

Transmission of SCHC-compressed packets over IEEE 802.15.4 networks

`draft-ietf-6lo-schc-15dot4-04`

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Main goal

```
+-----+
| CoAP, other |
+-----+
| UDP, other |
+-----+
|   IPv6   |
+-----+
| 6LoWPAN HC |
+-----+
|6LoWPAN Frag|
+-----+
|  802.15.4  |
+-----+
```

Traditional

```
+-----+
| CoAP, other |
+-----+
| UDP, other |
+-----+
|   IPv6   |
+-----+
|  SCHC HC   |
+-----+
|6LoWPAN Frag|
+-----+
|  802.15.4  |
+-----+
```

<-- NEW

SCHC-based

SCHC (RFC 8724) exploits a priori knowledge of header field values

Status

- **WG adoption**
 - draft-ietf-6lo-schc-15dot4-00
 - Same content as draft-gomez-6lo-schc-15dot4-05
 - In January 2023
- **Version -03**
 - Several additions and updates
 - Aims to address the comments from Kiran and Georgios
- **Version -04**
 - Incorporates feedback from the SCHC WG interim
 - October 17

Table of Contents

2 subsections

NEW

Relocated

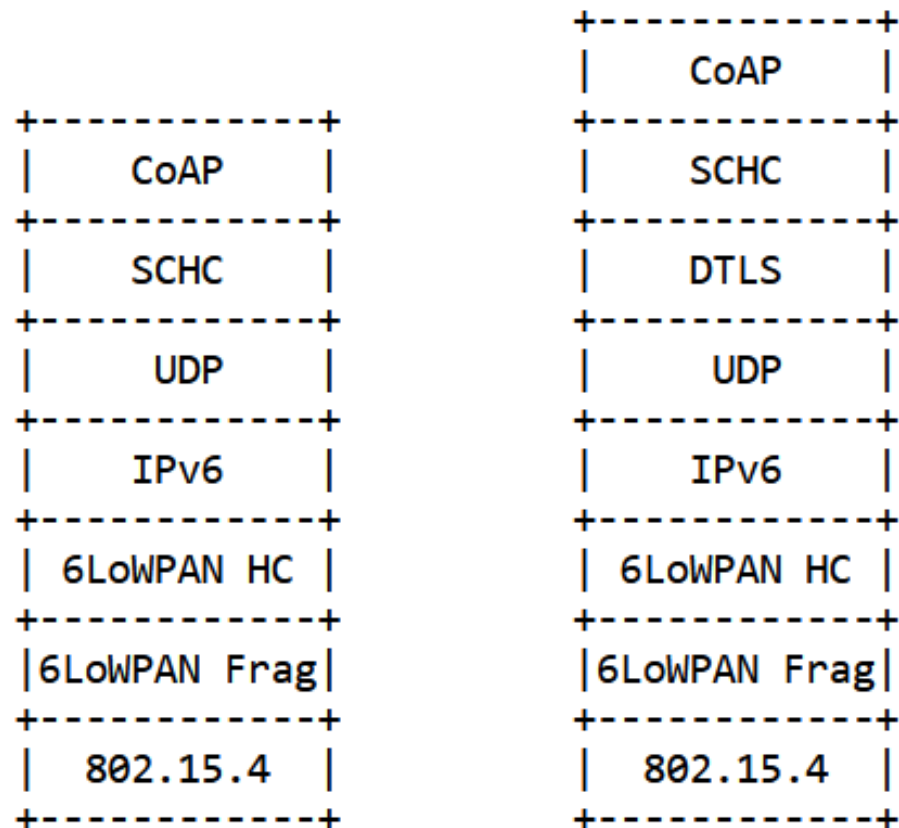
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1. Introduction

- Typical UDP-compressed header (RFC 6282)
 - OLD:
 - 4 bytes
 - NEW:
 - 2 to 4 bytes
- Typical IPv6/UDP-compressed header (RFC 6282)
 - OLD:
 - 6 bytes (link-local addresses)
 - 7 bytes (global addresses)
 - NEW:
 - 4 to 6 bytes (link-local addresses)
 - 5 to 7 bytes (global addresses)

