

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

Transmission of SCHC-compressed packets over  
IEEE 802.15.4 networks

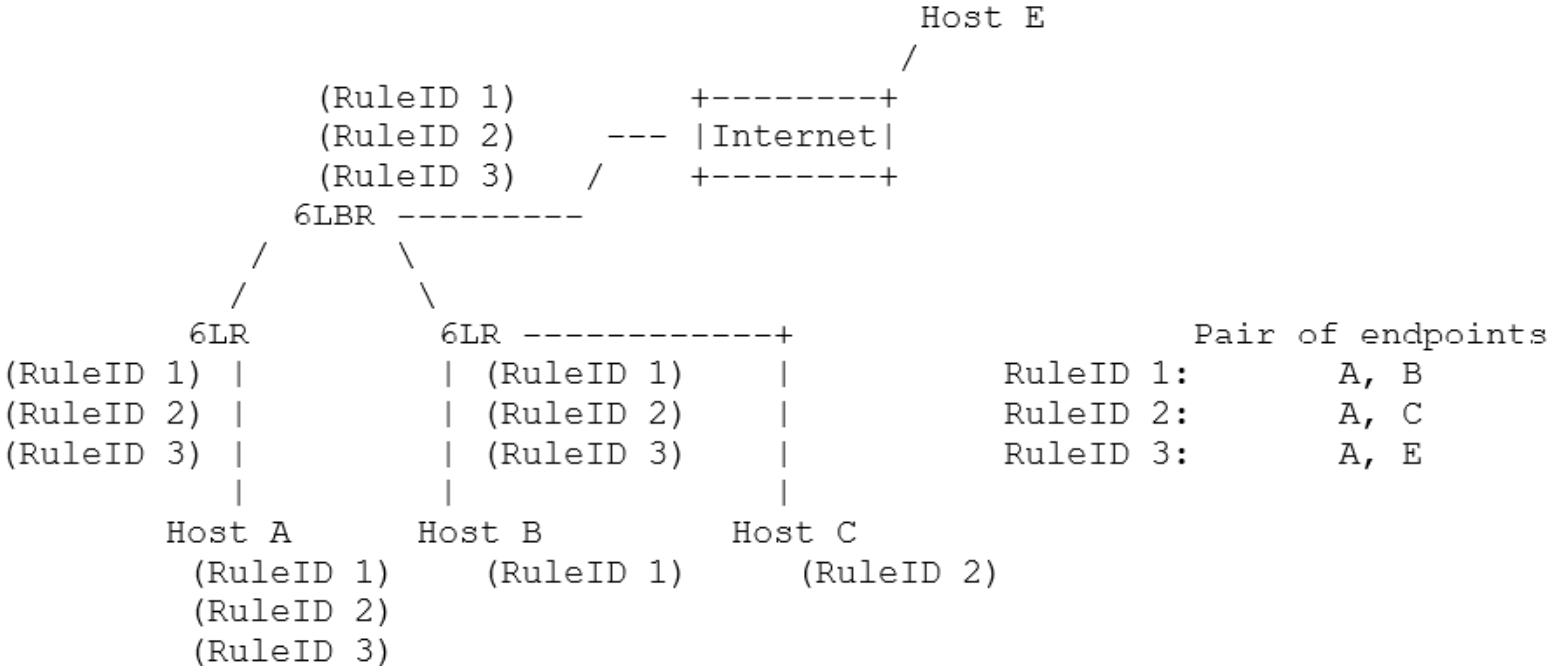
In preparation of: draft-ietf-6lo-schc-15dot4-06  
Ana Minaburo, Carles Gomez

# 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 (generally) be fully compressed

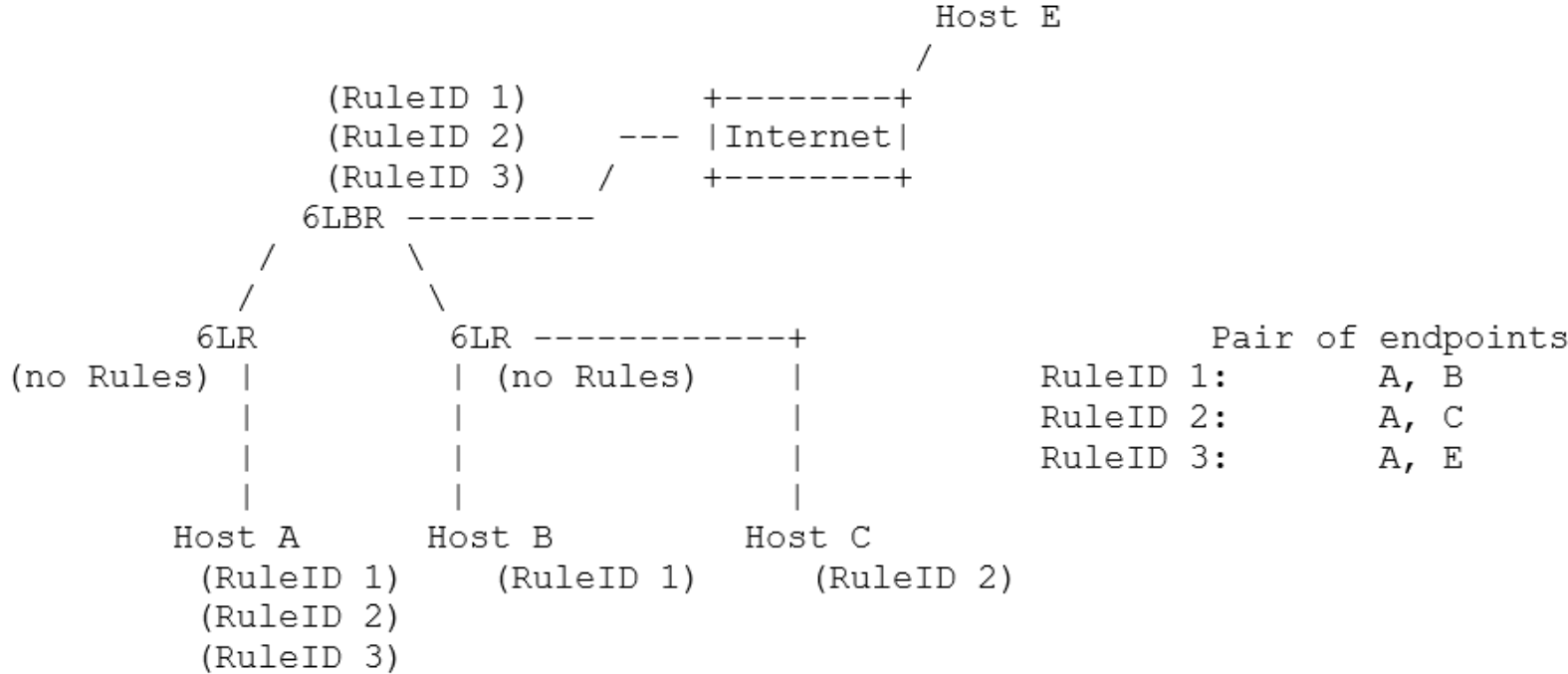
# Single-instance networks

- Example
  - SRO (straightforward: all routers store all the Rules used in the network)
  - SCHC Header: fully compressed
  - A RuleID (and its Rule) MUST be unique network-wide
    - Otherwise there could be ambiguities



