

Transmission of SCHC-compressed packets over IEEE 802.15.4 networks

`draft-ietf-6lo-schc-15dot4-11`

Carles Gomez

Universitat Politècnica de Catalunya (UPC)

carles.gomez@upc.edu

Ana Minaburo

Consultant

anaminaburo@gmail.com



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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
 - In January 2023
- **Version -11**
 - Clarification: various possible SCHC Strata in a protocol stack
 - Transition Protocol Stack (TPS)
 - Multiple SCHC Strata
 - Minor updates and clarifications

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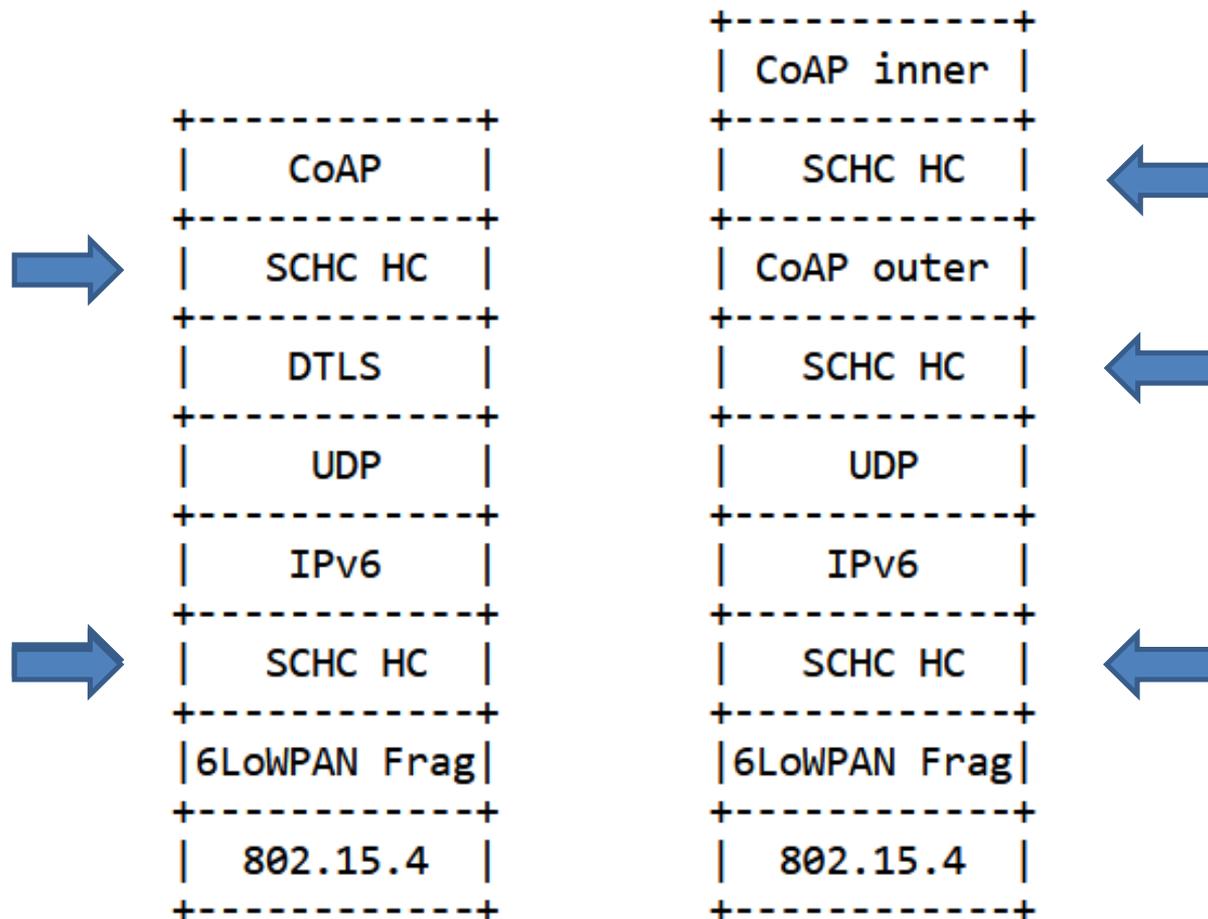
- Stable structure

