

SCHC architecture concepts for draft-ietf-6lo-schc-15dot4

Transmission of SCHC-compressed packets over
IEEE 802.15.4 networks

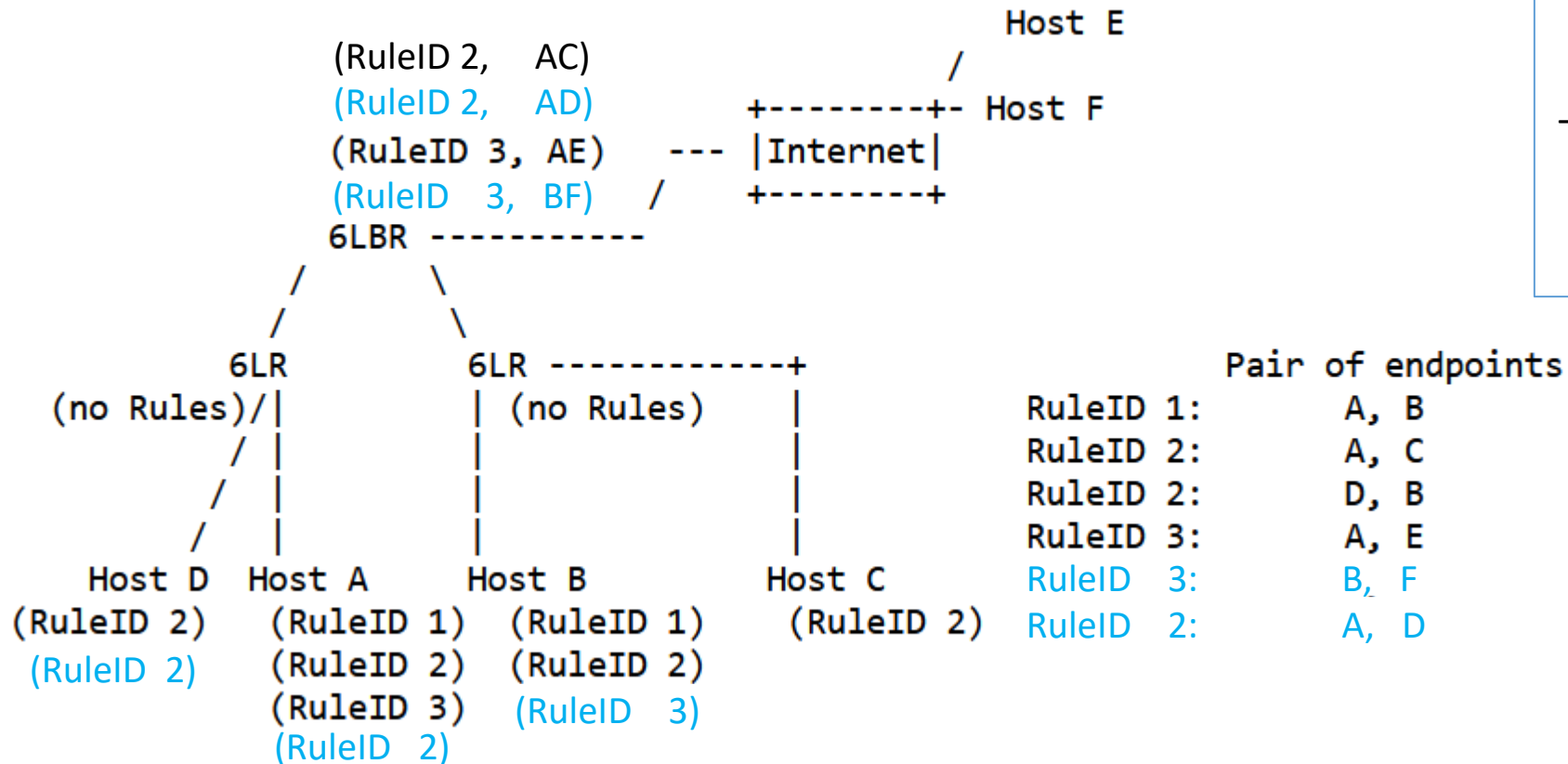
In preparation of: draft-ietf-6lo-schc-15dot4-06
Ana Minaburo, Carles Gomez

Goals and scenarios

- Keeping a low header overhead
 - Main motivation to introduce SCHC (HC) over IEEE 802.15.4 networks
- SCHC Header defined in draft-ietf-schc-architecture
 - For 6lo: fully compressed (if possible) or contributing low header overhead
- Main problem in SCHC HC over IEEE 802.15.4: multihop communication
 - Route-Over: Straightforward (SRO), Tunnel-based (TRO), Pointer-based (PRO)
 - Mesh-Under
- Two possible network types
 - Single-instance networks
 - All devices in the network use a single SCHC Packet Instance
 - SCHC Header MUST be fully compressed
 - **Multiple-instance networks**
 - **Some devices in the network use more than one SCHC Packet Instance**
 - **SCHC Header cannot be fully compressed**