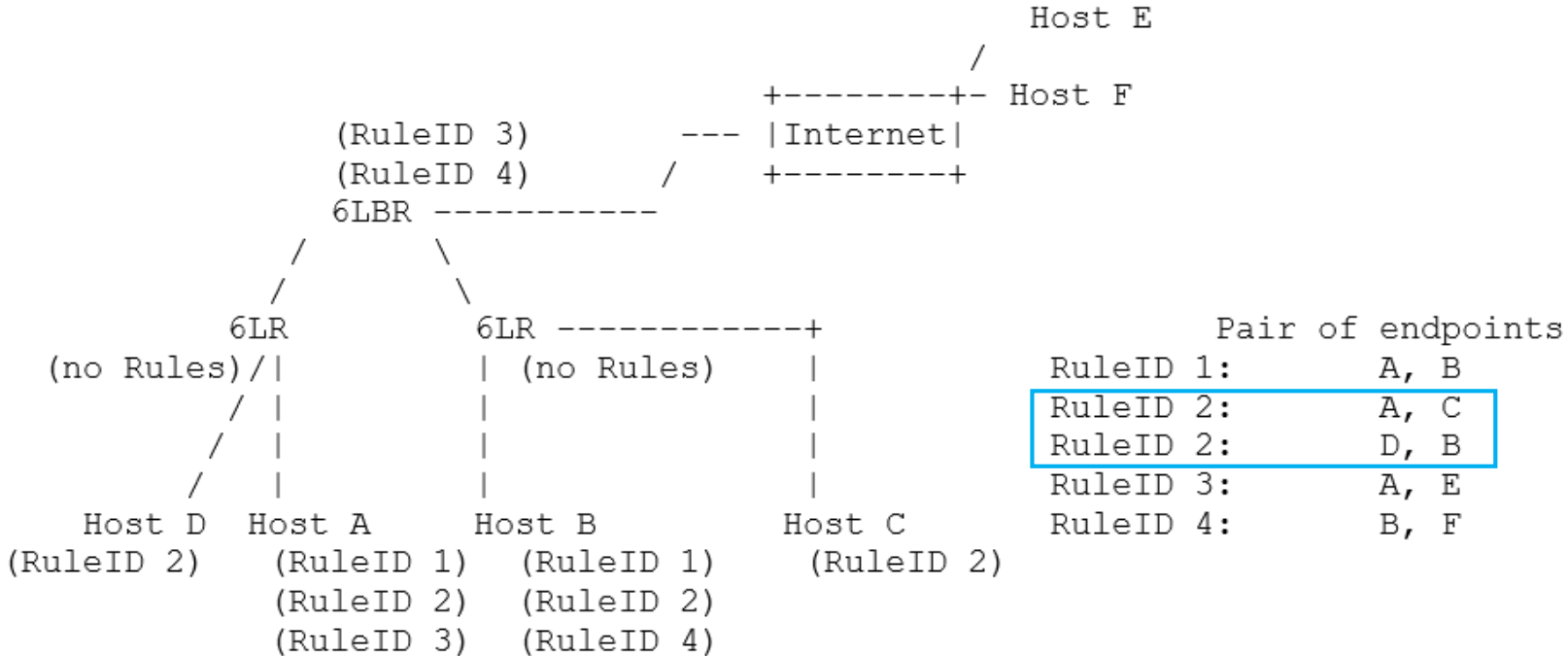
# Single-instance networks

- Example:
  - TRO (tunnels from/to the 6LBR or RPL Root)
  - SCHC Header: fully compressed
  - A RuleID (and its Rule) MUST be unique network-wide
    - Otherwise, the 6LBR would need to store several Rules with the same RuleID



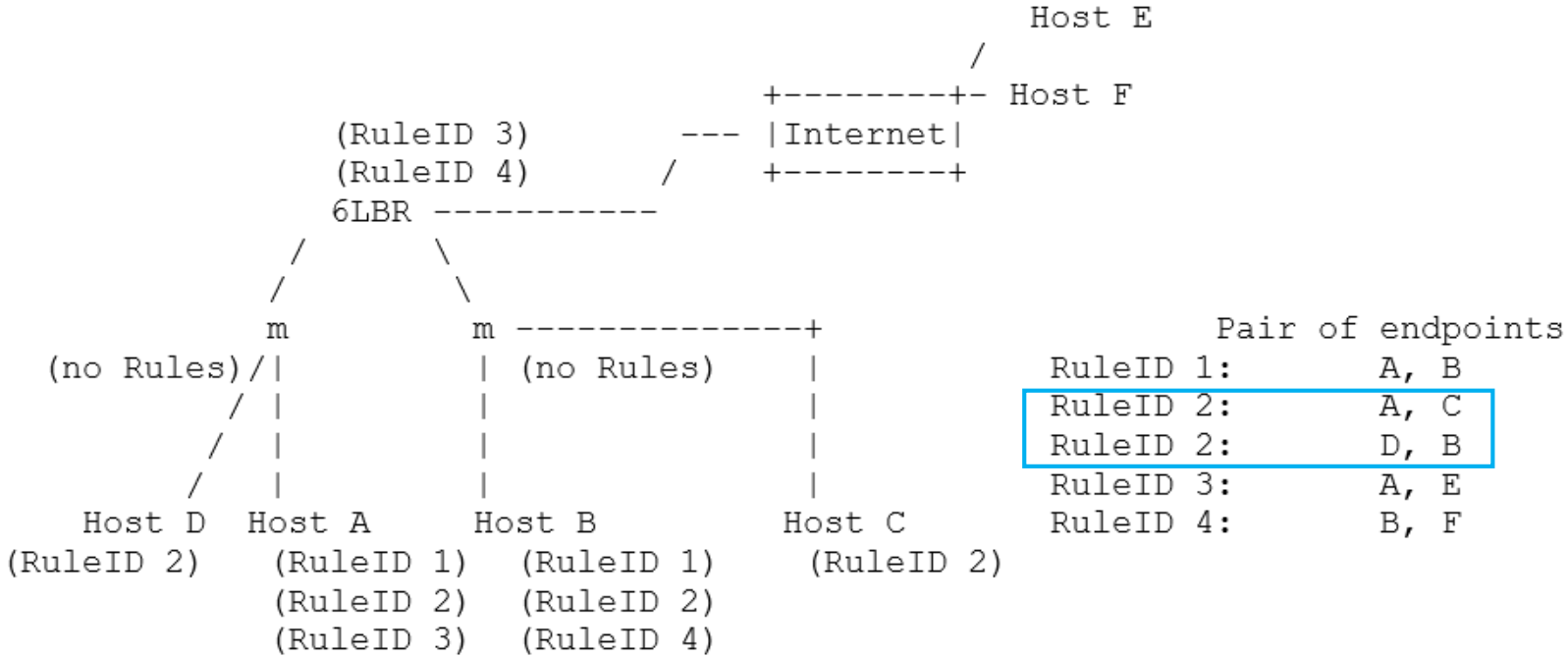
# Single-instance networks

- Example:
  - PRO (pointer tells how to find the IPv6 dest address compression residue)
  - SCHC Header: fully compressed
  - Disjoint pairs of endpoints MAY use the same RuleID (to identify different Rules)



