Side meeting – SCHC Architecture

July 21st, 2025

Alexander PELOV
alexander.pelov@imt-atlantique.fr

Pascal Thubert
pascal.thubert@gmail.com

Internet Engineering Task Force
© 2022 IETF Trust
Production by Meetecho

IETF

Note Well

This is a reminder of IETF policies in effect on various topics such as patents or code of conduct. It is only meant to point you in the right direction. Exceptions may apply. The IETF's patent policy and the definition of an IETF "contribution" and "participation" are set forth in BCP 79; please read it carefully.

As a reminder:

- By participating in the IETF, you agree to follow IETF processes and policies.
- If you are aware that any IETF contribution is covered by patents or patent applications that are owned or controlled by you or your sponsor, you must disclose that fact, or not participate in the discussion.
- As a participant in or attendee to any IETF activity you acknowledge that written, audio, video, and photographic records of meetings may be made public.
- Personal information that you provide to IETF will be handled in accordance with the IETF Privacy Statement.
- As a participant or attendee, you agree to work respectfully with other participants; please contact the ombudsteam (https://www.ietf.org/contact/ombudsteam/) if you have questions or concerns about this.

Definitive information is in the documents listed below and other IETF BCPs. For advice, please talk to WG chairs or ADs:

- BCP 9 (Internet Standards Process)
- BCP 25 (Working Group processes)
- BCP 25 (Anti-Harassment Procedures)
- BCP 54 (Code of Conduct)
- BCP 78 (Copyright)
- BCP 79 (Patents, Participation)
- https://www.ietf.org/privacy-policy/(Privacy Policy)

IETF

Agenda

- Introduction and outline – 30 min
- Questions regarding the SCHC architecture draft – Carles (15 min)
- SCHC terminology and architecture discussion points - Marion (15 min)
- Discussions

Can you describe an elephant?

Can you describe an elephant?

Meeting Objectives

Meeting Objectives

- Remind the spirit of the SCHC Architecture Document
- Identify areas needing redrafting or clarification
  - Define editorial next steps
  - Agree on edtorial approaches
- Prepare presentation for the WG meeting

Context

- RFC8724 (SCHC), RFC9363 (YANG Data Model for SCHC), (+more)
  - Defined with LPWANs in mind, 4 baseline technologies
  - ”Don’t boil the ocean”
    - Important questions were left for later (e.g. context provisioning)
    - Everything is implicit
- Our understanding is better now
  - SCHC has been adopted by several international SDOs and alliances (DLMS, IEC, Lora Alliance), there is official SCHC certification process/tools for RFC9011, new uses (e.g. IPv6 multicast over SCHC, 6LO, IPsec, etc.)
- The architecture document is a way to clearly define how SCHC works
  - Need to position RFC8724 terminology

IETF

There are still questions

From easiest to hardest (they are related, though!)

- On naming (how to name things)
- On the definitions (how named things are defined)

We have made huge progress, but the dialogue must remain open.

Approach for this side meeting:

- Keep open mind
- Nothing is set in stone
- Need a way to look for rough consensus – probably during WG meeting on Wednesday

