Protecting EST Payloads with OSCORE draft-selander-ace-coap-est-oscore

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Context

- To make full potential of LAKE/EDHOC requires matching certificate enrollment
  - In particular, enrolment of certificates for static DH public keys
  - Target devices typically have EDHOC-OSCORE implementation
- RFC 9148
  - Published in April 2022, output of ACE
  - EST-coaps: Specifies Enrollment over Secure Transport (EST) with coaps
  - Follows closely the EST design, security with DTLS
  - Profiles EST for constrained environments
- ACE charter
  - *“The Working Group will examine how to use Constrained Application Protocol (CoAP) as a transport medium for certificate enrollment protocols, such as EST and CMPv2, …”*

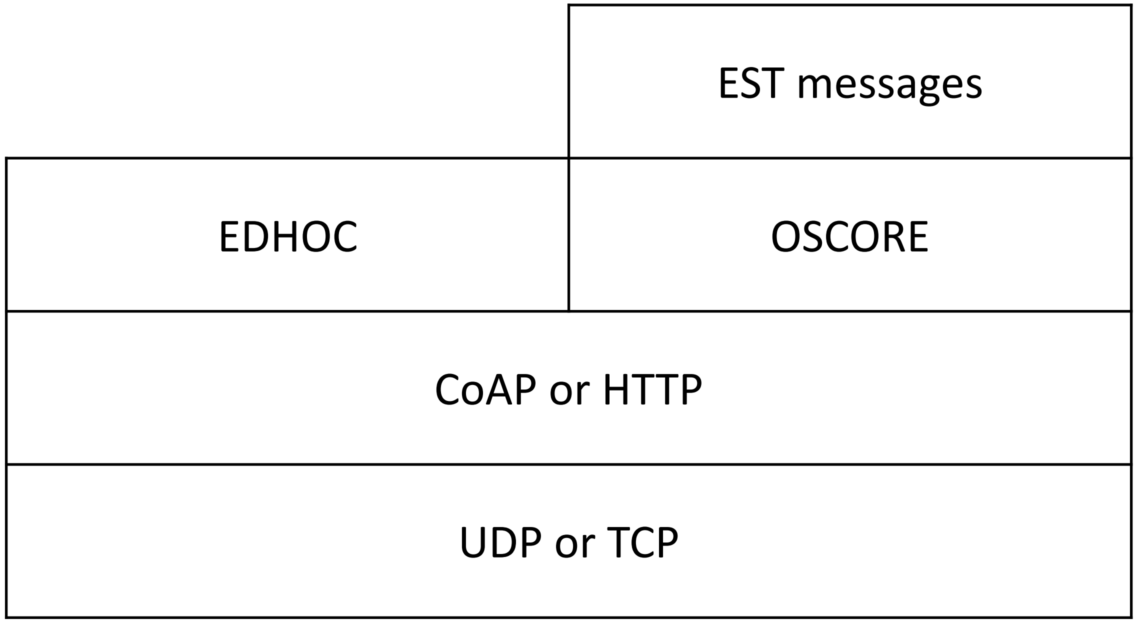
EST-oscore (this draft)

- Old draft, first version published in March 2017
- Protects EST payloads with OSCORE
- Follows the structure of RFC 9148, EDHOC-OSCORE instead of DTLS
- Agreement in a previous ACE WG interim meeting to work on this draft, but to complete EST-coaps first
- Revived for IETF 116
- Latest update includes support for enrollment of static DH keys

Operational differences with EST-coaps

	EST-coaps	EST-oscore
Message protection	DTLS Record	OSCORE
Mutual authentication	DTLS handshake	EDHOC
EST-server <-> Registrar Trust Relation	Required	Not required

Protocol Layering



EST messages

EDHOC

OSCORE

CoAP or HTTP

UDP or TCP

Authentication

- Mutual authentication required between EST-oscore client and server
- Uses EDHOC (draft-ietf-lake-edhoc)
- Authentication based on certificates
- Channel binding using “edhoc-unique”
  - edhoc-unique = EDHOC-Exporter(TBD1, "EDHOC Unique", length)
  - Byte string added as *challengePassword* of PKCS#10 Request
- Optimizations
  - Combined EDHOC message_3 and OSCORE request (draft-ietf-core-oscore-edhoc)
  - Certificates may be CBOR-encoded (draft-ietf-cose-cbor-encoded-cert)
  - Certificates may be referenced (draft-ietf-cose-x509)
  - PKCS#10 response may be a reference to the enrolled certificate

EST Functions

	EST-coaps	EST-oscore
/crts	MUST	MUST
/sen	MUST	MUST
/sren	MUST	MUST
/skg	OPTIONAL	OPTIONAL
/skc	OPTIONAL	OPTIONAL
/att	OPTIONAL	OPTIONAL

Enrollment of Static DH Keys

- EDHOC supports authentication using static DH keys
  - The most efficient EDHOC authentication method in terms of message size
- This draft adds the support for the enrollment of static DH keys
- Procedure
  - Client obtains CA’s DH key using /crts
  - Client generates the DH keypair following the DH group parameters of the CA
  - Client follows the steps in Section 4 of RFC 6955 to sign PKCS#10 object
  - Uses OSCORE KDF and MAC algorithms

Next Steps

- Complete the Security and Privacy Considerations section
- Reviews?

Thank you!