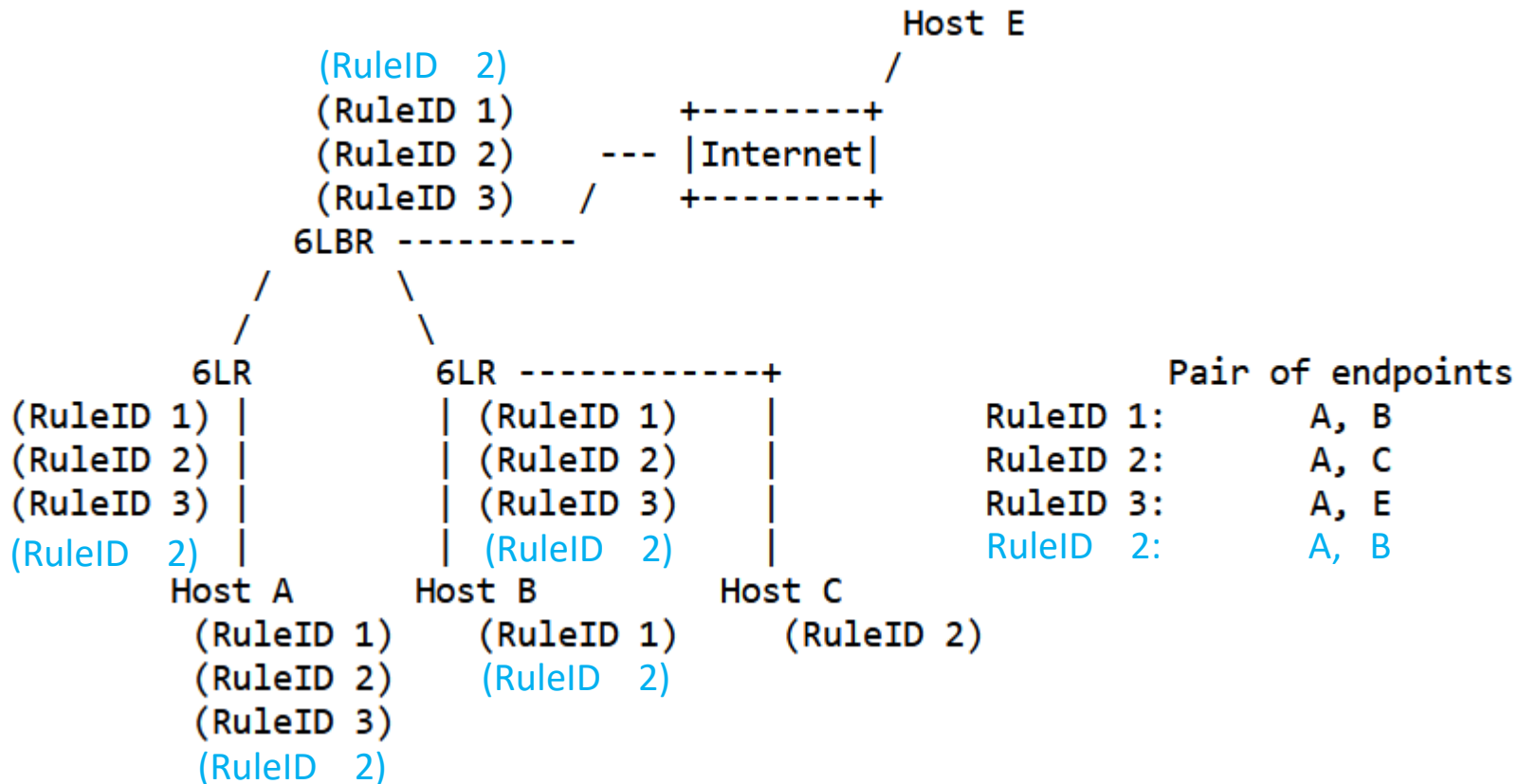
# Single-instance networks

- Example:
  - Mesh-Under
  - SCHC Header: fully compressed
  - Disjoint pairs of endpoints MAY use the same RuleID (to identify different Rules)



# 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

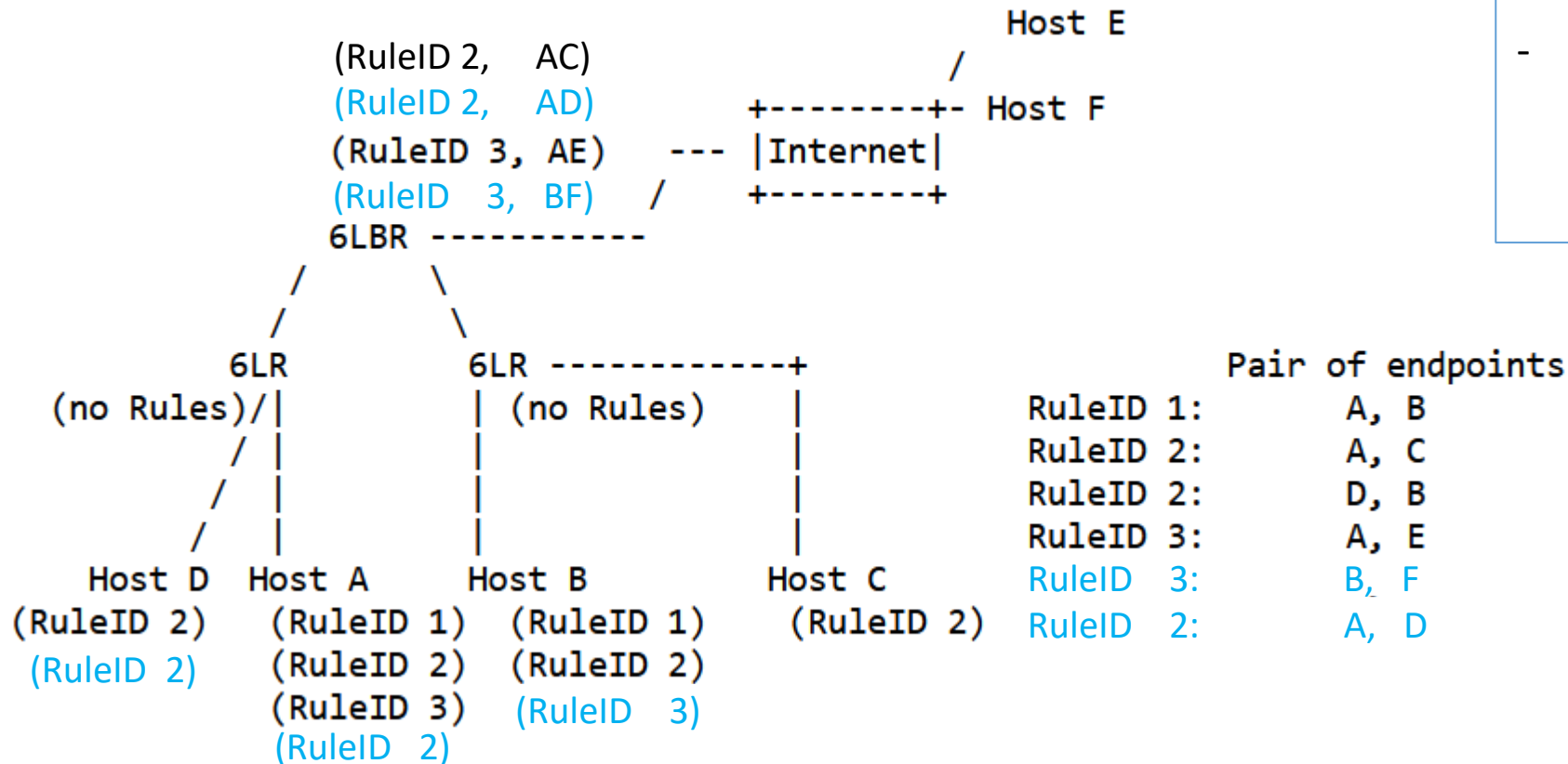


In SRO:

- SCHC Header needed (i.e., not fully compressed)
  - Otherwise, nodes 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:
  - TRO (tunnels from/to the 6LBR or RPL Root)
  - Two SCHC Packet instances: black and blue
    - Two corresponding SoRs