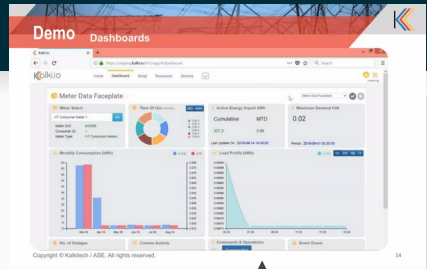
Structure of document

Table of Contents

1. Introduction
2. Requirements Language
3. Terminology
4. Building Blocks
   - 4.1. SCHC Stratum (plural: strata)
   - 4.2. Discriminator
   - 4.3. SCHC Stratum Header end point
     - 4.3.1. SCHC Stratum Header
   - 4.4. SCHC Payload end point
     - 4.4.1. SCHC Payload
   - 4.5. SCHC Profiles
   - 4.6. SCHC Operation
     - 4.6.1. SCHC Rules
     - 4.6.2. SoR identification
   - 4.7. SCHC Management
     - 4.7.1. SCHC Instance Manager
     - 4.7.2. SCHC Data Model
5. SCHC Architecture
6. The Static Context Header Compression
   - 6.1. SCHC over Network Technologies
     - 6.1.1. SCHC over PPP
     - 6.1.2. SCHC over Ethernet
     - 6.1.3. SCHC over IPv6
     - 6.1.4. SCHC over UDP
7. SCHC Endpoints for LPWAN Networks
   - 7.1. SCHC Device Lifecycle
     - 7.1.1. Device Development
     - 7.1.2. Rules Publication
     - 7.1.3. SCHC Device Deployment
     - 7.1.4. SCHC Device Maintenance
     - 7.1.5. SCHC Device Decommissionning

IETF

Example

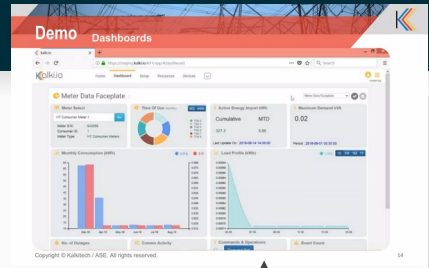


Protocol stack:
DLMS/UDP/IP

(this is the SCHC Stratum for this example)

DLMS Head-End System

Example



DLMS/UDP/IP
compressed with SCHC

DLMS/UDP/IP

SCHC Device

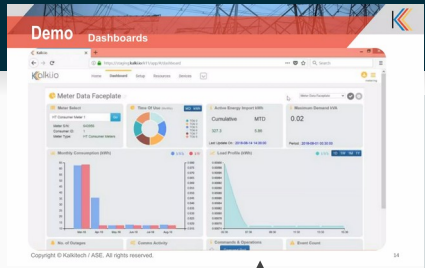
SCHC Node

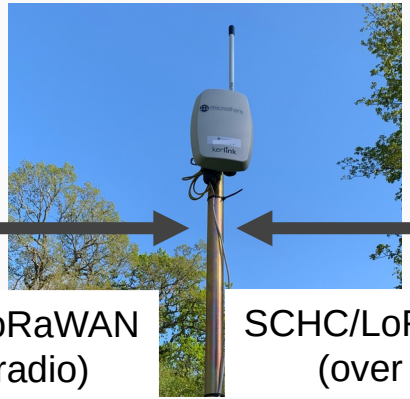
SCHC Gateway

SCHC Node

DLMS Head-End System

IETF





SCHC/LoRaWAN (over radio)

SCHC/LoRaWAN (over IP)

SCHC tunneled (over IP)

DLMS/UDP/IP

SCHC Device

SCHC Node

LoRaWAN GW

LNS (LoRaWAN Network Server)