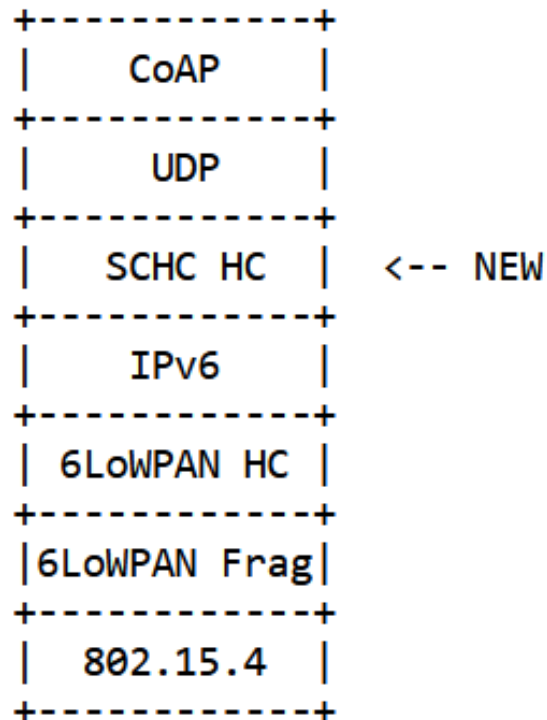
3.1.2. Transition protocol stacks (I/II)

- RFC 8824 enables SCHC HC for CoAP:



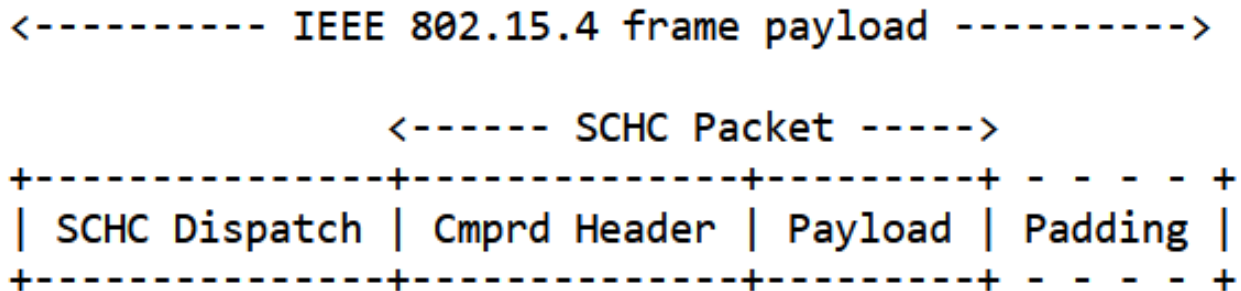
3.1.3. Transition protocol stacks (II/II)

- Currently enabled by this document...
 - ... but the SCHC architecture draft may actually enable it in the future:



3.3. Single-hop communication

- If the two endpoints are single-hop neighbors
 - Both endpoints MUST store the Rules for their communications
 - Same frame format as in Section 4.1
 - Same as for Straightforward Route Over

