Profiling EDHOC for CoAP and OSCORE

draft-ietf-core-oscore-edhoc-04

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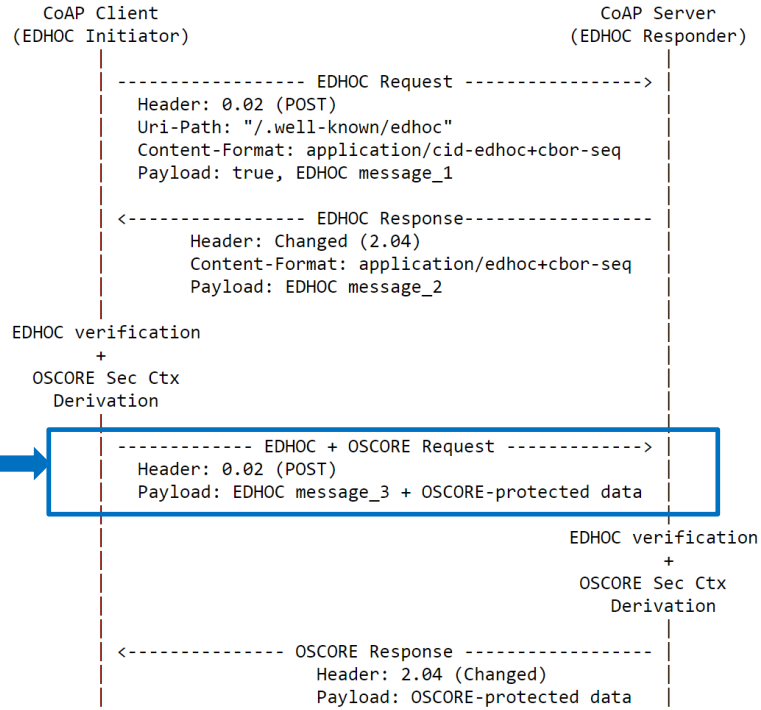
Recap

- **EDHOC: lightweight authenticated key exchange [1]**
  - Developed in the LAKE Working Group
  - Main use: establish an OSCORE Security Context
  - Normally, two round-trips before using OSCORE

- **Scope of this document**
  - EDHOC for OSCORE, transported over CoAP
  - Optimized key establishment workflow (main item)
    - Single request with EDHOC Option, combining final EDHOC message_3 and first OSCORE-protected application request
  - OSCORE-specific processing of EDHOC messages
  - Consistent extension of EDHOC application profiles
  - Web linking for discovery EDHOC resources and their application profiles (through target attributes)



[1] https://datatracker.ietf.org/doc/draft-ietf-lake-edhoc/

Update since IETF 113

Presented at the CoRE interim meeting on 2022-04-27

Updates in this slide are due to changes in EDHOC (now in its version -15)

- **No more special conversion of identifiers**
  - OSCORE Recipient/Sender IDs → EDHOC Connection Identifiers
  - Simple "identity" relation like in the opposite direction (defined by EDHOC)
  - When receiving the EDHOC + OSCORE request ...
    - … the server retrieves the value of 'kid' from the OSCORE Option
    - The ‘kid’ value is both the Server’s OSCORE Recipient ID and EDHOC Connection Identifier C_R
- **Text and examples using the new Content-Formats**
  - *application/cid-edhoc+cbor-seq* and *application/edhoc+cbor-seq*
  - The combined EDHOC + OSCORE request has still unnamed media-type
- **“EDHOC Applicability Statement” → “EDHOC Application Profile”**

Update since IETF 113

- **On the “good behavior” expected from the Client**
  - “*With the same Server, the Client **SHOULD NOT** have multiple simultaneous outstanding interactions (see Section 4.7 of [RFC7252]) such that: they consist of an EDHOC + OSCORE request; and their EDHOC data pertain to the EDHOC session with the same connection identifier C_R.*”
  - Changed from "MUST NOT“, based on feedback during the CoRE interim meeting in April [2].

- **Revised and simplified processing of EDHOC messages**
  - Selection of own EDHOC Connection Identifier (offered as own OSCORE Recipient ID).
  - Related consistency checks on incoming EDHOC messages.
  - Consistent with requirements from Section 3.3 of RFC 8613.