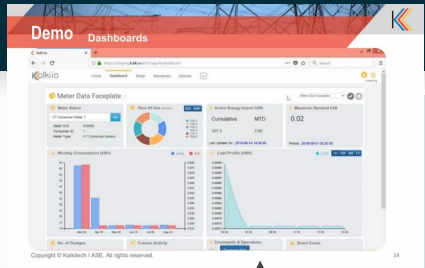
SCHC Gateway

SCHC Node

DLMS Head-End System

IETF

SCHC Stratum: DLMS/UDP/IP



SCHC End-Point

SCHC Instance

SCHC End-Point

DLMS/UDP/IP

SCHC Device

SCHC Gateway

SCHC Node

SCHC Node

SCHC Stratum: DLMS/UDP/IP

SCHC End-Point

SCHC Instance

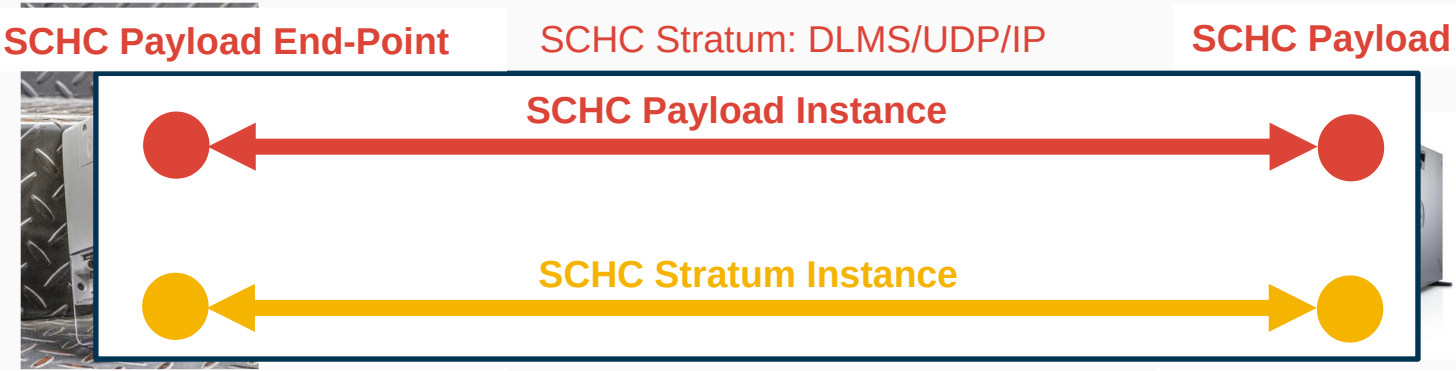
SCHC End-Point

SCHC Device

SCHC Node

SCHC Gateway

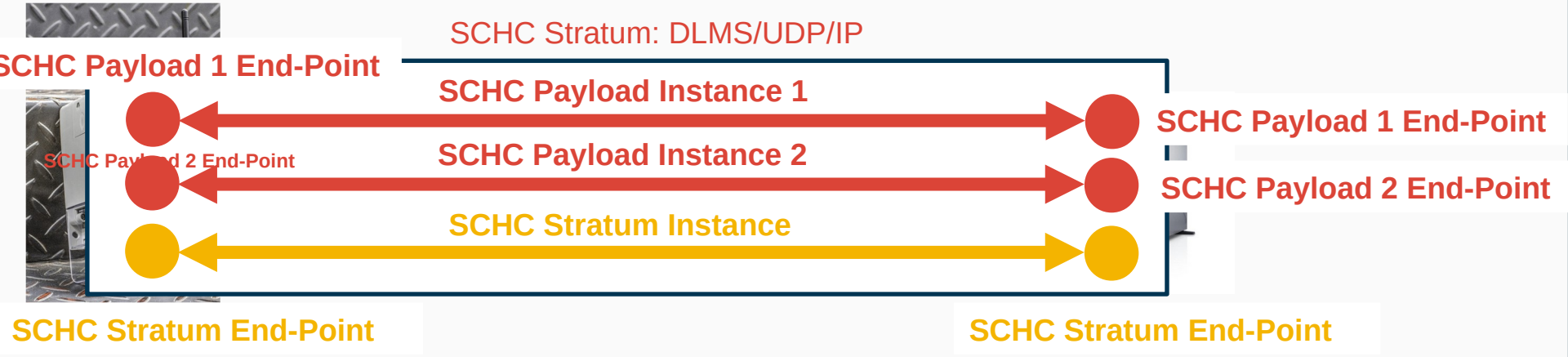
SCHC Node



SCHC Device