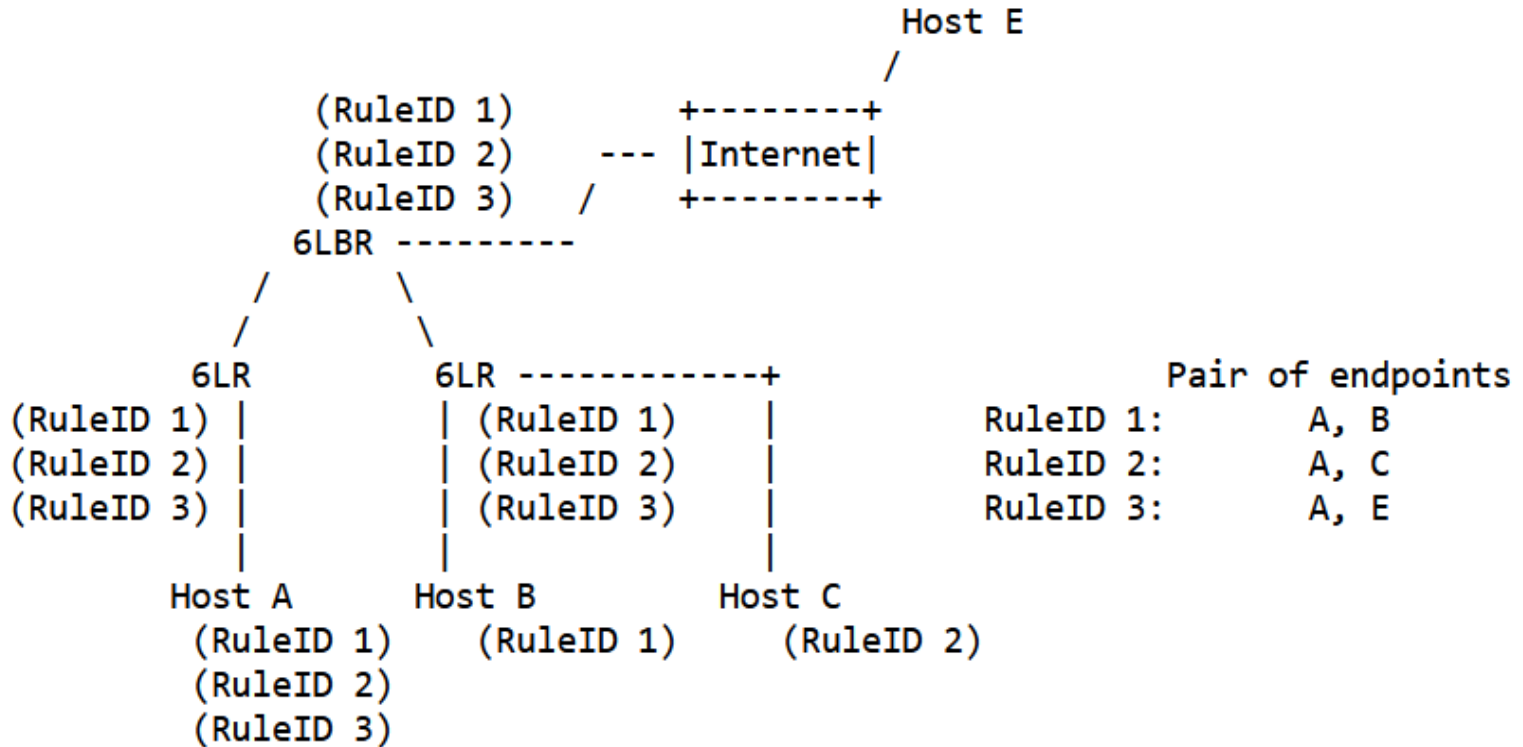


3.4. Multihop communication

- New acronyms for Route-Over:
 - Straightforward Route-Over (SRO)
 - Tunneled, RPL-based Route-Over (TRO)
 - Pointer-based Route-Over (PRO)

