Implementation Considerations for EDHOC

draft-tiloca-lake-edhoc-implem-cons-00

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Motivation

- **While developing the EDHOC protocol in [1], a number of side topics came up**
  - Those were rightly considered out of scope for EDHOC itself
  - Not elaborated in *draft-ietf-lake-edhoc*, which rightly focuses on the actual protocol

- **Practically, implementors have to deal with those side topics**
  - When building an application using EDHOC or an “EDHOC library”
  - Related implementation guidelines would be useful

- **A potential Informational document was discussed in previous (interim) meetings**

- **Also in the latest WG Charter:** *… the working group will work on an Informational document gathering implementation considerations and guidance for the base protocol specification.*

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

Just released version -00

Focus on three main topics

1. **Handling of EDHOC sessions or application keys that have become invalid**

2. **Different trust models for learning new authentication credentials on-the-fly**

3. **Side-processing of EDHOC messages**
   - Fetching and validation of authentication credentials
   - Processing of EAD items, possibly influencing the validation of authentication credentials

Topic 1 – Purging and cleaning up

- **Most likely, only the application is aware of <u>both</u>:**
  - The completed EDHOC sessions and the derived application keys (e.g., OSCORE Security Contexts)
- **Case 1 – A completed EDHOC session becomes invalid**
  - E.g., the other peer's authentication credential has been revoked
  - Purge the EDHOC session, then purge the derived application keys

- **Case 2 – Application keys become invalid (e.g., expiration, too many uses)**
  - If the keys are not persisted yet, purge the session and re-run EDHOC
  - Otherwise, if supported, run a key update procedure (e.g., KUDOS [1] for OSCORE)
  - As a last resort, purge the session and re-run EDHOC

- **Case 3 – Application keys or bound access rights become invalid**
  - Similar to case 2, but the trigger can also be an access token become invalid (e.g., in [2])
  - If so, a new access token is also required before EDHOC can be re-run

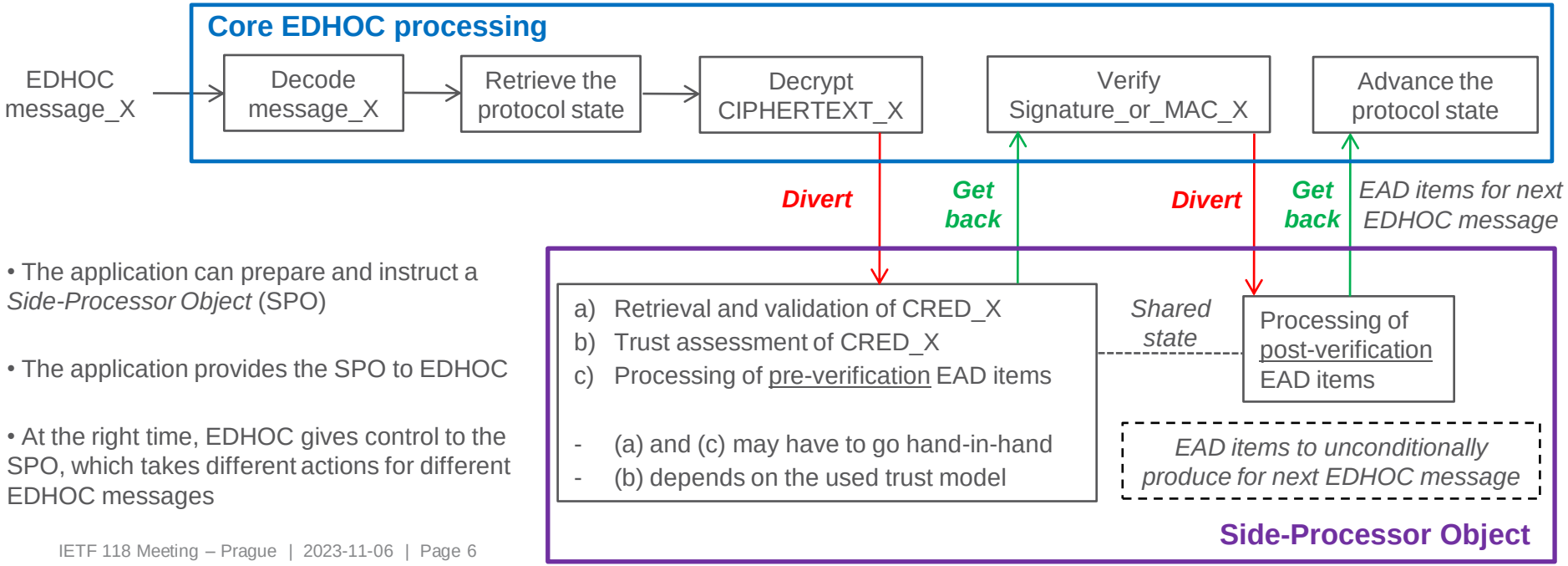
[1] https://datatracker.ietf.org/doc/draft-ietf-core-oscore-key-update/
[2] https://datatracker.ietf.org/doc/draft-ietf-ace-edhoc-oscore-profile/

Topic 2 – Trusting peer's credentials

- **If already stored, an authentication credential CRED_X is also trusted**
  - It is also valid, until its expiration or until a revocation notice says otherwise
- **Should a peer trust an unknown CRED_X retrieved from ID_CRED_X?**
  - ID_CRED_X conveys CRED_X by value, or a URI from where CRED_X can be retrieved
- **#1 PRE-KNOWLEDGE-ONLY (PKO) – Never trust an unknown CRED_X**
  - Authentication credentials to use have to be pre-installed by a trusted party
  - ID_CRED_X has to point to an already stored CRED_X
- **#2 LEARN-ON-FIRST-USE (LOFU) – Trust and store CRED_X only if:**
  - CRED_X is valid **AND** a compatible, trusted identifier is already stored
  - E.g., ID_CRED_X conveys a certificate by value, and its hash is already stored
- **#3 TRUST-ON-FIRST-USE (TOFU) – Always trust an unknown CRED_X**
  - Trust and store CRED_X, as long as it is valid

Topic 3 – Side processing of messages

- **The processing of (especially) EDHOC message_2 and message_3 is not linear**
  - A big part of it does not pertain to the core EDHOC processing and has several possible incarnations
  - Yet, it is something crucial to implement for an application using EDHOC or in an "EDHOC library"



• The application can prepare and instruct a *Side-Processor Object* (SPO)

• The application provides the SPO to EDHOC

• At the right time, EDHOC gives control to the SPO, which takes different actions for different EDHOC messages

Summary and next steps

- **Guidelines for EDHOC implementations**
  - Handling of EDHOC sessions or application keys that have become invalid
  - Different trust models for learning new authentication credentials on-the-fly
  - Side-processing of EDHOC messages
    - Fetching and validation of authentication credentials
    - Processing of EAD items, possibly influencing the validation of authentication credentials

- **Plan for the next version**
  - Add figures, mostly about the side-processing of EDHOC messages
  - Add guidelines on using EDHOC with CoAP and Blockwise (RFC 7959)
    - Also together with the EDHOC + OSCORE combined request, see *draft-ietf-core-oscore-edhoc*
  - Add an appendix with public key certificates for testing
    - *draft-ietf-lake-traces* provides them for Ed25519 keys; good to have also for X25519 and P-256

- **Comments are welcome! Any further aspects worth covering?**

Thank you!

https://gitlab.com/crimson84/draft-tiloca-lake-edhoc-implem-cons