SCHC Node

SCHC Gateway
SCHC Node

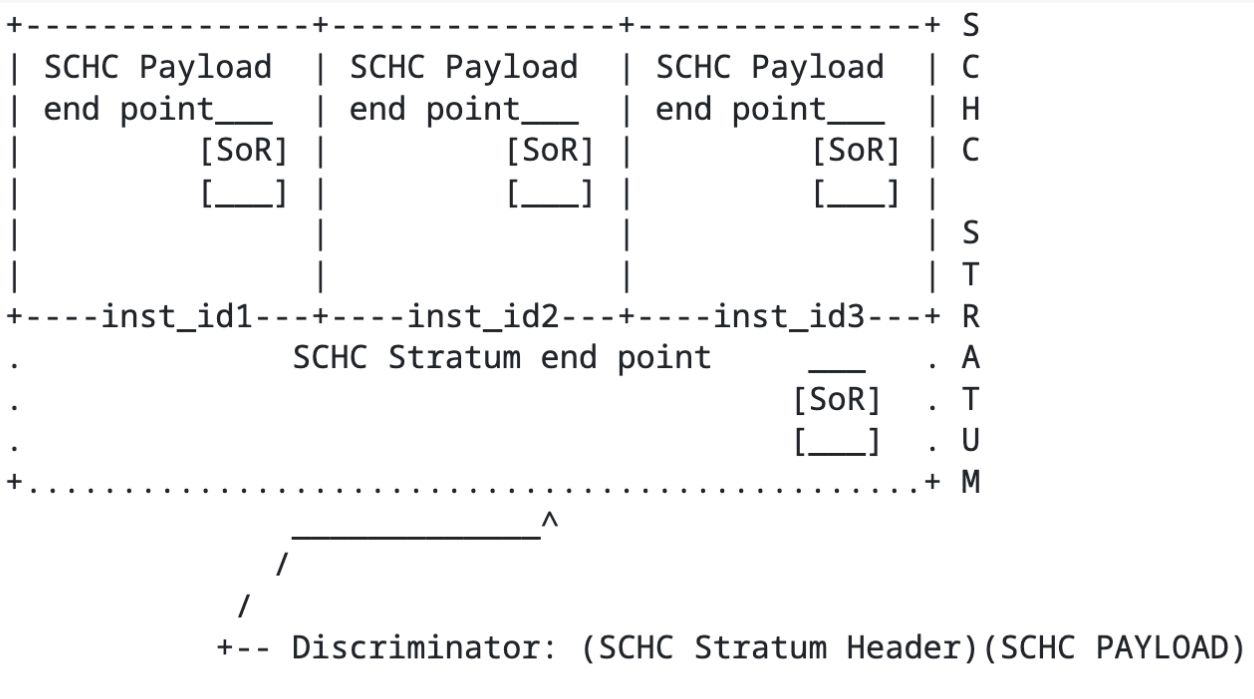
IETF



SCHC Device
SCHC Node

SCHC Gateway
SCHC Node

IETF



Each SCHC Payload End point uses its own Set of Rules,
but share the same SCHC Stratum Header.

IETF

Why there is always a SCHC Stratum Instance

In RFC8724, section 6:

At least one RuleID MUST be allocated to tagging packets for which SCHC compression was not possible (i.e., no matching compression Rule was found).