Multiple-instance networks

- Example:
 - TRO (tunnels from/to the 6LBR or RPL Root)
 - Two SCHC Packet instances: black and blue
 - Two corresponding SoRs

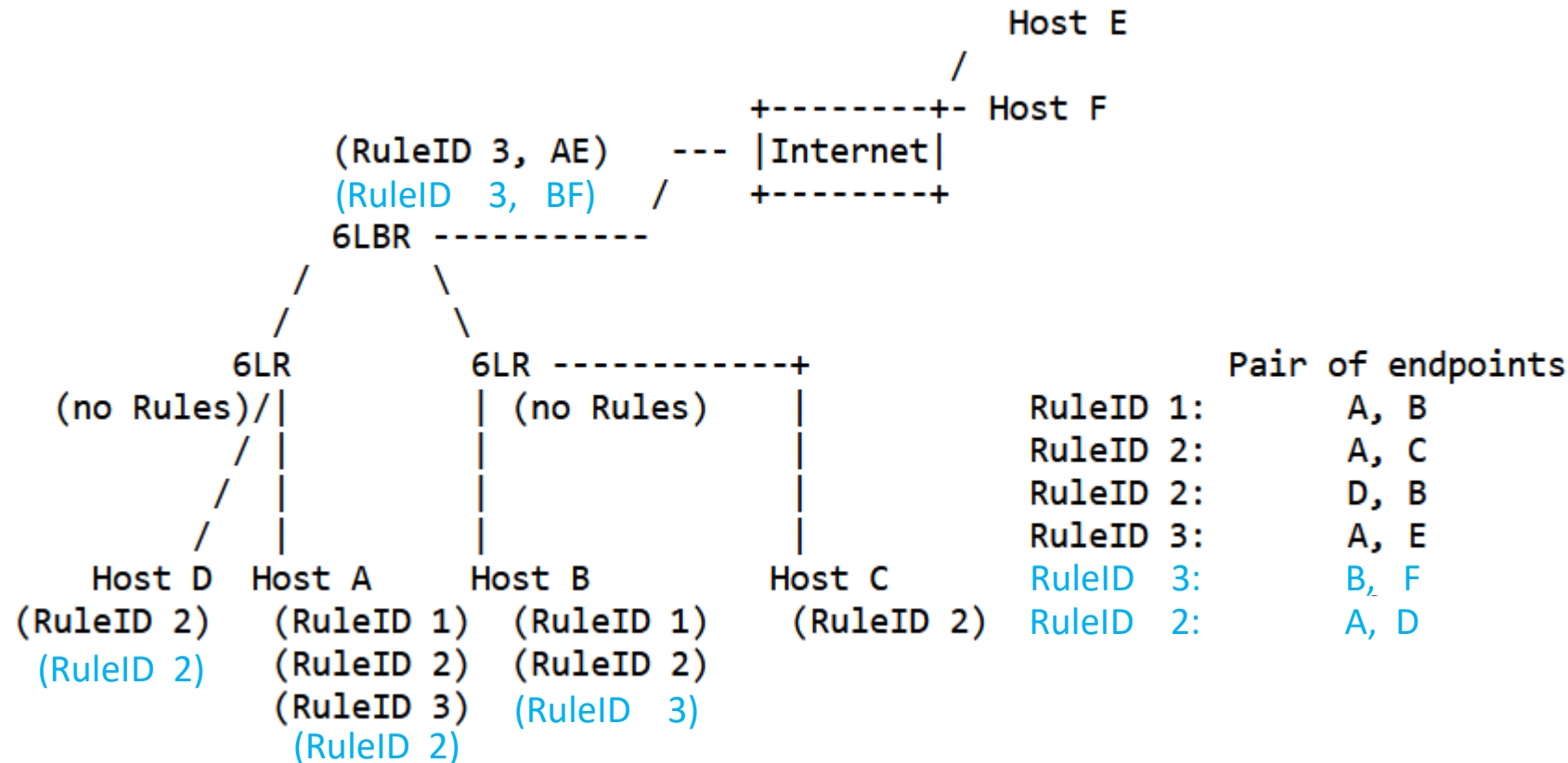


In TRO:

- SCHC Header needed (i.e., not compressed) for both UL and DL
 - Otherwise, 6LBR or endpoints do not know which Rule needs to be used for decompression
- The SCHC Header comprises a parameter to determine the SoR to be used

Multiple-instance networks

- Example:
 - PRO (pointer tells how to find the IPv6 dest address compression residue)
 - Two SCHC Packet instances: black and blue
 - Two corresponding SoRs