[2] https://datatracker.ietf.org/doc/minutes-interim-2022-core-05-202204271600/

Update since IETF 113

- **Simplified extension/consistency of EDHOC Application Profile template**
  - Nothing to say anymore about conversion of OSCORE/EDHOC identifiers
  - If the EDHOC + OSCORE request is supported, the application profile of an EDHOC resource:
    - SHOULD signal the support of the EDHOC + OSCORE request
    - MUST NOT signal the support of message_4

- **Revised use of web-linking to signal EDHOC Application Profiles**
  - Removed target attribute related to conversion of EDHOC/OSCORE identifiers
  - Admitted multiple instances of an "ead_X" target attribute, with value the ead_label of a supported External Authorization Data (EAD) item for EAD_X in EDHOC message_X.

- **Added security considerations**
  - Flooding the Server with EDHOC + OSCORE combined requests is not a security problem.
    - The server does not process the same EDHOC message_3 multiple times
    - The server performs replay checks on the OSCORE-protected application request

On using Block-wise

- **When can the EDHOC + OSCORE request get too big because of EDHOC?**
  - Use of large ID_CRED_I in EDHOC, e.g., as a certificate chain
  - Use of large EAD items in EAD_3 as External Authorization Data
- **Client processing in Section 3.2.1**
  - Only the first inner block conveys EDHOC data and the EDHOC Option
  - Stop if the EDHOC + OSCORE request exceeds MAX_UNFRAGMENTED_SIZE
- **Server processing in Section 3.3.1**
  - Just as per RFC 7959 and RFC 8613: the EDHOC + OSCORE request is rebuilt first
- **New Section 6**
  - Guidelines on (not) using Block-wise together with the EDHOC + OSCORE request
  - The Client might use inner Block-wise, but it is assumed to not use also outer Block-wise
    - Possible to fragment the application data, but not the whole EDHOC + OSCORE request

Optimized workflow and Block-wise

- **LIMIT: practical maximum size to exceed before using Block-wise**
- **When is it OK to send the EDHOC + OSCORE request?**
  - Generally, (EDHOC data) <= LIMIT is a requirement
  - If Block-wise is not used, when (Application data + EDHOC data) <= LIMIT
  - If Block-wise is used, when (1 block + EDHOC data) <= LIMIT
- **When using the EDHOC + OSCORE request, use also Block-wise if …**
  - … (Application data) > LIMIT **or** (Application data + EDHOC data) > LIMIT
  - In either case (1 block + EDHOC data) must not exceed LIMIT
  - If both conditions hold, the optimized workflow is always better in terms of RTTs
- **Corner case:** (Application data) <= LIMIT **and** (Application data + EDHOC data) > LIMIT
  - Using the EDHOC + OSCORE request would be the actual cause for using Block-wise!
  - The optimized workflow may still be not worse than the original one, but it may also be just worse
  - Under this case, the Client SHOULD NOT use the EDHOC + OSCORE request, as not worth it

Next steps

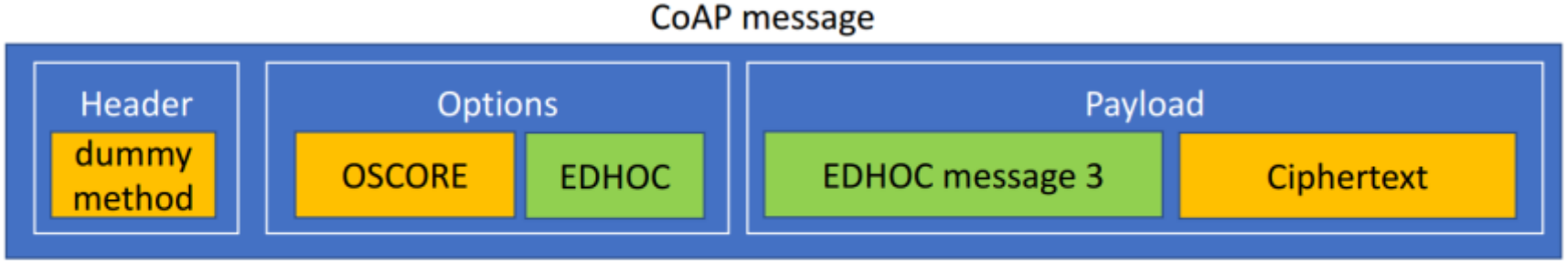
- **Add more security considerations, e.g.:**
  - When using the EDHOC + OSCORE combined request, the OSCORE-protected application request has to undergo access control enforcement, like if it was received stand-alone.
- **We have running code built for Eclipse Californium (Java)**
  - Aligned to the latest EDHOC v -15
    - https://github.com/rikard-sics/californium/tree/edhoc-dev
- **TODO: Renew early registration of EDHOC CoAP Option number (21)**
  - Expiration on 2022-11-08
  - IANA: is it needed to register also the other suggested number 13? → No need to
- **Absent big issues or EDHOC changes, the next version might be good for WGLC**
  - Maybe we should synch with the LAKE WG, and have it in parallel with the WGLC of EDHOC?
- **Comments are reviews are welcome!**