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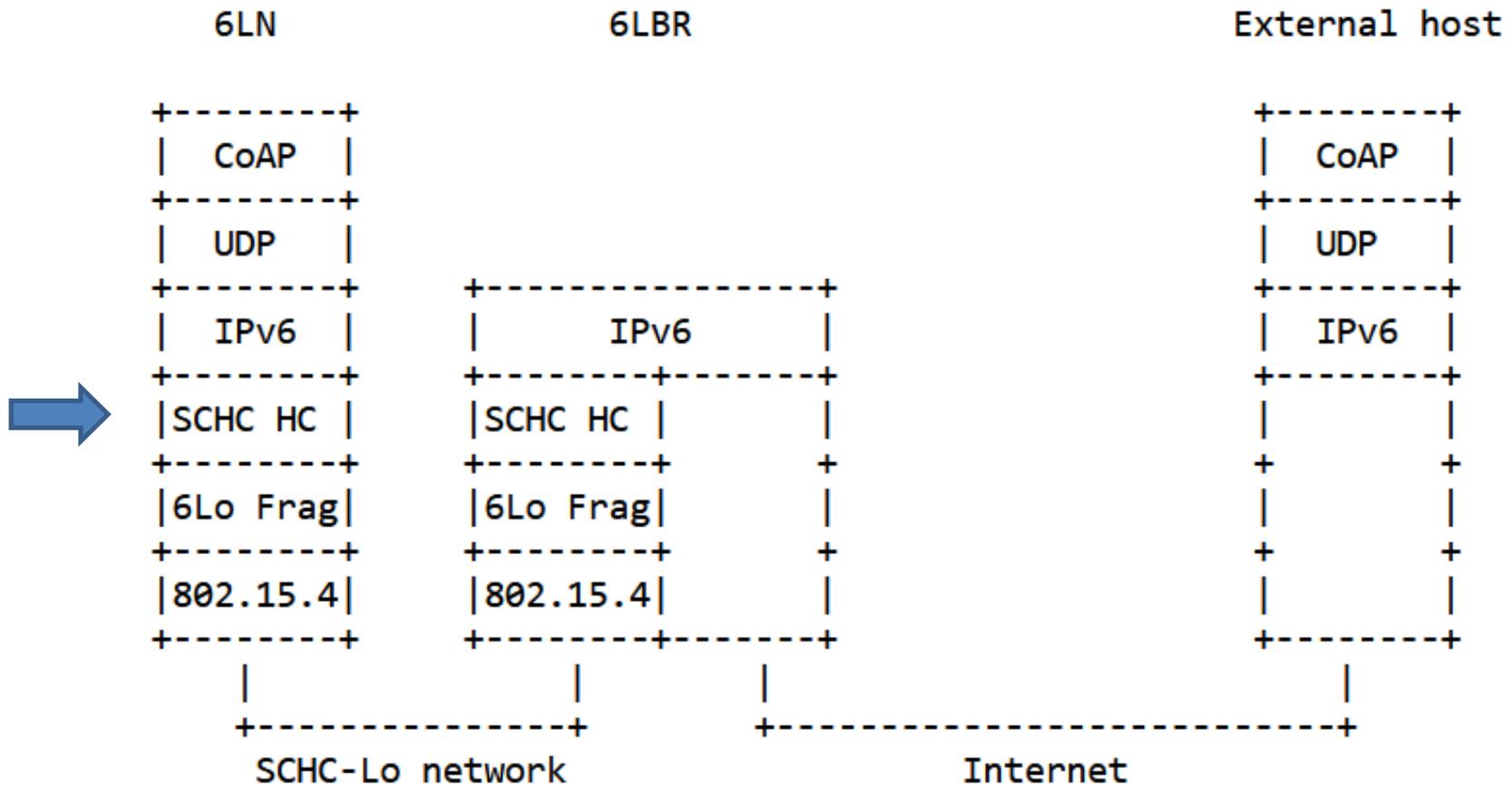
3.1.1. Main Protocol Stack