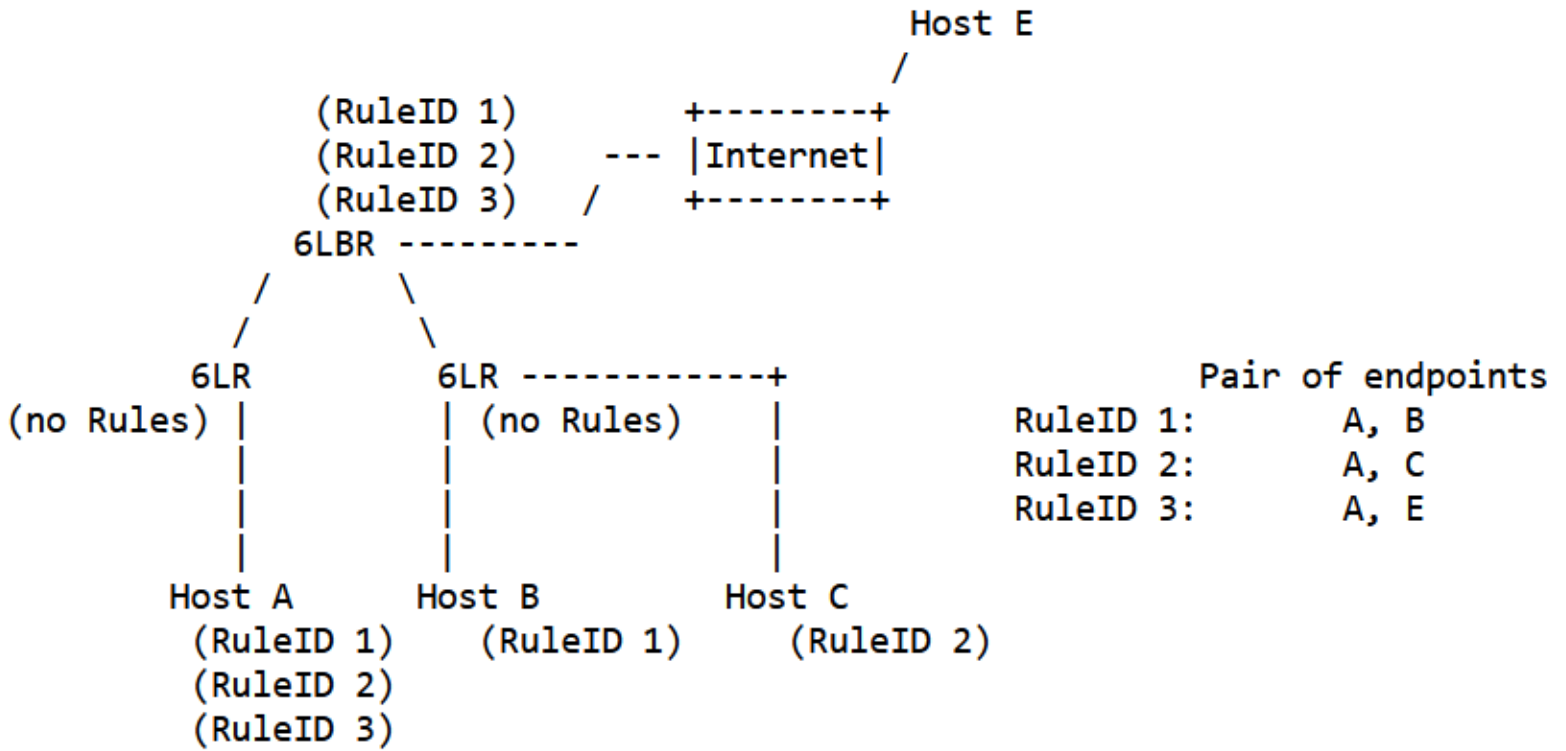
3.4.1. SRO

- Rules storage
 - All routers MUST store all the Rules
 - A host MUST store the Rules for its communication with other endpoints



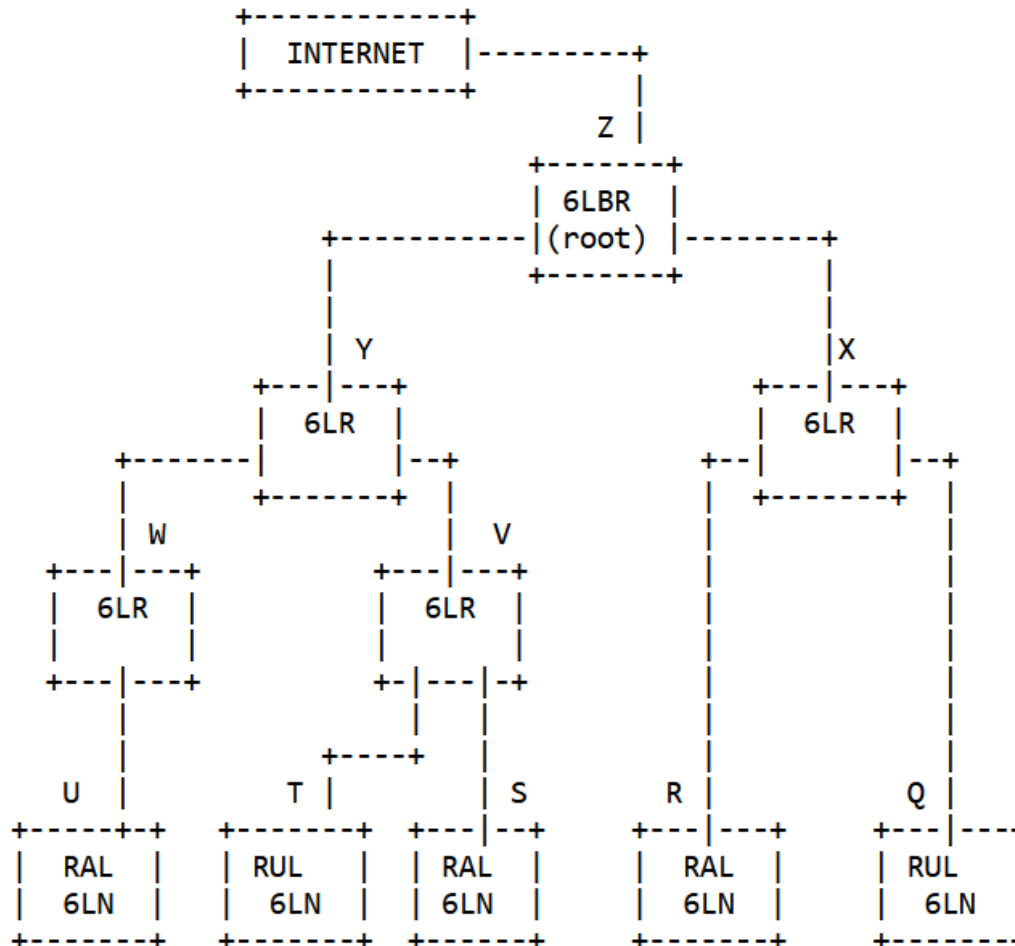
3.4.2. TRO (I/II)