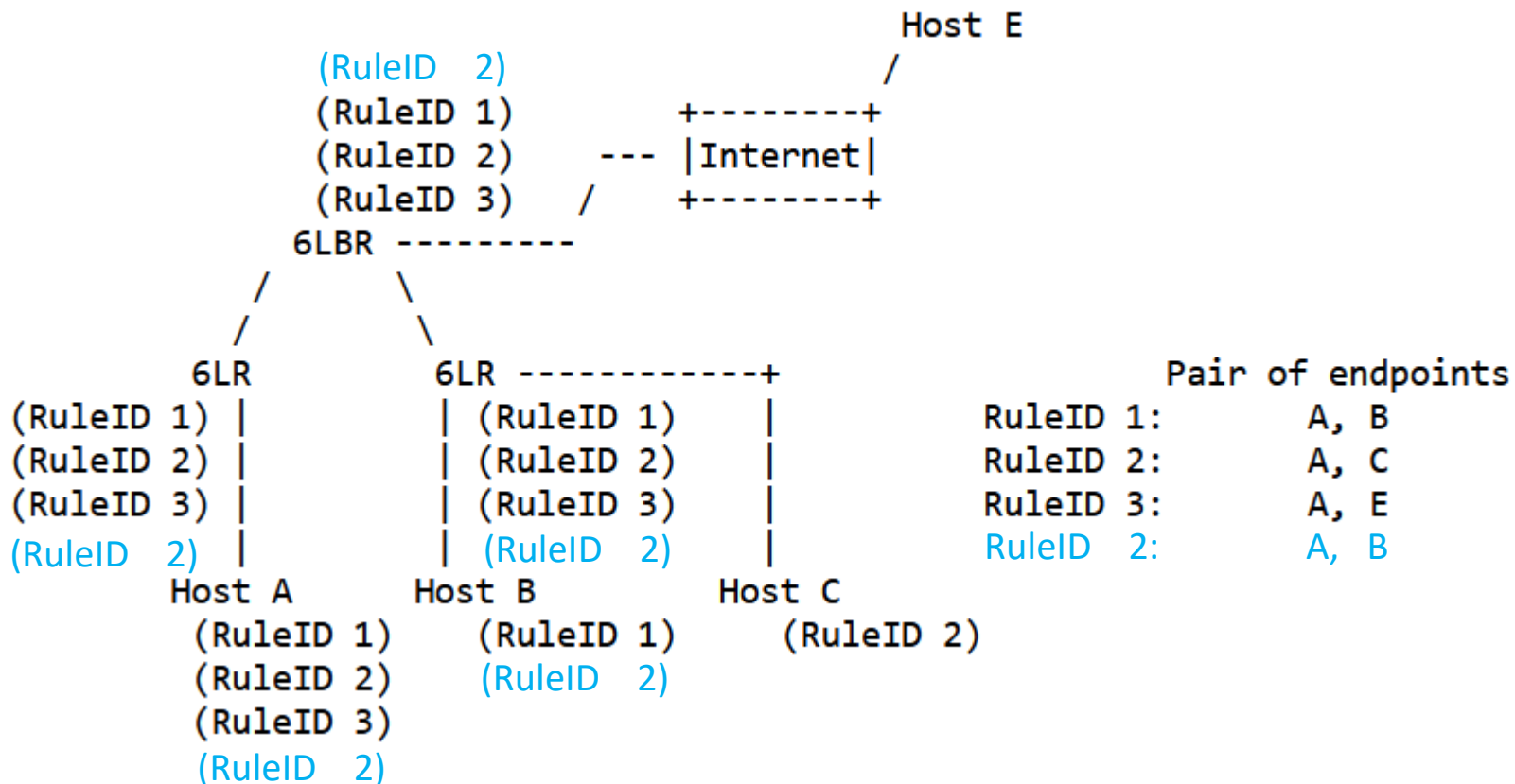


In PRO:

- SCHC Header needed (i.e., not compressed)
 - Otherwise, 6LBR or endpoints do not know which Rule needs to be used for decompression
- The SCHC Header comprises a parameter to determine the SoR to be used

Multiple-instance networks

- Example
 - SRO (straightforward: all routers store all the Rules used in the network)
 - Two SCHC Packet instances: black and blue
 - Two corresponding SoRs

