Protecting EST Payloads with OSCORE draft-ietf-ace-coap-est-oscore-03

Göran Selander, Ericsson
Shahid Raza, RISE
Martin Furuhed, Nexus
Mališa Vučinić, Inria
Timothy Claeys

ACE @ IETF 118 – 10/11/2023

Status

- Received review from John Mattsson on 19 September 2023
  - https://mailarchive.ietf.org/arch/msg/ace/h85KdNLkMxqzCZjJlY-fGlPEyVw/
- Published -03 on 23 October 2023
  - Partial resolution of issues raised in John's review
- Goal of the presentation
  - Present the resolutions to the notable issues raised in John's review
  - Discuss open issues

#15: How does a Client obtain the DH key of a Server (Enrollment of Static DH Keys)

Closed

John's comment

- **"The EST client obtained the CA certs including the CA's DH certificate using the /crts function"**
  This seems very inefficient. Why not just use G_Y from EDHOC? The Client/Initiator can use the cipher suite to get the curve it wants. I think this should be added as on option.

Context

- When enrolling static DH key, Proof-of-possession is a MAC (RFC 6955)
- MAC is computed with a key generated from a shared ECDH secret
- To compute the secret, Client needs the Server's public DH key (certificate)
- EST uses the /crts functions for the Client to retrieve the certificates

Action taken

- Optimization when EDHOC and combined EDHOC-OSCORE delivery precedes enrollment
  - "… the client MUST use the public ephemeral key of the EDHOC Responder, G_Y, as the recipient public key…"
  - PR #32 merged: https://github.com/ace-wg/est-oscore/pull/32

#9 Connection-based proof-of-possession

Closed

John's comment

- *Connection-based proof-of-possession", I assume this means the client might not be authenticated (verify identity) in EDHOC. In that case this needs to be described and discussed.*

Context

- Refers to the binding between the CSR and the underlying secure transport layer
- Achieved by including the challengePassword attribute in the CSR that depends on the ongoing security session
- When EDHOC is used for enrolling static DH keys, the CSR PoP is now generated with an EDHOC ephemeral key
  - Binds the EDHOC session to the CSR without the need for additional bytes in challengePassword

Action taken

- Removed the specification on how to generate edhoc-unique byte string that was used as challengePassword
- Made the usage of challengePassword OPTIONAL for non-EDHOC use cases
  - "How challengePassword" is generated is outside of the scope of this specification and can be specified by an application profile."
- Added security consideration how this binding is achieved when using EDHOC (usage of the ephemeral key to compute the MAC)
- PR #33 merged: https://github.com/ace-wg/est-oscore/pull/33
  - Closes #10 raised by John on the length of the edhoc-unique byte string

Fixed editorials

- #5: Consolidate references Closed
- #6: Fix BCP14 boilerplate Closed
- #11: Explicitly state the type of certificate in “Optimizations” Closed
- #12: Illustrate the use of draft-ietf-core-oscore-edhoc Closed
- #13: Update figures Closed
- #16: Delete the sentence on HKDF Closed
- #21: Add acks Closed
- #28: Additional optimization in 3.4 Closed

Open Issues

#35: Normative requirements on Content-Format support (ASN.1 / CBOR)

Context

- EST-oscore may transport ASN.1 or CBOR objects
- Content type negotiation happens through CoAP's Accept option
- Need to specify normative requirements on what is supported
- Aim at keeping backward compatibility

Proposed text

➢ "EST-server SHOULD support both ASN.1 and CBOR-encoded objects. It is up to the client to support only ASN.1, CBOR encoding, or both. As a reminder, Content-Format negotiation happens through CoAP's Accept option present in the requests."

#34: Payload formats should explicitly mention CBOR-encoded objects

Context

- Table 2 gives a summary of ASN.1 media types carried within request and responses for each of the supported EST functions

Proposal

- Add an equivalent for CBOR-encoded objects as registered in I-D.ietf-cose-cbor-encoded-cert
- Currently missing from I-D.ietf-cose-cbor-encoded-cert
  - media-type registration for PKCS#10
  - CBOR encoding and media type for PKCS#8

URI	Content-Format	#IANA
/crts	N/A (req)	-
	application/pkix-cert (res)	287
	application/pkcs-7-mime;smime-type=certs-only (res)	281
/sen	application/pkcs10 (req)	286
	application/pkix-cert (res)	287
	application/pkcs-7-mime;smime-type=certs-only (res)	281
/sren	application/pkcs10 (req)	286
	application/pkix-cert (res)	287
	application/pkcs-7-mime;smime-type=certs-only (res)	281
/skg	application/pkcs10 (req)	286
	application/multipart-core (res)	62
/skc	application/pkcs10 (req)	286
	application/multipart-core (res)	62
/att	N/A (req)	-
	application/csrattrs (res)	285

Table 2: EST functions and the associated CoAP Content-Format identifiers

#17: Use of EAD fields of EDHOC to transport EST

John's comment

- "External Authorization Data (EAD) fields of EDHOC are intentionally not used to carry EST payloads because EDHOC needs not be executed in the case of re-enrollment."

This seems to me like the wrong decision. Using EAD would be much more efficient for the first enrollment. How common and important is re-enrollment? By using EDHOC efficiently I think the client might be able to send the CSR in message_3 and get the cert in message_4.

Context

- IoT device lifetime on the order of several years -> need to support re-enrollment
- Separate code paths for enrollment and re-enrollment complicate the implementation
- Possible to do enrollment with combined EDHOC-OSCORE delivery
- That way, initial enrollment can happen in EDHOC message_3 and message_4

Proposal

- Keep enrollment in OSCORE, option for combined EDHOC-OSCORE delivery is already present in the draft

#14: Update RFC9148?

John's comment

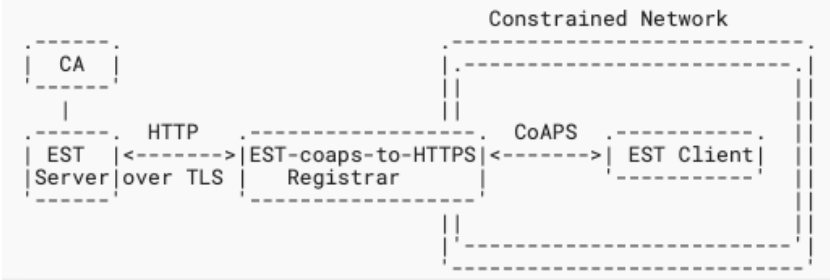
- *EST with hop-by-hop protection over a proxy seems like a very bad security architecture. Unless RFC 9148 makes this NOT RECOMMENDED, I think this draft should update RFC 9148 and do that. Server generated private keys visible to proxies should be MUST NOT. I have not read RFC 9148.*

Context

- Section 5 of RFC9148 discusses the HTTPS-CoAPs "Registrar" which acts as a HTTP-CoAP proxy
- Enables the EST-server to talk only HTTP/TLS
- In case of server-generated private keys which are not encrypted at the object level, key is visible to the proxy
- OSCORE traverses proxies

Proposal

- Add a security consideration on this in EST-oscore
- Do not update RFC 9148



Open editorial issues

- #7: Terminology rewrite to account for static DH keys
- #8: Trust Anchor database is always required
- #18: Clarify that issuing C509 certs is optional
- #19: Clarify scope in the introduction
- #20: Use Oxford comma
- #29: Adding message flow example

Next Steps

- Resolve remaining open issues
- More reviews?

Thank you!