- Rules storage
 - A node MUST store the Rules for its communication with other endpoints
 - A 6LBR MUST store all the Rules in use in the network



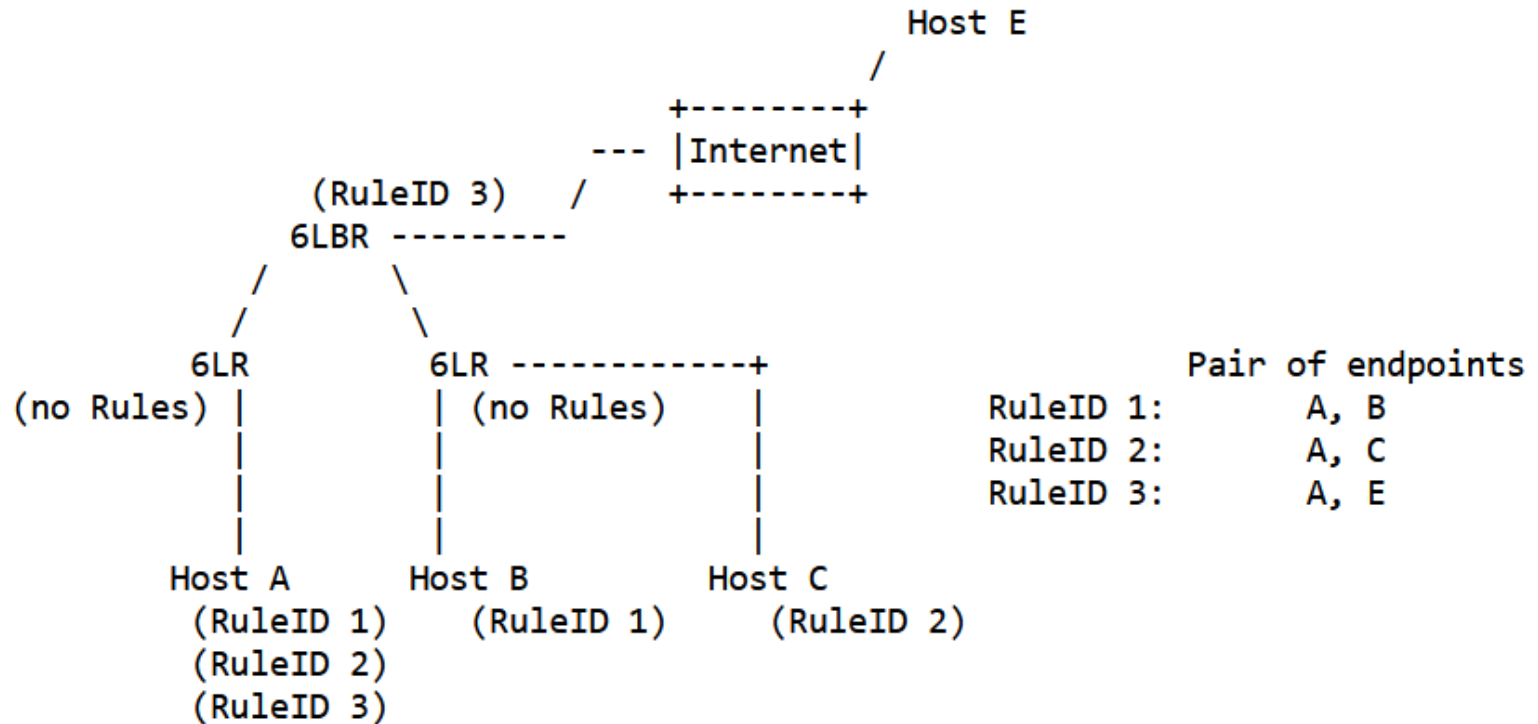
3.4.2. TRO (II/II)

