -> C Join Response (1/2)

- The "**key**" parameter includes:
  - * "**kty**" with value "Symmetric".
  - * "**k**" as the OSCORE Master Secret.
  - * "**alg**" (opt) as the AEAD algorithm used in the group.
  - * "**kid**" (opt) as the identifier of "k".
  - * "**base IV**" (opt) as the OSCORE Common IV.
  - ** "**clientID**" as the Endpoint ID of the joining node.
  - ** "**serverID**" as the Group Identifier (Gid) of the group.
  - ** "**kdf**" (opt) as the KDF algorithm used in the group.
  - ** "**slt**" (opt) as the OSCORE Master Salt.
  - "**cs_alg**" as the countersignature algorithm used in the group.

* defined in *RFC8152*

** defined in *draft-ietf-ace-oscore-profile*

GM (RS) -> C Join Response (2/2)

- The "**pub_keys**" parameter:
  - Is present if "get_pub_keys" was in the Join Request.
  - Includes the public keys of the current group members.

- The "**group_policies**" parameter:
  - Includes a list of policies enforced in the group.
  - E.g. synchronization of sequence numbers, rekeying protocol.

- The "**mgt_key_material**" parameter:
  - Includes administrative key material to participate to the rekeying.
  - Content and format are specific of the rekeying protocol.

Conclusion

- Aligned with:
  - General message formats from *draft-palombini-ace-key-groupcomm*
  - Now providing specific message format for joining OSCORE groups
- Aligned with:
  - The general join description in *draft-ietf-core-oscore-groupcomm*
  - Pointer to this document as recommended joining approach
  - Should this approach be more than recommended?
- “High-priority” at the ACE interim meeting (October 2017)
- Ready for adoption ?

Thank you!

Comments/questions?

https://gitlab.com/crimson84/draft-tiloca-ace-oscoap-joining/

Goal

- Join an OSCORE group through its Group Manager (GM)
  - Using the ACE framework and its profiles
  - Keeping the approach oblivious to the used security profile
  - Preserving flexible arrangements and managements of groups

- Objectives
  - Authorize joining nodes according to group join policies
  - Secure channel establishment between joining nodes and the GM
  - Initialization of joining nodes and key provisioning through the GM

- Out of scope
  - Authorization to access resources at group members
  - Actual secure communication in the OSCORE group

Protocol overview

- Join an OSCORE group using the ACE framework
  - Client → Joining node
  - Resource Server (RS) → Group Manager (GM)
  - The AS enforces access policies on behalf of the GM
  - Leverage profiles of ACE for secure communication with the GM

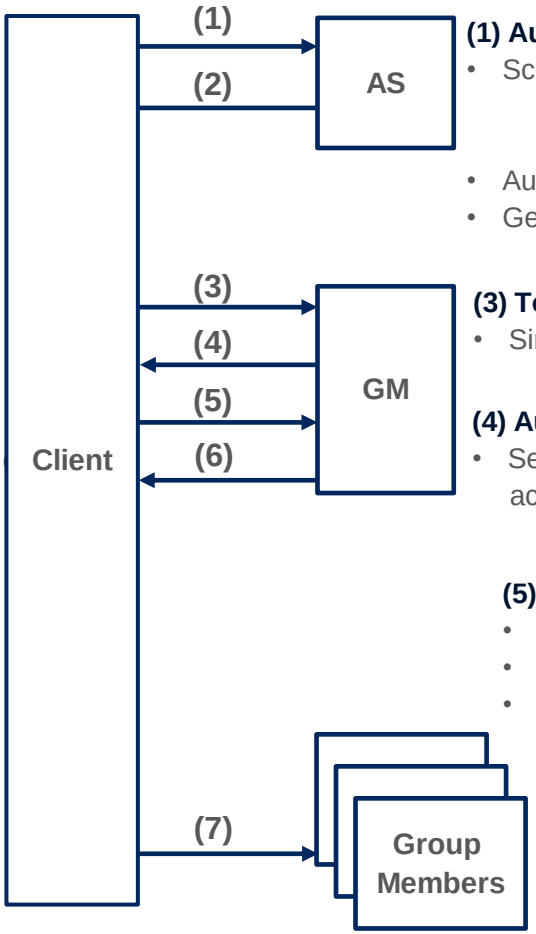
- Joining process
  - CoAP request to the GM resource associated to the group to join
  - The GM provides keying material and other parameters to the joining node

- The GM may store the members' public keys
  - It receives new members' public key upon their joining
  - If requested so, it provides members' public keys to joining nodes

Step-by-step message formats

(2) Authorization Response
- AT: access token
- Exp: lifetime of the AT
- Scope: confirmation of the roles requested in (1)
- Profile: security protocol between Client and GM

(6) Join Response
- Keying material for the OSCORE Security Context
- Pub_keys : if get_pub_keys was in (5), includes public keys of current group members
- Group_policies: includes list of policies (synchronization of seq number, rekeying protocol)
- Mgt_key_material :administrative key material to participate to the rekeying; content and format depends on the specific rekeying protocol



(1) Authorization Request
- Scope
  - Gid: Group ID that joining node wants to join
  - Roles: {Sender, Listener, Pure Listener}
- Aud : Group Manager's address
- Get_pub_keys : request to get public keys of members