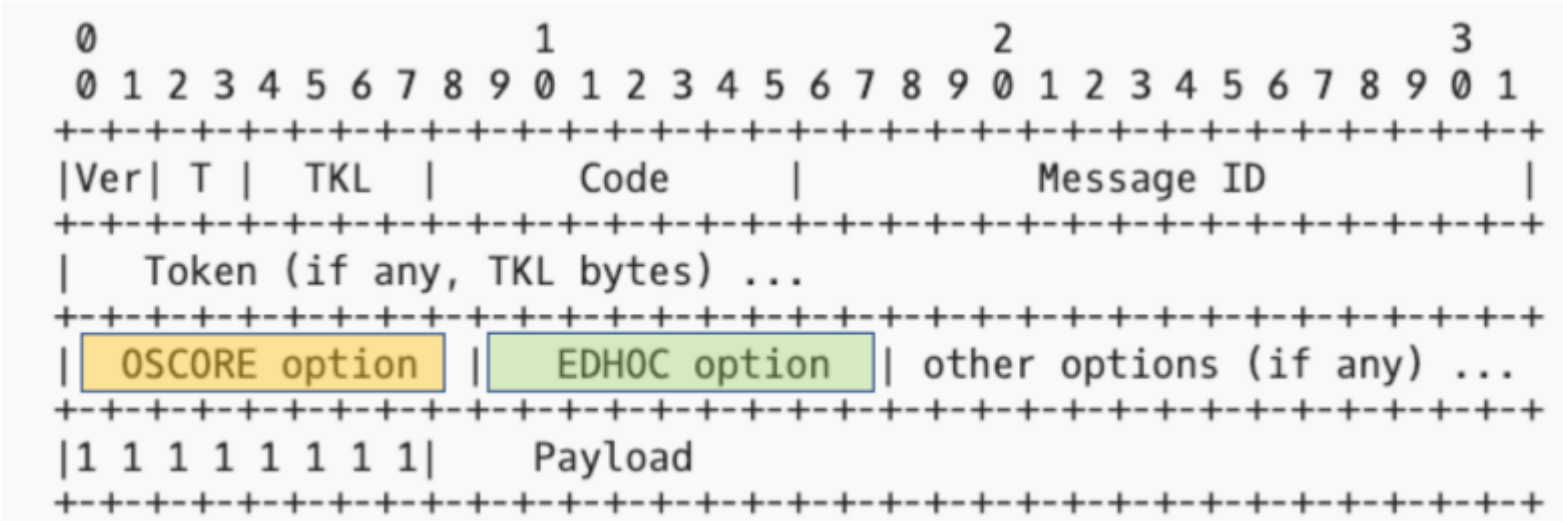
Thank you!

Comments/questions?

https://github.com/core-wg/oscore-edhoc/

EDHOC + OSCORE request





On using Block-wise

- **Client processing (Section 3.2.1)**
  - OSCORE protection of each inner block as usual
  - If the protected block is not the first one (i.e., Block1.NUM ≠ 0)
    - The client MUST NOT add the EDHOC Option, but sends the protected request as is
    - → Only the first inner block conveys EDHOC data
  - If the protected block is the first one (i.e., Block1.NUM = 0) and …
    - … (EDHOC message_3 | OSCORE ciphertext) > MAX_UNFRAGMENTED_SIZE … then
    - … abort and possibly switch to the original vanilla EDHOC workflow
    - No further inner blockwise can happen once the EDHOC + OSCORE request is assembled

- **Server processing (Section 3.3.1)**
  - First re-assemble the full EDHOC + OSCORE, as per RFC 7959 and RFC 8613.