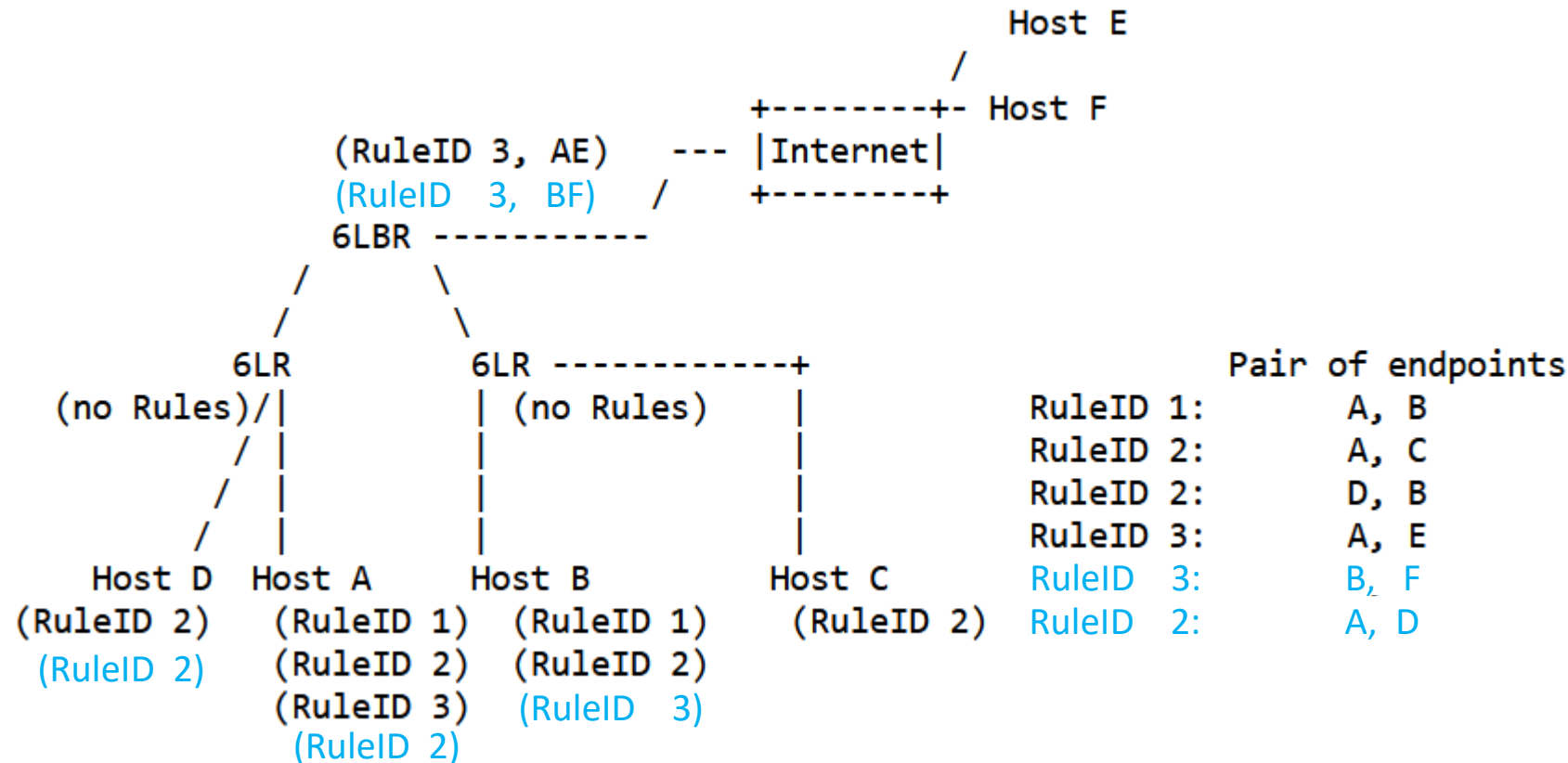


In SRO:

- SCHC Header needed (i.e., not compressed)
 - Otherwise, nodes do not know which Rule needs to be used for decompression
- A SCHC Header parameter would need to be unique network-wide

Multiple-instance networks

- Example:
 - Mesh-Under
 - Two SCHC Packet instances: black and blue
 - Two corresponding SoRs



In Mesh Under:

- SCHC Header could be fully compressed
 - The 6LBR or an endpoint can know which rule to be used for decompression based on the source MAC address (which is carried in the Mesh-Under header)
- But SCHC Header not fully compressed if multiple SCHC Packet instances for a given pair of endpoints (i.e., if the source MAC address is not enough)!

Frame formats with SCHC Header

- TRO, downward, source is not the root

OLD:

```

<----- IEEE 802.15.4 frame payload ----->

                                   <- SCHC pkt ->
+-+ ... +-+ ... +-+ ... +-+ ... +-+ ... +-+ ... +-+ ... +-+ ... +-+ 
|11110001|SRH-6LoRH| RPI- | IP-in-IP | 01000100 |Cmprd|payload| pad | 
|Page 1 |          | 6LoRH | 6LoRH |SCHCDsptch| Hdr |          |    | 
+-+ ... +-+ ... +-+ ... +-+ ... +-+ ... +-+ ... +-+ ... +-+ ... +-+ 
                                     (Page 1)

                                  <----- This specification ----->
    
```

NEW:

```

<----- IEEE 802.15.4 frame payload ----->

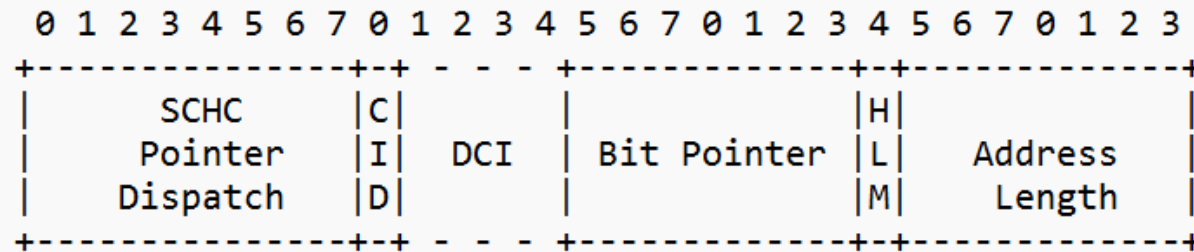
                                   <- SCHC pkt ->
+-+ ... +-+ ... +-+ ... +-+ ... +-+ ... +-+ ... +-+ ... +-+ ... +-+ 
|11110001|SRH-6LoRH| RPI- | IP-in-IP | 01000100 |SCHC|Cmprd|payload| pad | 
|Page 1 |          | 6LoRH | 6LoRH |SCHCDsptch| Hdr|          |    | 
+-+ ... +-+ ... +-+ ... +-+ ... +-+ ... +-+ ... +-+ ... +-+ ... +-+ 
                                     (Page 1)

                                  <----- This specification ----->
    
```