- New figure (and text) to illustrate the concepts in TRO
 - Similar to RFC 9008:



3.4.3. PRO

- Rules storage
 - A node MUST store the Rules for its communication with other endpoints
 - A 6LBR MUST store all the Rules in use in the network for communication with external nodes



4.5. Summary

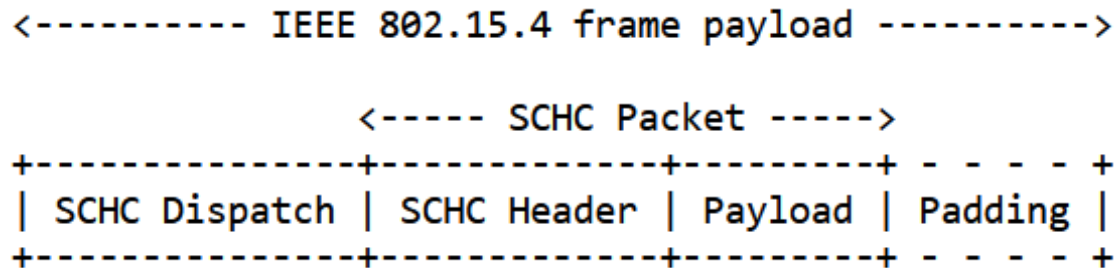
- Updated and relocated

| Single-hop | Multihop | | | |
|---------------|------------|-----------------------------------|--------------------------------|--------------------------------|
| | Route-Over | | | Mesh-Under |
| | SRO | TRO | PRO | |
| SCHC Dispatch | SCHC Disp | IP-in-IP, 6LoRH, SCHC Dispatch | SCHC Ptr Disp, SCHC Pointer | Mesh Headers, SCHC Dispatch |
| see 4.1 | see 4.1 | see 4.2 | see 4.3 | see 4.4 |

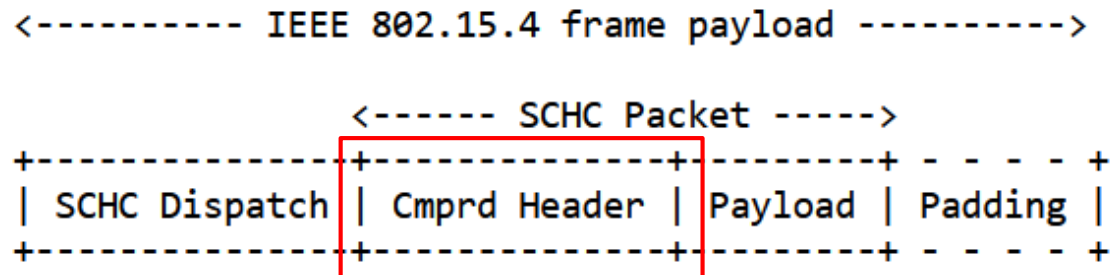
SCHC header

- “SCHC header” is now a concept defined in draft-ietf-schc-architecture
 - Updated all previous “SCHC Header” instances

– OLD:



– NEW:



Next steps

- Ensure alignment with SCHC architecture draft
- Provide further details on RuleID management
 - E.g. when a RuleID needs to be unique within the SCHC over 15.4 network
- Complete the examples in Appendix A

Comments/Questions?

