Project: IEEE P802.15 Working Group for Wireless Personal Area Networks (WPANs)

Submission Title: EDHOC as KMP for 802.15.9
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Abstract: EDHOC is a new lightweight security handshake protocol standardized by the IETF (RFC 9528). EDHOC enables a low complex implementation with few and short messages using generic encoding (CBOR) and security processing (COSE) which makes it suitable for low-cost / low-power deployments, in particular for establishing shared secret keys for 802.15.4 links. This presentation gives a background of lightweight security work in the IETF with focus on EDHOC.

Purpose: Specify EDHOC as a new KMP for 802.15.9

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EDHOC as KMP for 802.15.9

IEEE 802 Wireless

IG Crypto

14 May, 2024

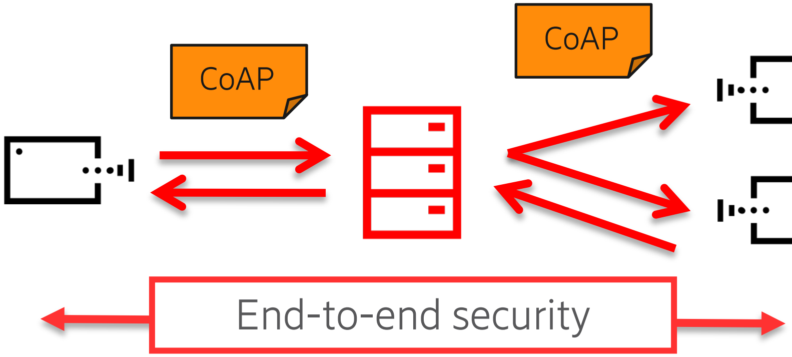
IETF Lightweight Security Background

- The IETF has developed lightweight protocols and enablers suitable for constrained environments, e.g. 6LoWPAN, 6TiSCH, CBOR, CoAP
- This effort also extends to security, for example COSE (RFC 9052), OSCORE (RFC 8613), ACE-OAuth (RFC 9200), EDHOC (RFC 9528)
- Building on lightweight primitives
  - CBOR (Concise Binary Object Representation, RFC 8949) for encoding
  - COSE (CBOR Object Signature and Encryption) for secure encapsulation and extensible identification of algorithms and credentials
  - May use CoAP, but not required in general
- Used for keying link layer
  - CoJP for 6TiSCH (RFC 9031) uses CoAP / OSCORE
    - Extended to EDHOC in draft-ietf-lake-authz
  - Keying of MACsec with EAP-EDHOC (draft-ietf-emu-eap-edhoc)

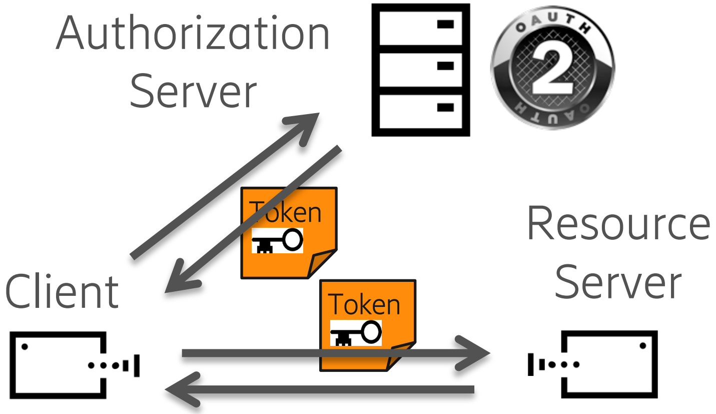
IETF Lightweight Security Examples

OSCORE

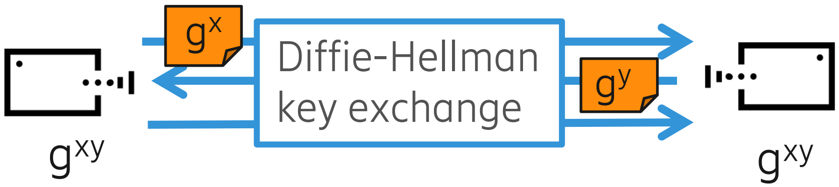
Group OSCORE



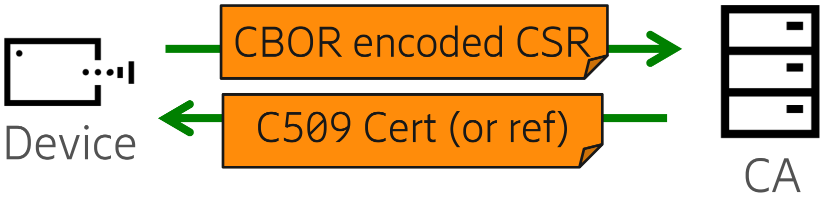
ACE-OAuth



EDHOC



CBOR encoded certificate management



EDHOC authenticates and establishes keys

- **Ephemeral Diffie-Hellman Over COSE – RFC 9528**
  - Lightweight security handshake
  - Authentication and derivation of shared secret keys
- **Lightweight protocol**
  - Lightweight primitives
  - Low message overhead
- **Secure design**
  - Extensive security analysis
- **Benchmark use cases**
  - Parallel handshakes, e.g. network formation
  - Frequent handshakes, e.g. intermittent actuations

EDHOC	Bytes
Message 1	37
Message 2	45
Message 3	19
Total	101

Example
Message sizes of an EDHOC protocol session

Keying 802.15.4 with EDHOC

- EDHOC is a lightweight authentication and key establishment protocol matching 802.15.4 objectives
- EDHOC builds on lightweight standardized enablers CBOR and COSE enabling code reuse
- Other current work on specifying the use of EDHOC to establish link layer keys
- EDHOC has analogous properties as other KMPs in 802.15.9 allowing a straightforward addition