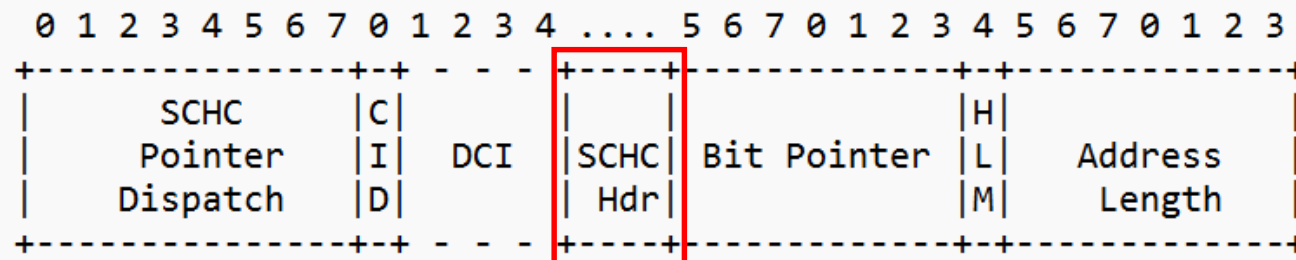
Frame formats with SCHC Header

- PRO header

OLD:



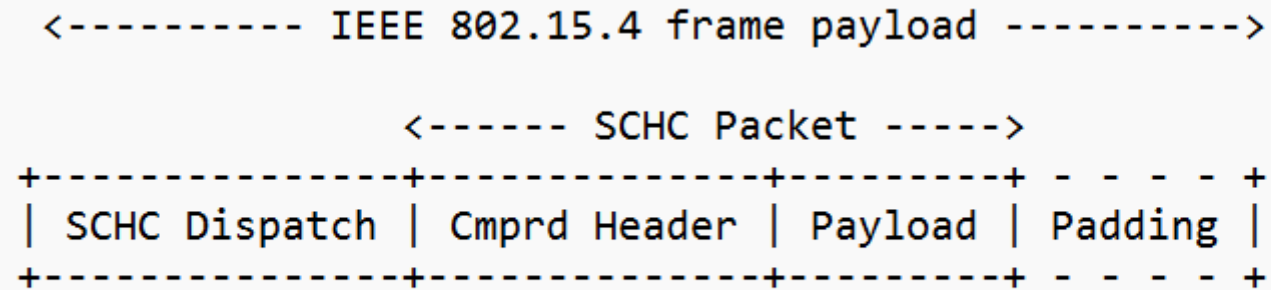
NEW:



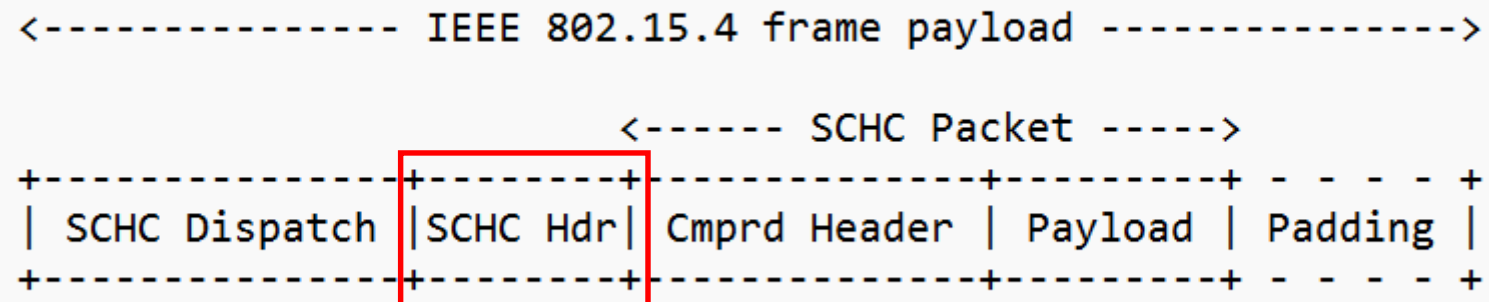
Frame formats with SCHC Header

- SRO header

OLD:



NEW:



SCHC architecture concepts for SCHC HC over 15.4

- Single-instance networks:

- SCHC Header

- Fully compressed

- SCHC Header Instance

- One SoR
 - The SoR contains a single implicit Rule

- SCHC Packet Instance

- Only one, thus only one SoR

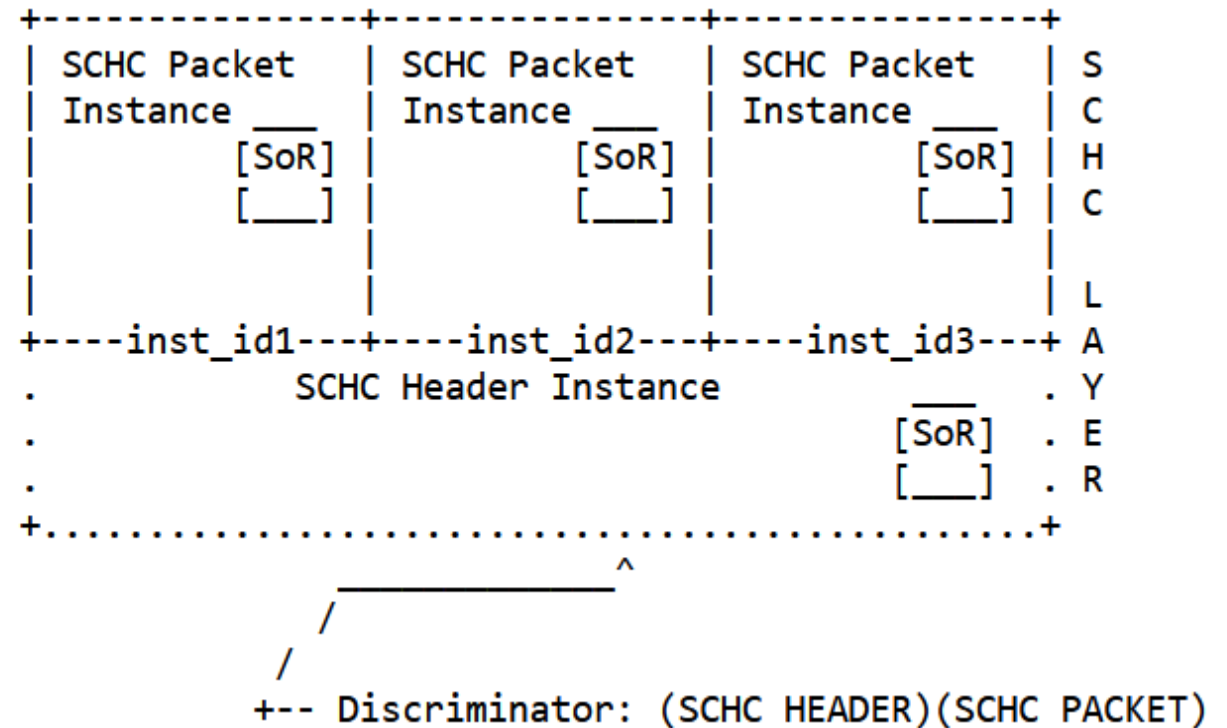
- Discriminator

- SCHC Dispatch (or SCHC Pointer Dispatch)?

- From draft-ietf-schc-architecture, Discriminator is used to:

- “determine the SCHC Instance that is used to decompress the SCHC header, called a SCHC Header Instance”

From draft-ietf-schc-architecture-02:

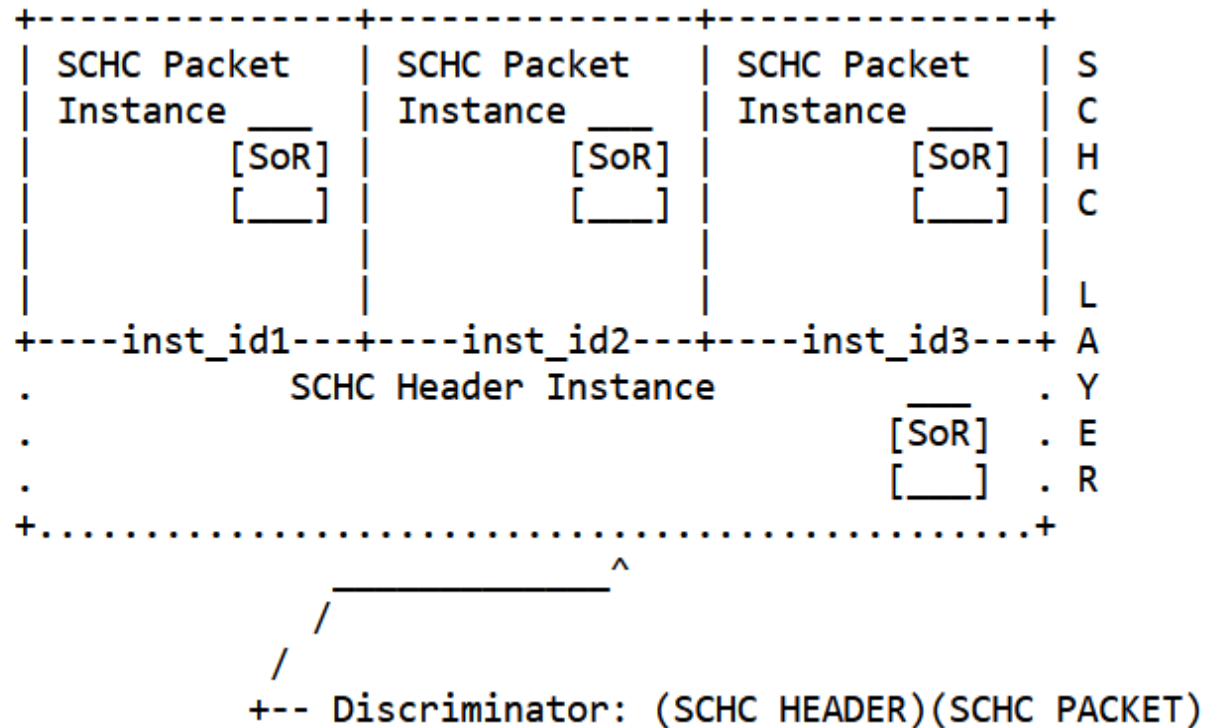


SCHC architecture concepts for SCHC HC over 15.4

- Multiple-instance networks:

- SCHC Header
 - Compressed (not fully)
- SCHC Header Instance
 - One SoR, may comprise several Rules
- SCHC Packet Instance
 - There are several
 - Each one with its corresponding SoRs

From draft-ietf-schc-architecture-02:

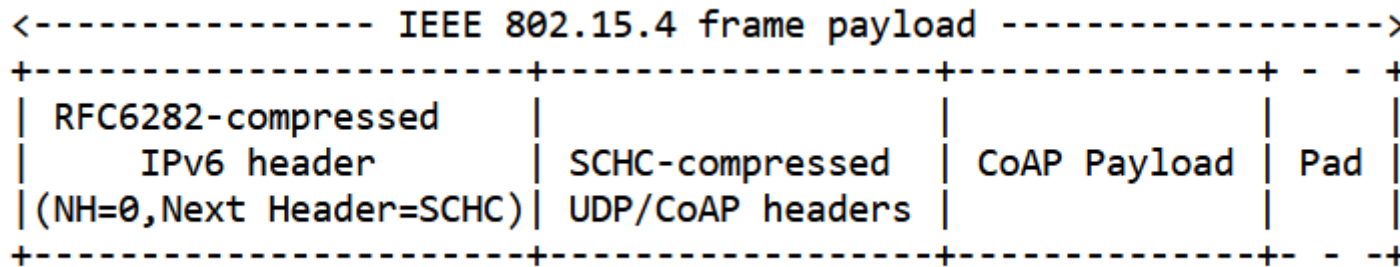
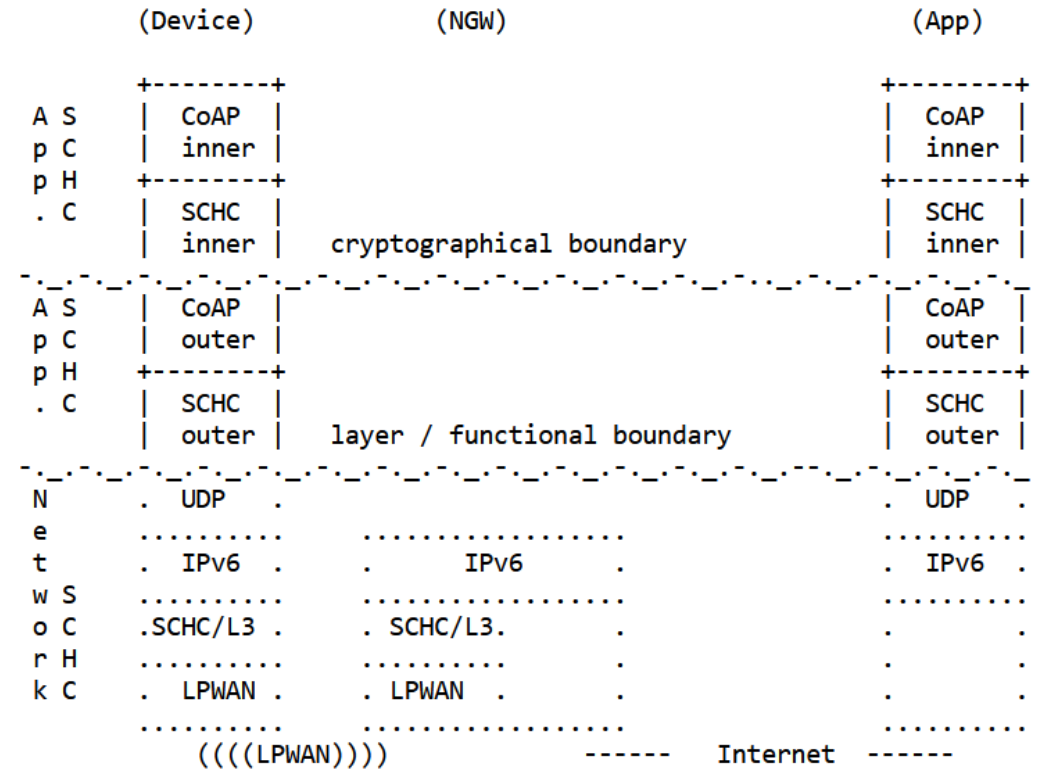