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Introduction

Assumptions:

- Best case, global addr.
- CoAP
 - a) No header options
 - b) Table 6, RFC 8824

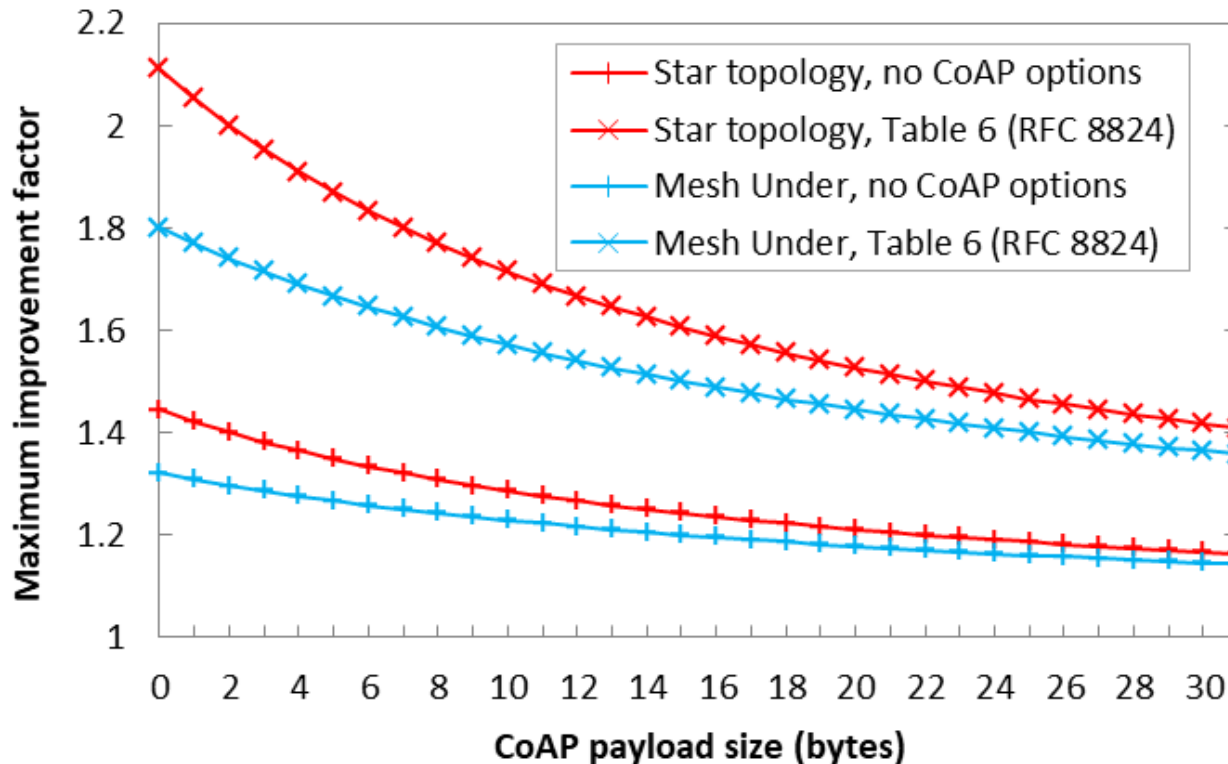
- IPv6/UDP/CoAP header size

| | IPv6/UDP (bytes) | CoAP (bytes) | | TOTAL (bytes) | |
|-----------------------|---------------------|-----------------|----|------------------|----|
| | | a) | b) | a) | b) |
| No compression | 48 | 4 | 16 | 52 | 64 |
| 6Lo(WPAN) - RFC 6282 | 7 | 4 | 16 | 11 | 23 |
| SCHC - RFC 8724, 8824 | 1 | 1 | 1 | 2 | 2 |

- SCHC: static context, a priori knowledge of header field values
- Theoretical battery lifetime improvement over IEEE 802.15.4 by a factor up to >2
 - **Actual improvement will be lower**, depending on device HW, MAC/adaptation/application layer settings, payload size, network topology, etc.

Introduction (II)

- Maximum battery lifetime improvement factor
 - Short MAC addresses, intra-PAN
 - E.g. a battery-operated sensor that periodically sends a message over IEEE 802.15.4



NOTE: actual improvement will be lower