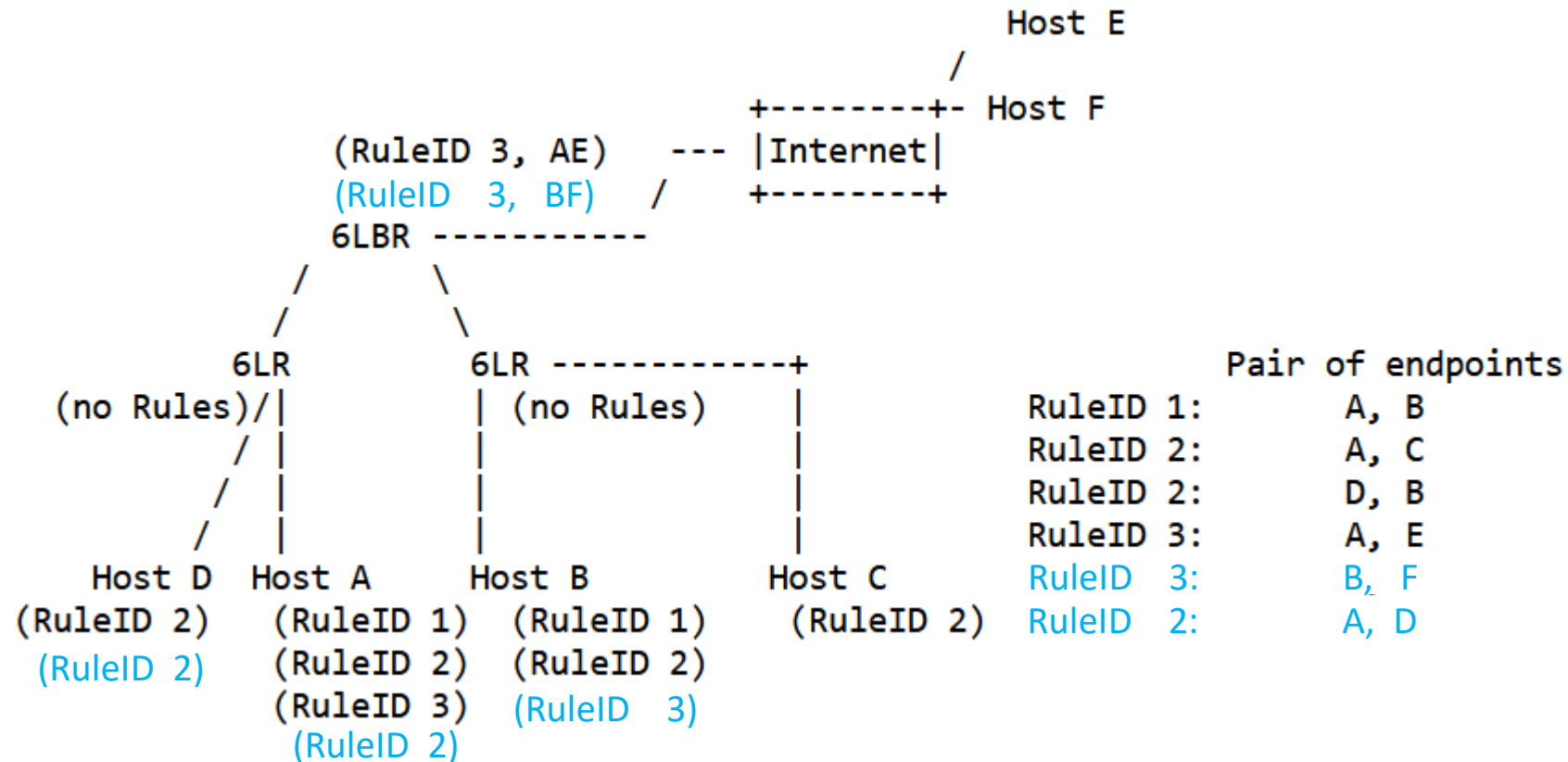
In TRO:

- SCHC Header needed (i.e., not fully 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

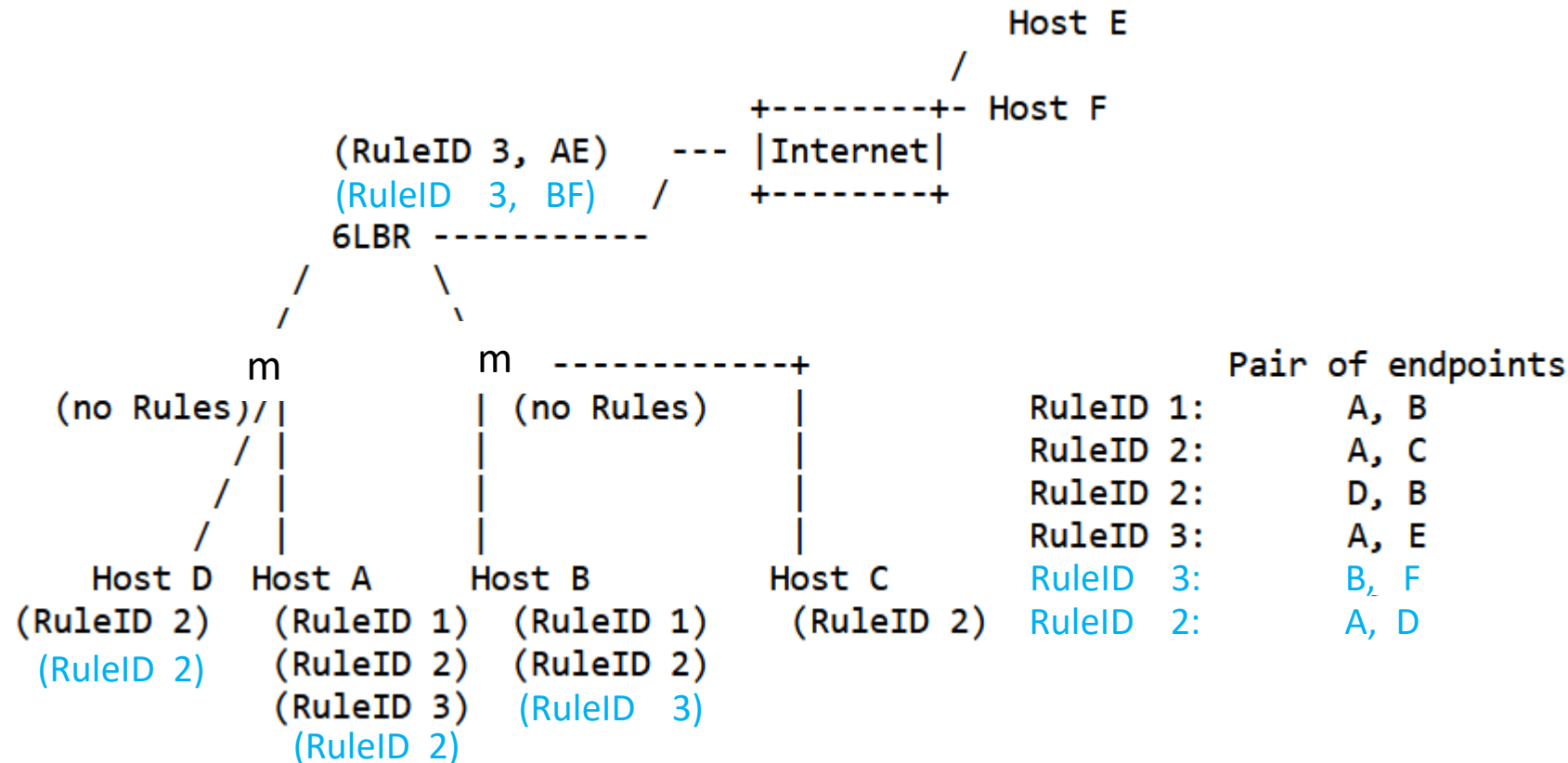


In PRO:

- SCHC Header needed (i.e., not fully 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:
  - Mesh-Under
  - Two SCHC Packet instances: black and blue
    - Two corresponding SoRs



In Mesh Under:

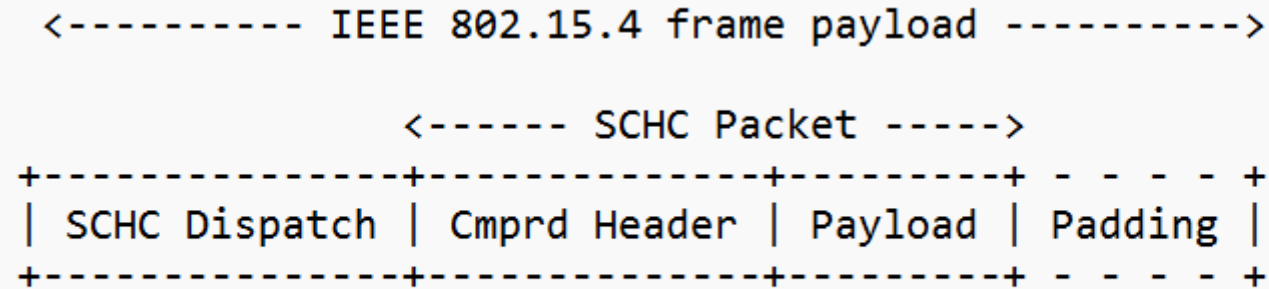
- SCHC Header could be fully compressed
  - The 6LBR or an endpoint can know which rule to be used for decompression based on the source MAC address (which is carried in the Mesh-Under header)
- But SCHC Header not fully compressed needed if multiple SCHC Packet instances for a given pair of endpoints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

# Frame formats with SCHC Header

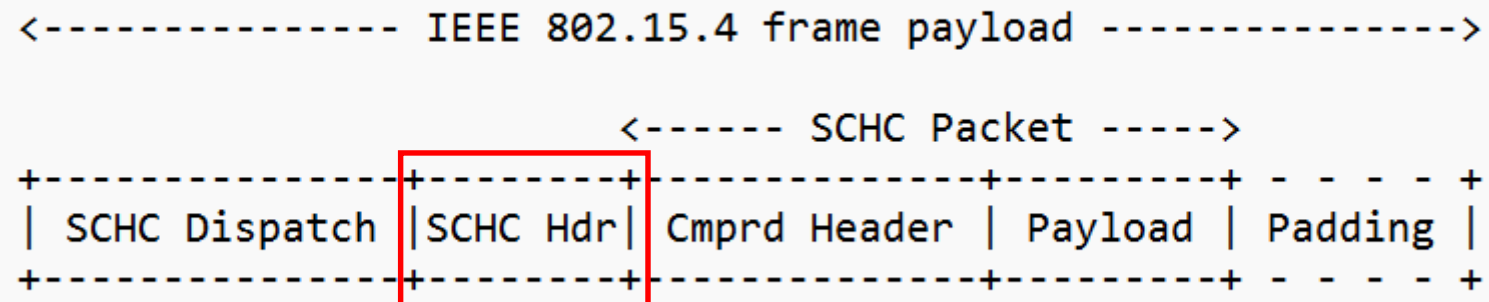
- SRO header

SCHC Header of 0 bits if fully compressed

OLD:



NEW:

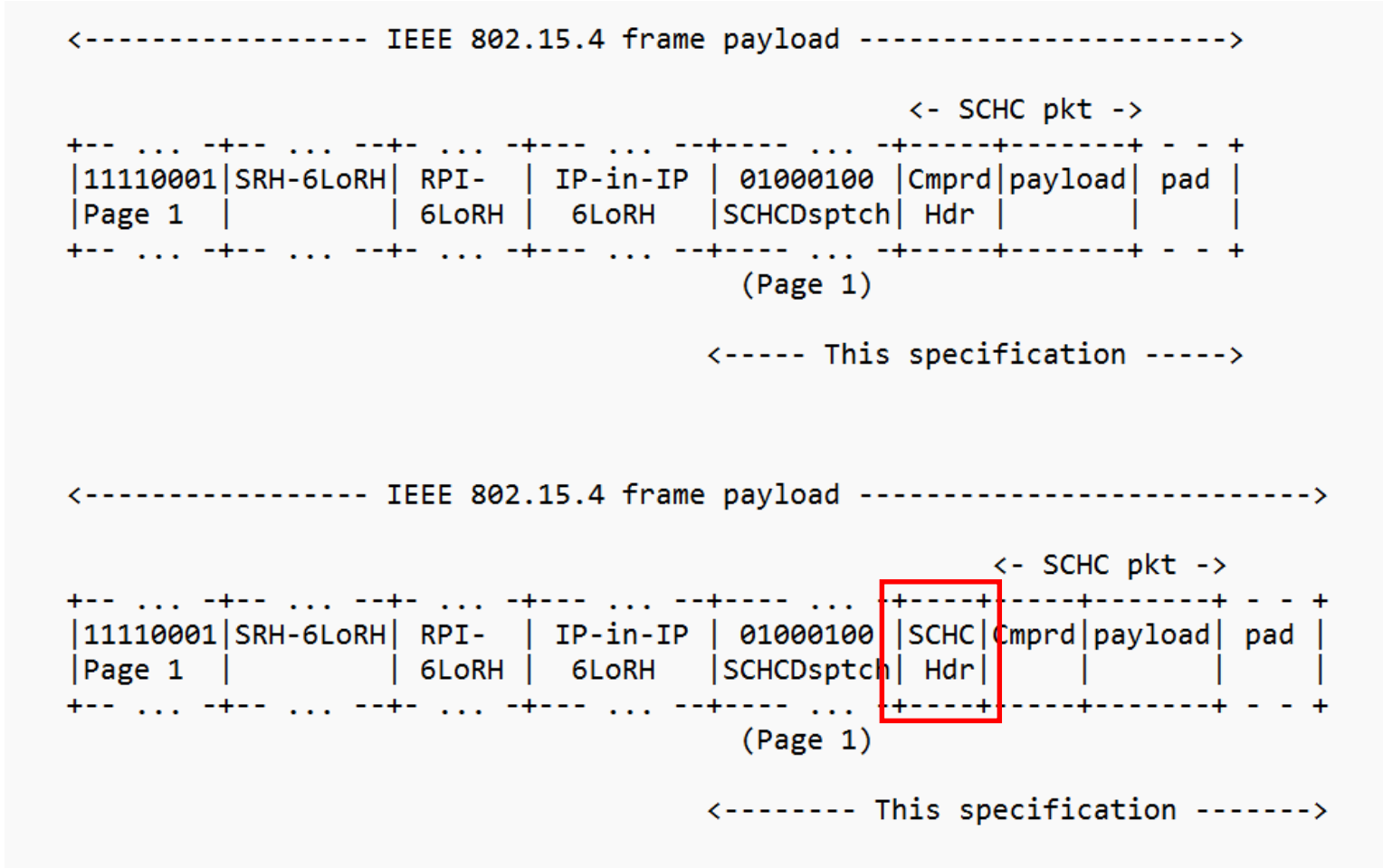


# Frame formats with SCHC Header

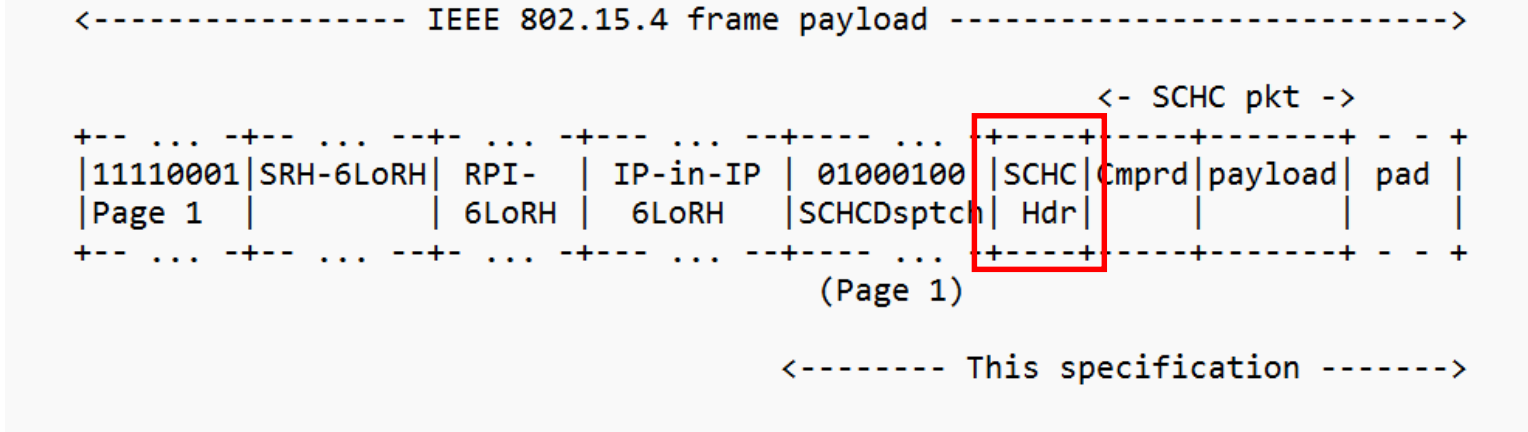
SCHC Header of 0 bits if fully compressed

- TRO, downward, source is not the root

OLD:



NEW:

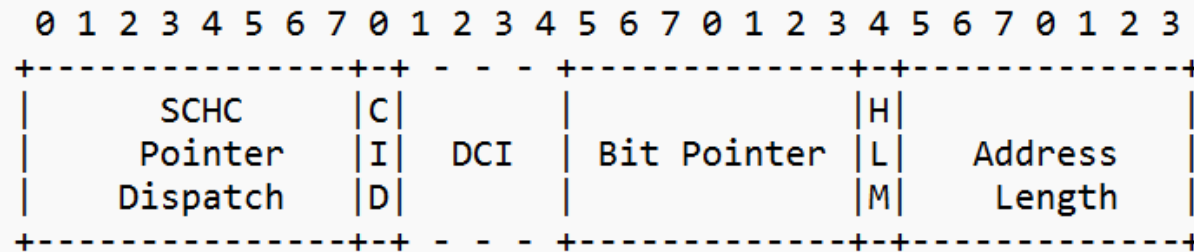


# Frame formats with SCHC Header

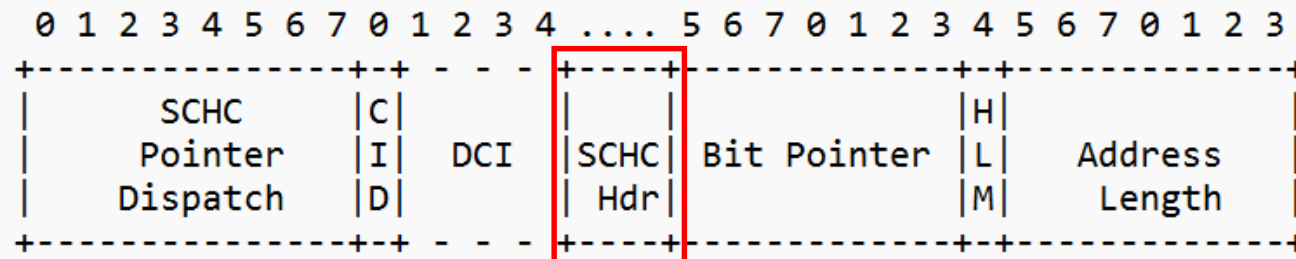
- PRO header

SCHC Header of 0 bits if fully compressed

OLD:



NEW:

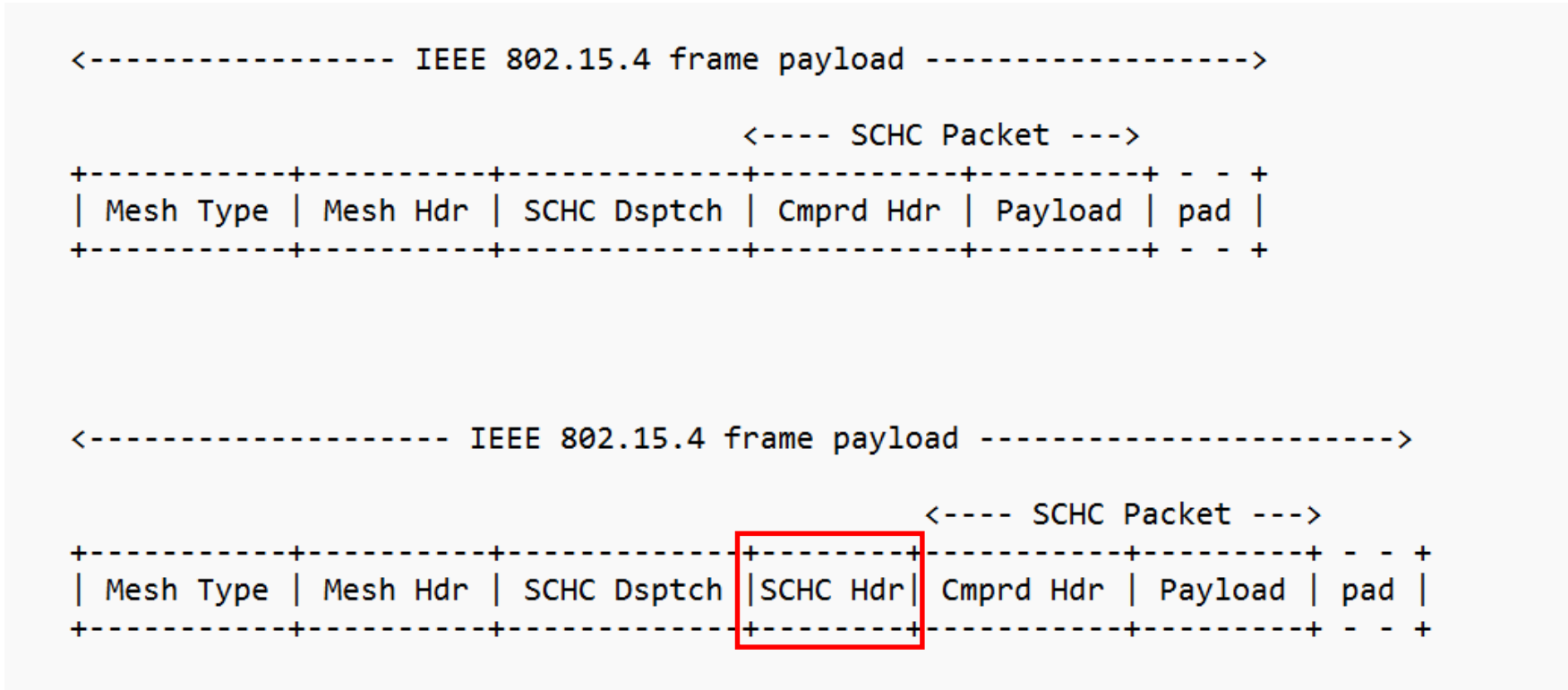


# Frame formats with SCHC Header

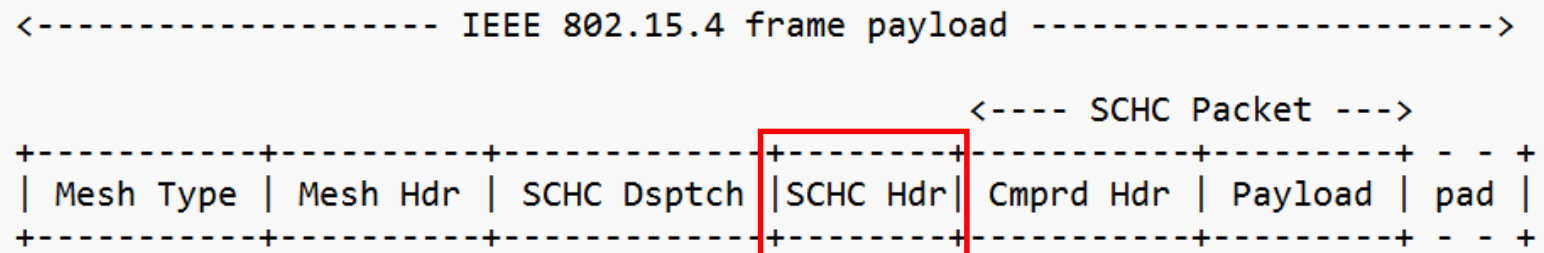
- Mesh-Under

SCHC Header of 0 bits if fully compressed

OLD:



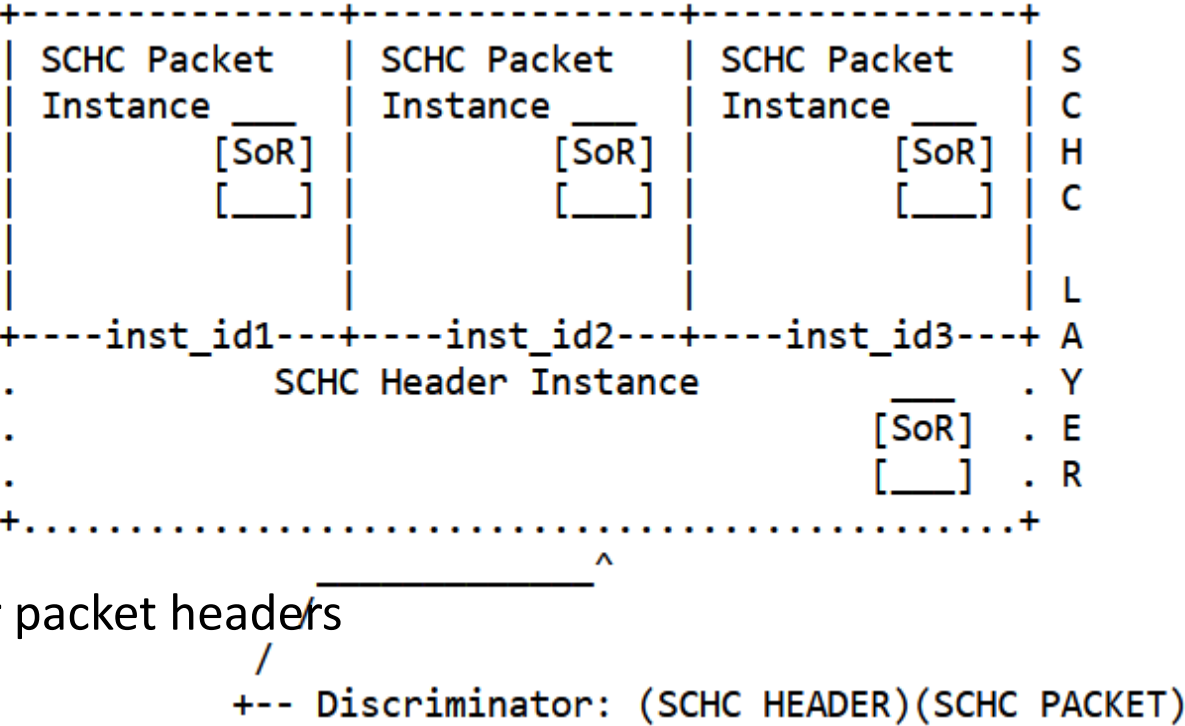
NEW:



# 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
  - SCHC Stratum
    - Located at layer 2.5
    - Compressed data may comprise all upper layer packet headers
  - 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:

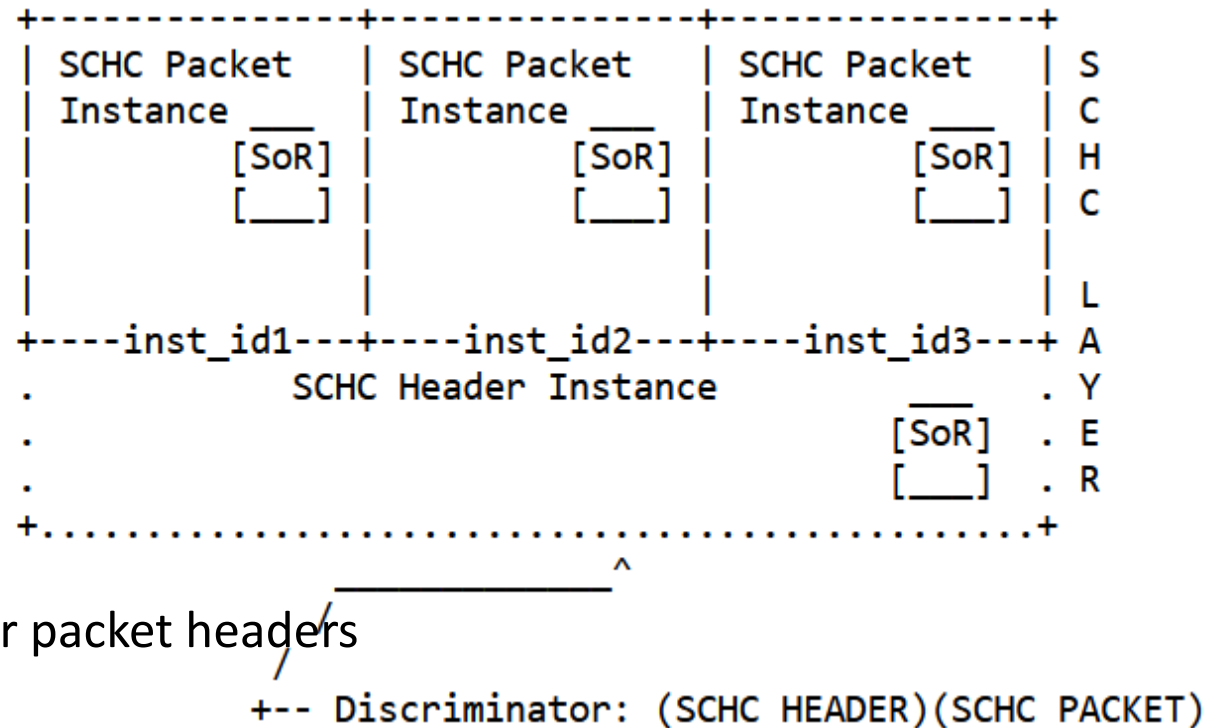


# SCHC architecture concepts for SCHC HC over 15.4

- Multiple-instance networks:

- SCHC Header
  - Compressed (generally, not fully)
- SCHC Header Instance
  - One SoR, may comprise several Rules
- SCHC Packet Instance
  - There are several
  - Each one with its corresponding SoRs
- SCHC Stratum
  - Located at layer 2.5
  - Compressed data may comprise all upper layer packet headers
- 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”

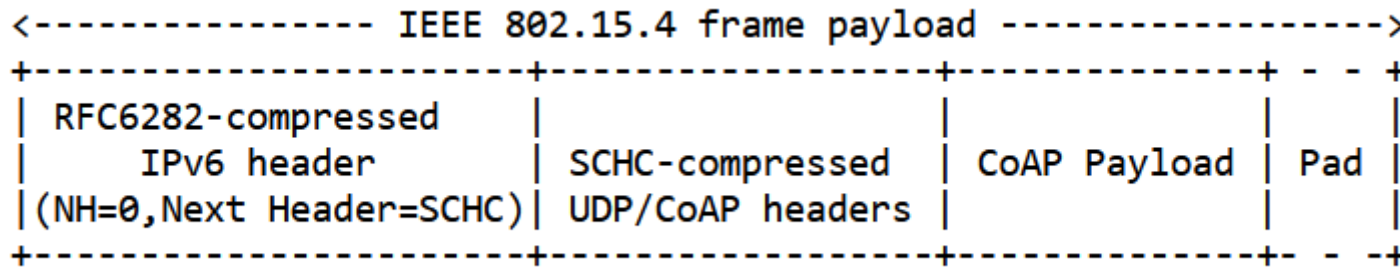
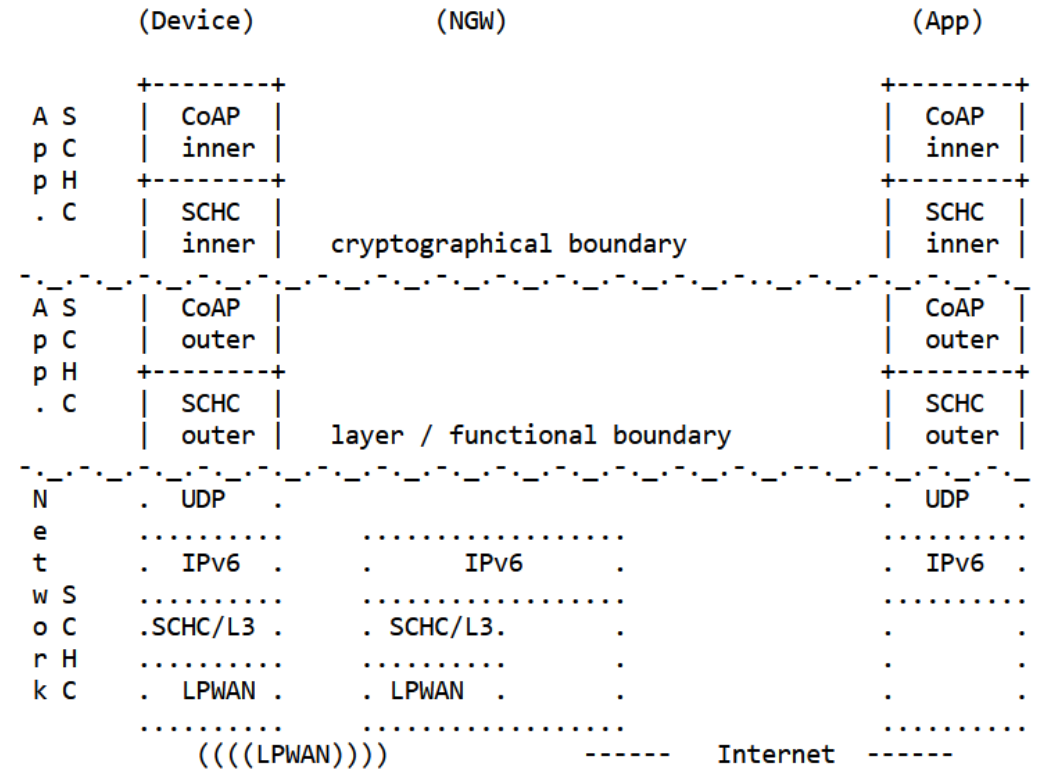
From draft-ietf-schc-architecture-02:



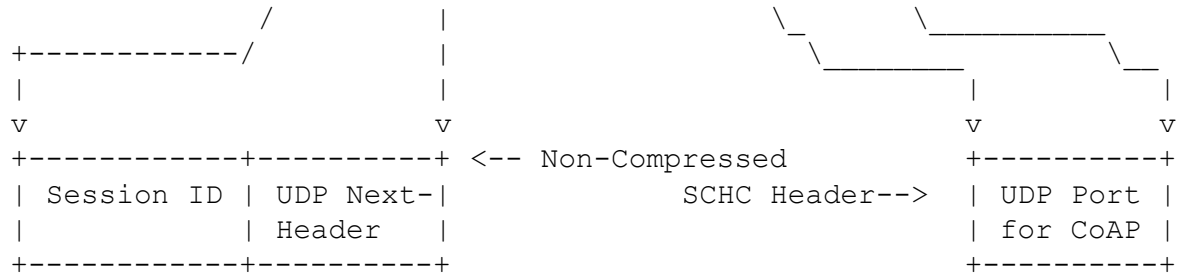
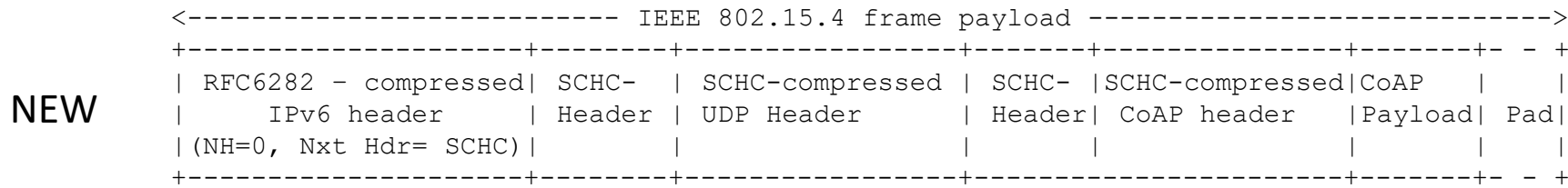
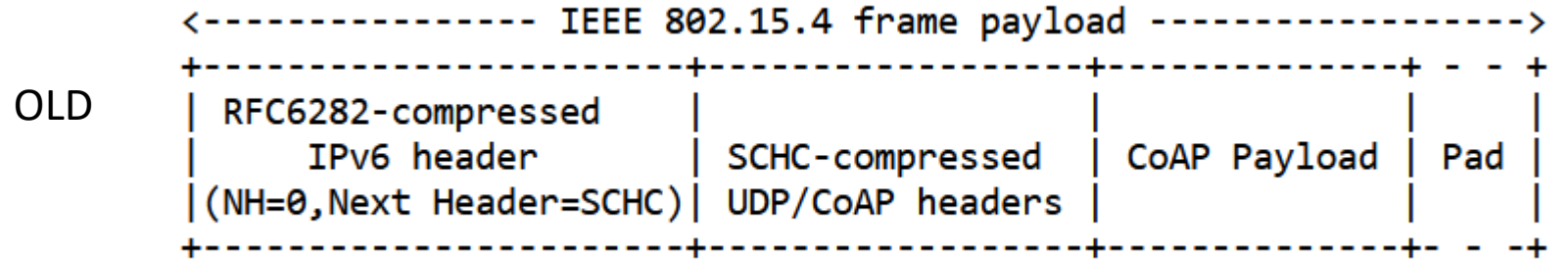


# Transition protocol stack

- 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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