(3) Token Post
- Simple post of AT

(4) Authorization Response
- Secure channel establishment according to the signalled profile of ACE

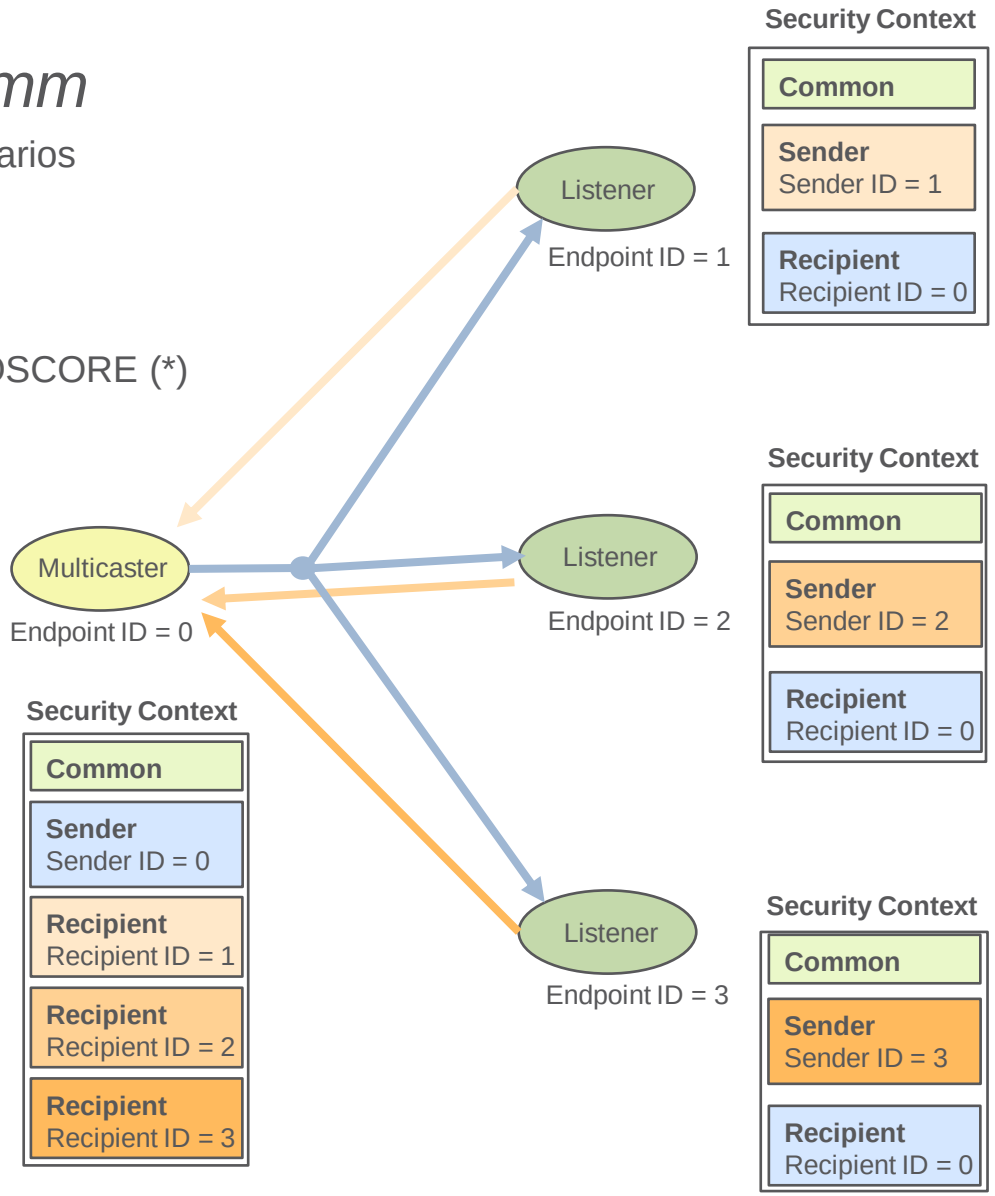
(5) Join Request
- If get_pub_keys is included in (1), also included here
- Client_cred: public_key or certificate of the Client
- pub_keys_repos: including a list of public repos if client_cred is present and includes a certificate

(7) OSCORE group communication

Group OSCORE

- *draft-ietf-core-oscore-groupcomm*
  - Use of OSCORE (*) in group communication scenarios

- Main features
  - Same structures, constructs and mechanisms of OSCORE (*)
  - Confidentiality, integrity, replay protection
  - Source authentication through digital signatures
  - Request-response binding



(*) *draft-ietf-core-object-security*

Use cases for Group OSCORE

- Lighting control
- Integrated building control
- Software and firmware updates
- Parameter and configuration updates
- Commissioning of LLNs systems
- Emergency multicast

See “Appendix B” of *draft-ietf-core-oscore-groupcomm-01*

Group Manager (GM)

- Can be responsible of multiple OSCORE groups
  - Join of new group members
  - Renewal of group keying material

- Drive the joining process
  - Contact point for joining the group
  - Actual admission of new nodes in the group
  - Provides keying material to joining nodes (incl. security context)

- Possibly act as key repository
  - Store/provide public keys of group members