- SCHC header compression can be used at various layers of the protocol stack



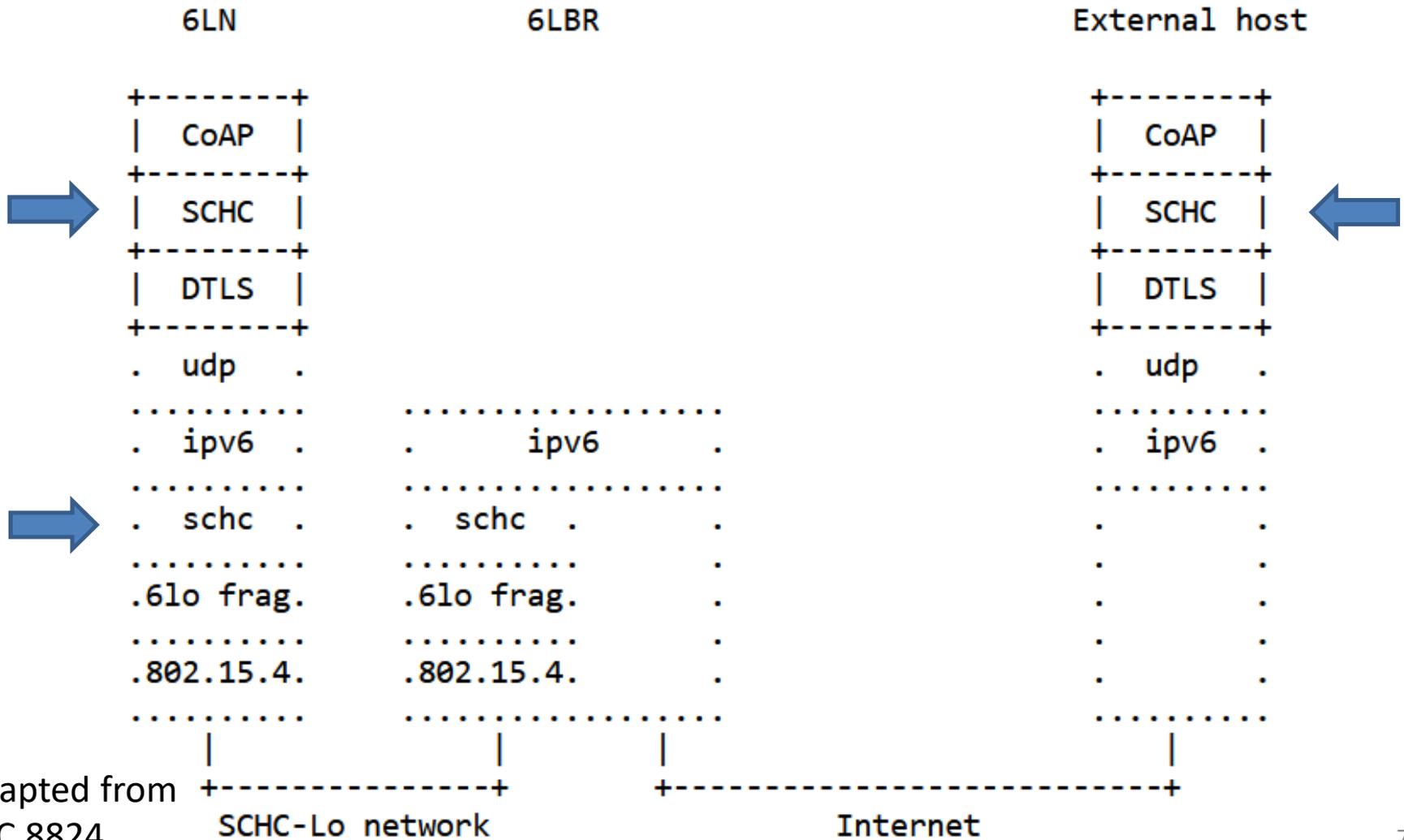
3.1.1. Main Protocol Stack

- Scenarios with external hosts (I/III)