- Discriminator

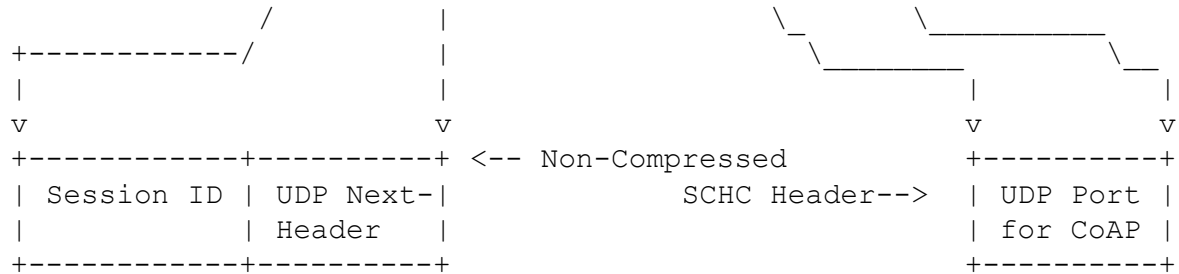
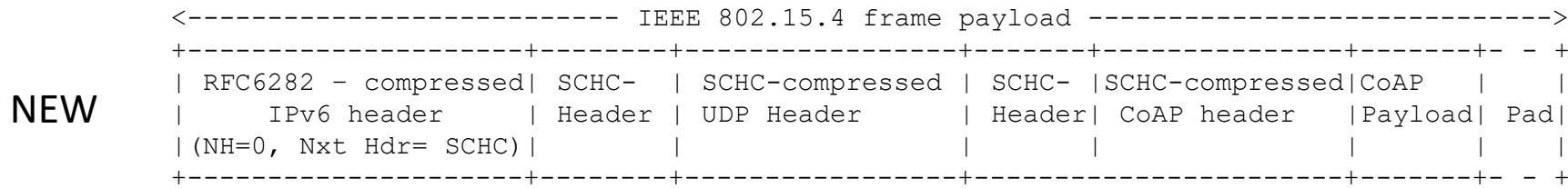
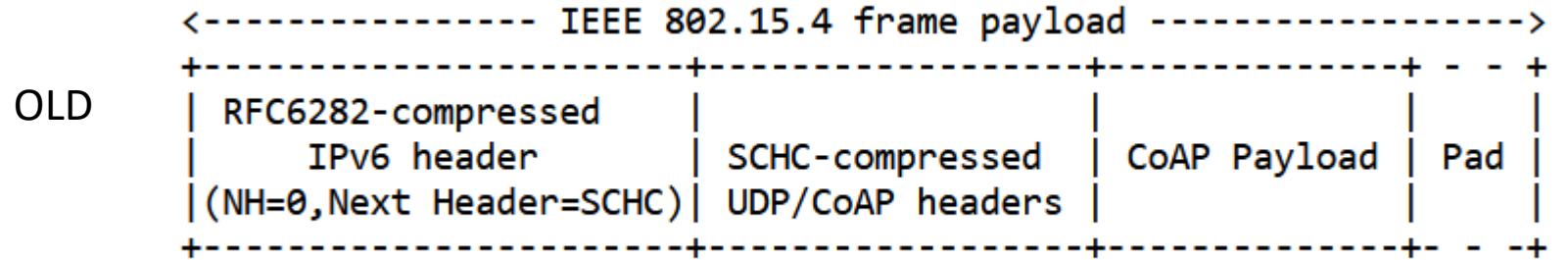
- SCHC Dispatch (or SCHC Pointer Dispatch)?
- From draft-ietf-schc-architecture, Discriminator is used to:
 - “determine the SCHC Instance that is used to decompress the SCHC header, called a SCHC Header Instance”

Transition protocol stack

- 6LoWPAN HC for IPv6
- SCHC for UDP/CoAP
 - SCHC Header
 - To identify CoAP



How to identify upper protocols: UDP and CoAP



Rule

| FID | FL | POS | DI | TV | MO | CDA |
|-----------------|----|-----|----|------|--------|----------|
| SCHC.sesid | 8 | 1 | Bi | 0x00 | MSB(7) | LSB |
| SCHC.UDP-NxtHdr | 16 | 1 | Bi | 5683 | equal | not-sent |

Rule

| FID | FL | POS | DI | TV | MO | CDA |
|----------------|----|-----|----|------|-------|----------|
| SCHC.CoAP-Port | 16 | 1 | Bi | 5683 | equal | not-sent |

Thanks!

Questions?

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