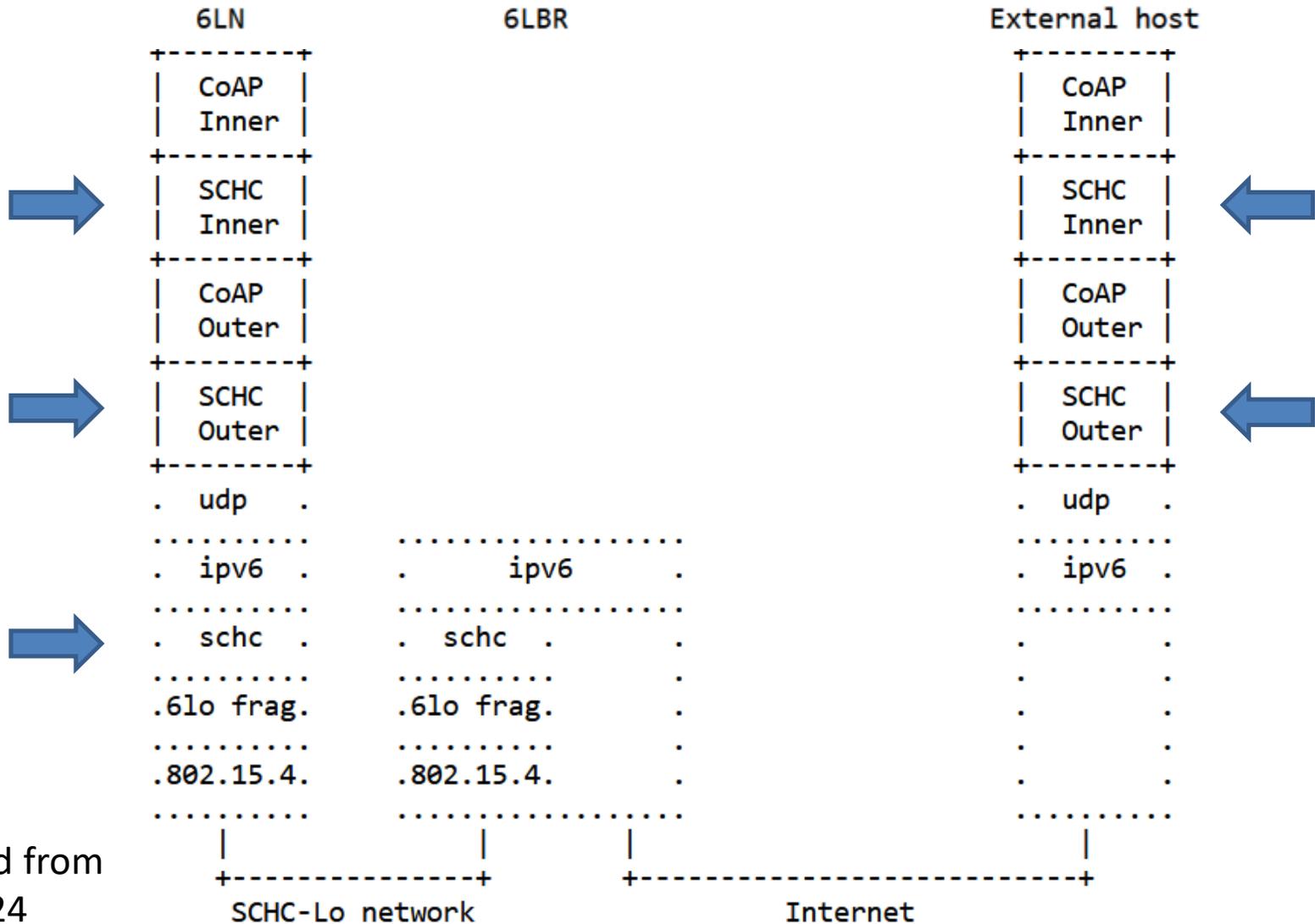
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- Scenarios with external hosts (II/III)



3.1.1. Main Protocol Stack

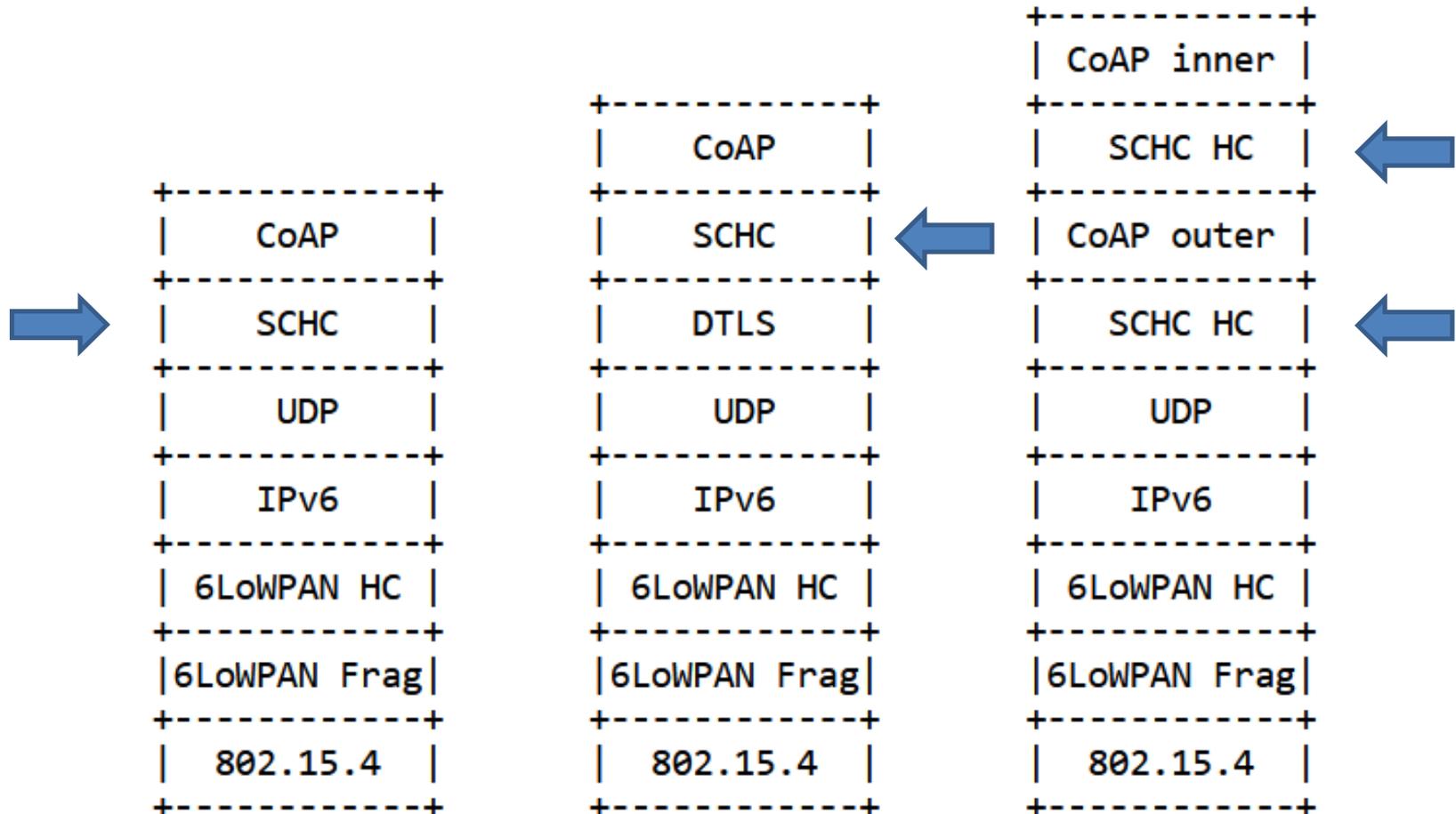
- Scenarios with external hosts (III/III)



Adapted from
RFC 8824

3.1.2. Transition Protocol Stacks

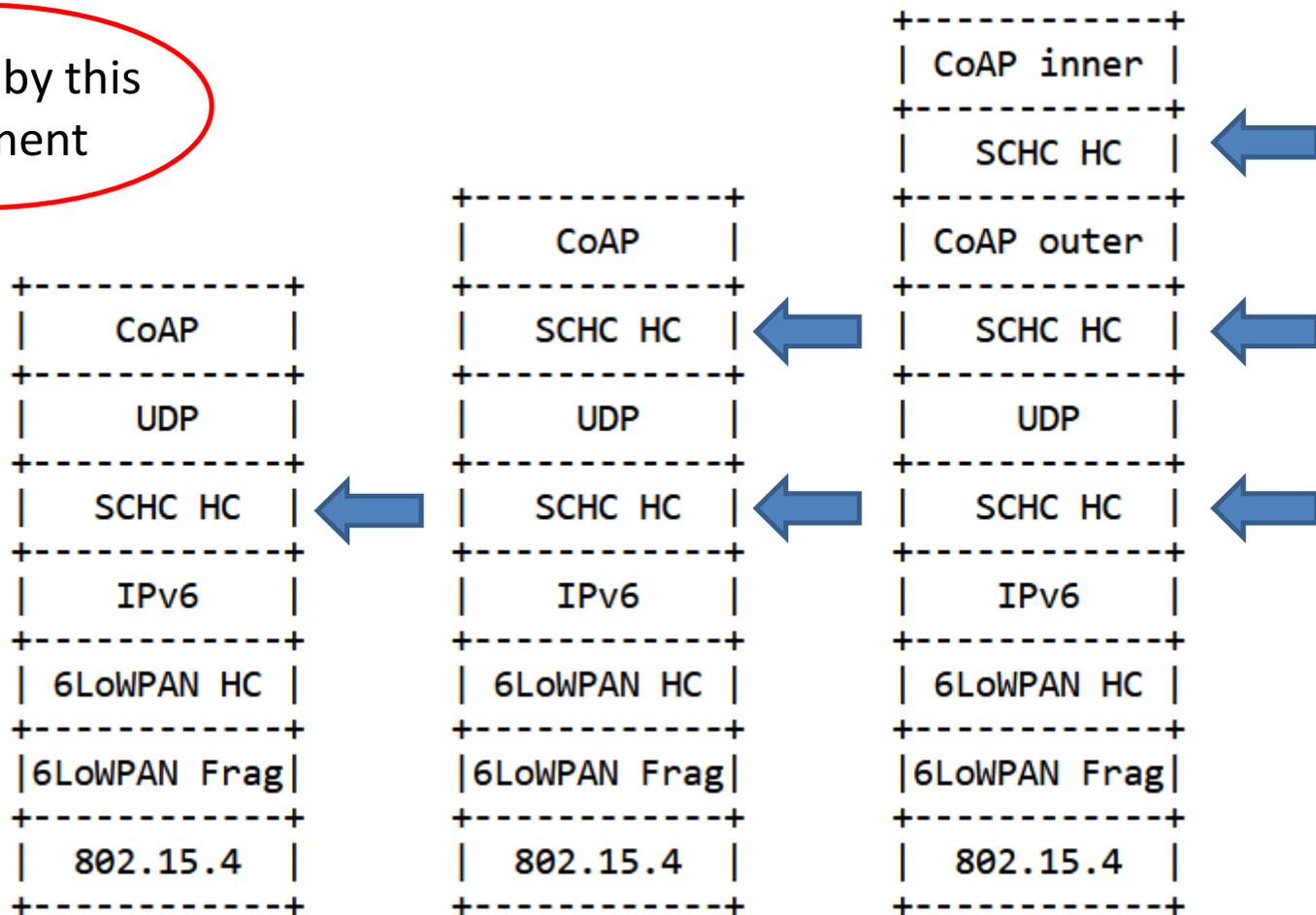
- Some alternatives when 6LoWPAN HC is used for IPv6/UDP C/D:



3.1.2. Transition Protocol Stacks

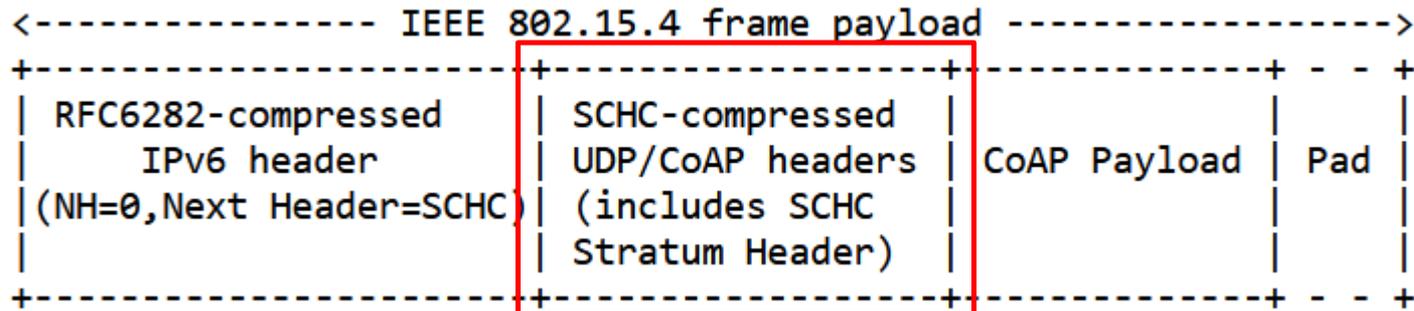
- Alternatives when 6LoWPAN HC is used for IPv6 C/D, SCHC used for UDP and CoAP:

Enabled by this document



5. Enabling the TPS

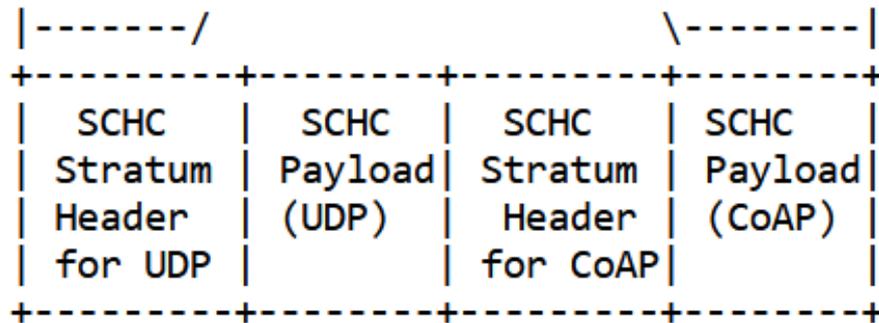
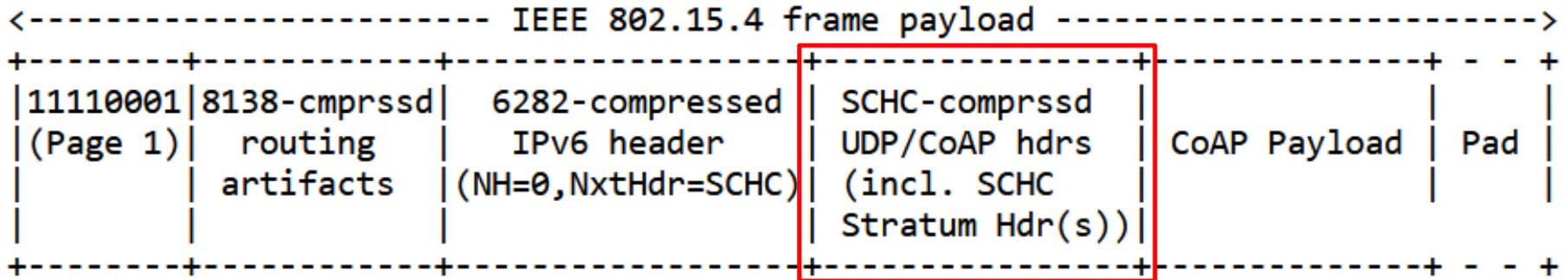
- General format:



- Two approaches:
 - 5.1. Joint UDP/CoAP SCHC-based C/D
 - Single SCHC Stratum (on top of IPv6)
 - 5.2. Separate SCHC Strata:
 - SCHC Stratum for UDP (between IPv6 and UDP)
 - SCHC Stratum for CoAP (between UDP and CoAP)
 - (If OSCORE: SCHC Stratum for CoAP inner)

5.2. Multiple SCHC Strata (I/V)

- Detailed view:



Fully elided if only one SoR for UDP header C/D

Fully elided if only one SoR for CoAP header C/D

5.2. Multiple SCHC Strata (II/V)

- Non-compressed SCHC Stratum Header for UDP C/D:

```
+-----+
| Protocol ID |
+-----+
Protocol ID = 17 (UDP)
```

- Compressed SCHC Stratum Header for UDP C/D:

```
+-----+-----+
| Rule ID | Compression Residue |
+-----+-----+
```

- C/D Rule for TPS-only devices:
 - RuleID not sent

```
RuleID
+-----+-----+-----+-----+-----+-----+
|      FID      | FL|POS|DI| TV | MO | CDA |
+-----+-----+-----+-----+-----+-----+
| SCHC.proto | 8| 1 |Bi| 17 |equal | not-sent |
+-----+-----+-----+-----+-----+-----+
```

5.2. Multiple SCHC Strata (III/V)

- Non-compressed SCHC Stratum Header for CoAP C/D:

```
+-----+
| Port number |
+-----+
Port number = 5683 (CoAP)
```

- Compressed SCHC Stratum Header for CoAP C/D:

```
+-----+-----+
| Rule ID | Compression Residue |
+-----+-----+
```

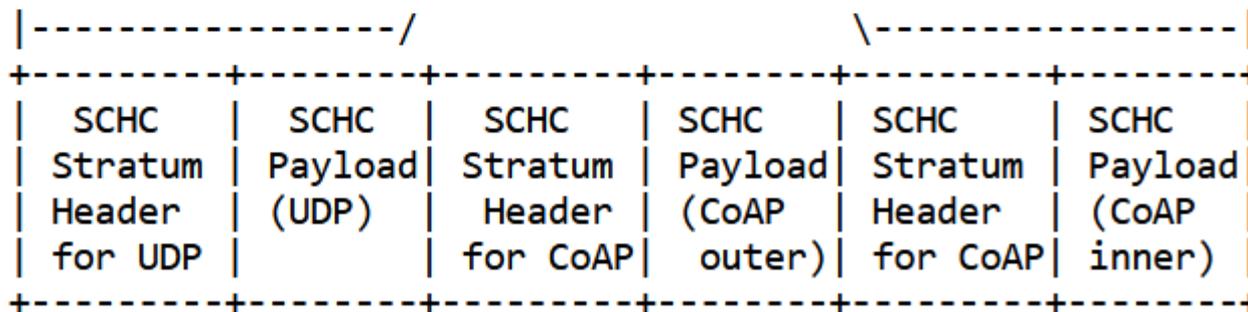
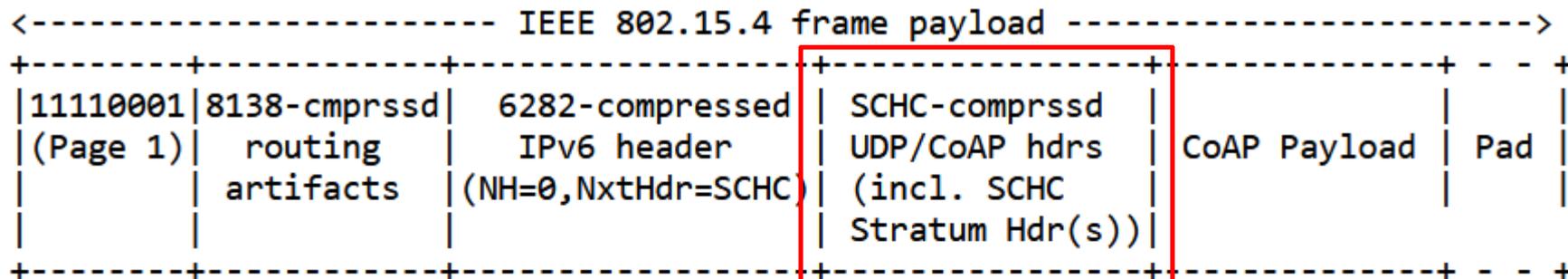
- C/D Rule for TPS-only devices:

- RuleID not sent

```
RuleID
+-----+-----+-----+-----+-----+-----+
|      FID      | FL | POS | DI | TV | MO | CDA |
+-----+-----+-----+-----+-----+-----+
| SCHC.portnum | 8 | 1 | Bi | 5683 | equal | not-sent |
+-----+-----+-----+-----+-----+-----+-----+
```

5.2. Multiple SCHC Strata (IV/V)

- Detailed view:



When OSCORE is used

Fully elided if only one SoR for **UDP** header C/D

Fully elided if only one SoR for **CoAP outer** header C/D

Fully elided if only one SoR for **CoAP inner** header C/D

5.2. Multiple SCHC Strata (V/V)

- Non-compressed SCHC Stratum Header for CoAP inner C/D:

```
+-----+
|Option number|
+-----+
Option number = 9 (OSCORE)
```

- Compressed SCHC Stratum Header for CoAP inner C/D:

```
+-----+-----+
| Rule ID | Compression Residue |
+-----+-----+
```

- C/D Rule for TPS-only devices:

- RuleID not sent

```
RuleID
+-----+-----+-----+-----+-----+-----+
|      FID      |FL|POS|DI| TV |  MO  |  CDA  |
+-----+-----+-----+-----+-----+-----+
| SCHC.optnum  |16| 1 |Bi|  9 |equal | not-sent |
+-----+-----+-----+-----+-----+-----+
```

Appendix B. Analysis of RO multihop

- Additions to “B.4. Summary”

- SRO: best suited for small and static-SCHC-context networks

NEW: — ... such as small home or small office networks

- TRO best applicability is for networks where upwards traffic is dominant

NEW: — ... and RPL deployments are already in place (e.g., a smart grid network)

- PRO

NEW: — ... does not require RPL
— ... can be a better fit when non-upwards traffic is significant (e.g., between any 2 nodes within the same network, as in a large home network.)

Minor points

- 1. Introduction

NEW:

- Techniques intended to allow communication between nodes that only use 6LoWPAN for header compression and nodes that only use SCHC for header compression are out of the scope of this document

- Terminology update?

- CURRENT: Single-end point networks
 - Where all nodes support a single SCHC end point
- NEW? **Single-endpoint-node networks**

Next steps.

Esko Dijk's review: overview

- Hybrid approaches (mesh-under, route over)
- SCHC C/D for messages from/to 6LRs/6LBRs
- ECN bits support for TRO and PRO?
- Clarify 6LN vs “leaf”
- PRO Address Length field requires further specification
- Several clarification and editorial suggestions

Next steps

- Continue monitoring and aligning with the SCHC architecture draft
 - Recently updated, -05
 - New terms:
 - SCHC Stratum Header → SCHC Control Header
 - SCHC Payload → SCHC Data
 - SCHC Packet → SCHC Datagram
 - Ongoing discussion on other terms
- Complete the examples in Appendix A
- Reviews are welcome! (Approaching WGLC?)

Comments/Questions?

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