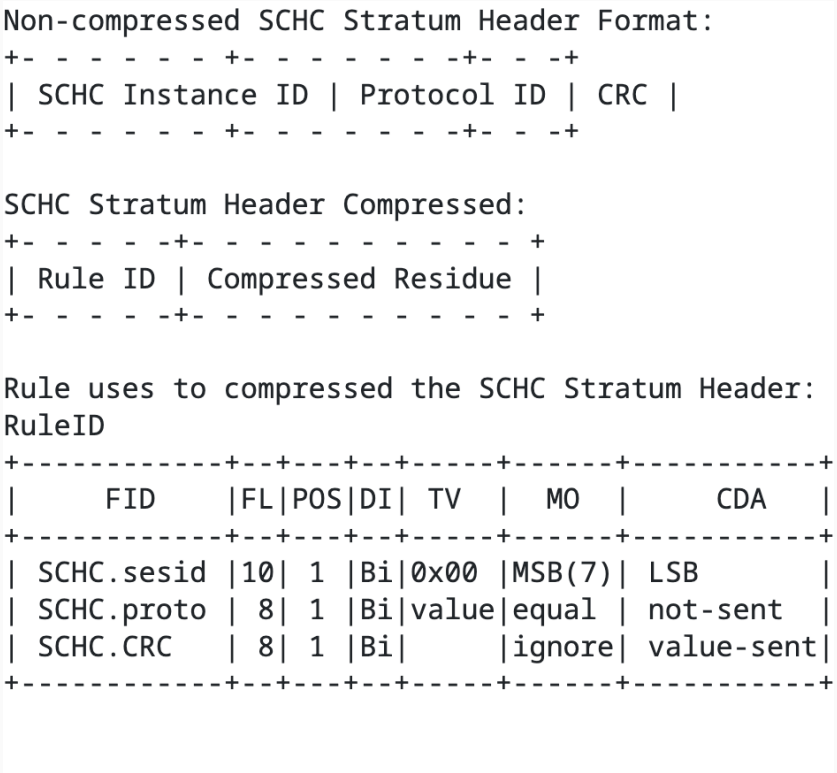
Let’s say we bridge Ethernet with SCHC/Ethernet, where SCHC compresses IPv6 and uses Non-Compression for anything else.

There is only one SCHC Stratum. (e.g. Ethernet/Internet Layer)

The IPv6 traffic which is compressed, will be decompressed on the other side, and then the EtherType can be correctly put for IPv6 (e.g. 0x86DD).

All other traffic, however, goes through the Non-Compressed Rule, but there is NO way to indicate the EtherType for the other side (e.g. is it IPv4, ICMPv6, IGMP, …)
-> There is the need to transport this information, which is why SCHC Stratum Instance is always there and the SCHC Stratum Header is necessary (although elided in almost all cases) -> Except for this case

Why there is always a SCHC Stratum Instance



Non-compressed SCHC Stratum Header Format:

| SCHC Instance ID | Protocol ID | CRC |

SCHC Stratum Header Compressed:

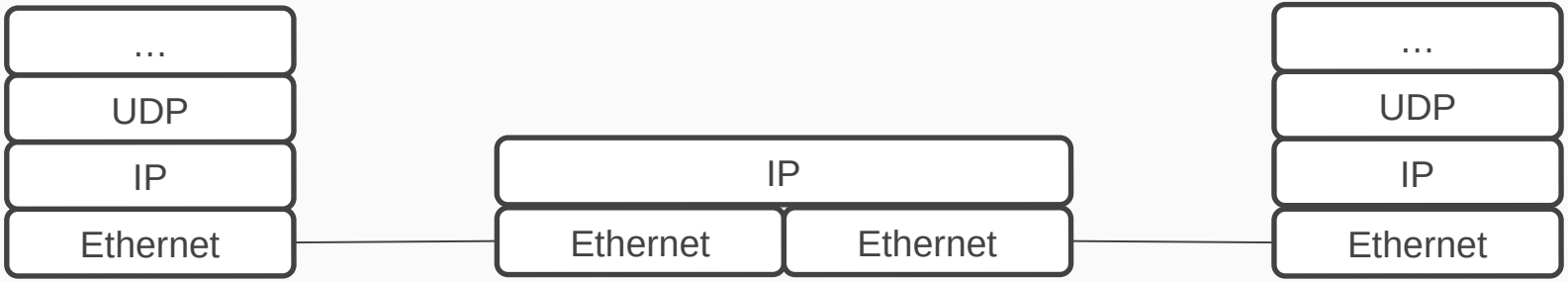
| Rule ID | Compressed Residue |

Rule uses to compressed the SCHC Stratum Header:

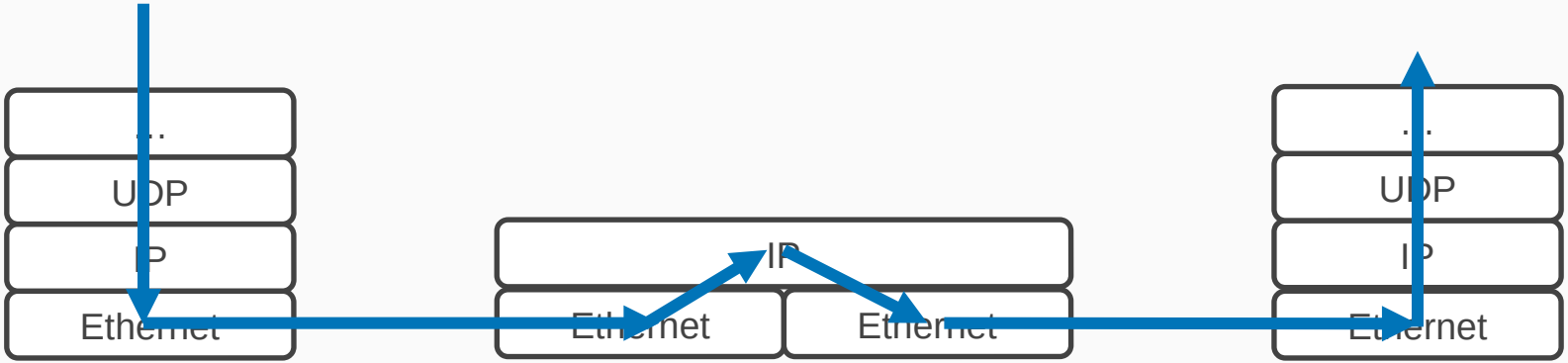
RuleID

FID	FL	POS	DI	TV	MO	CDA
SCHC.sesid	10	1	Bi	0x00	MSB(7)	LSB
SCHC.proto	8	1	Bi	value	equal	not-sent
SCHC.CRC	8	1	Bi		ignore	value-sent

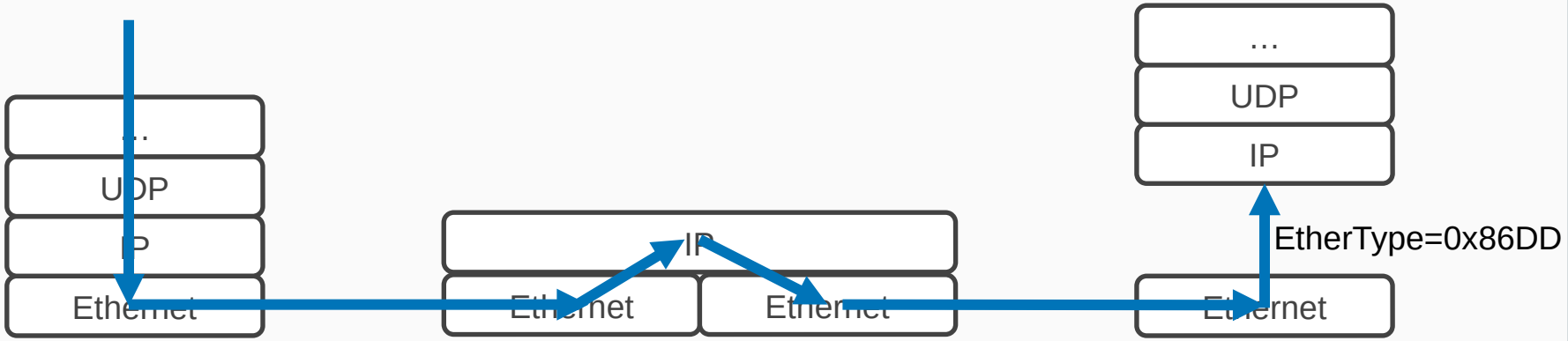
The trip of a little packet fellow



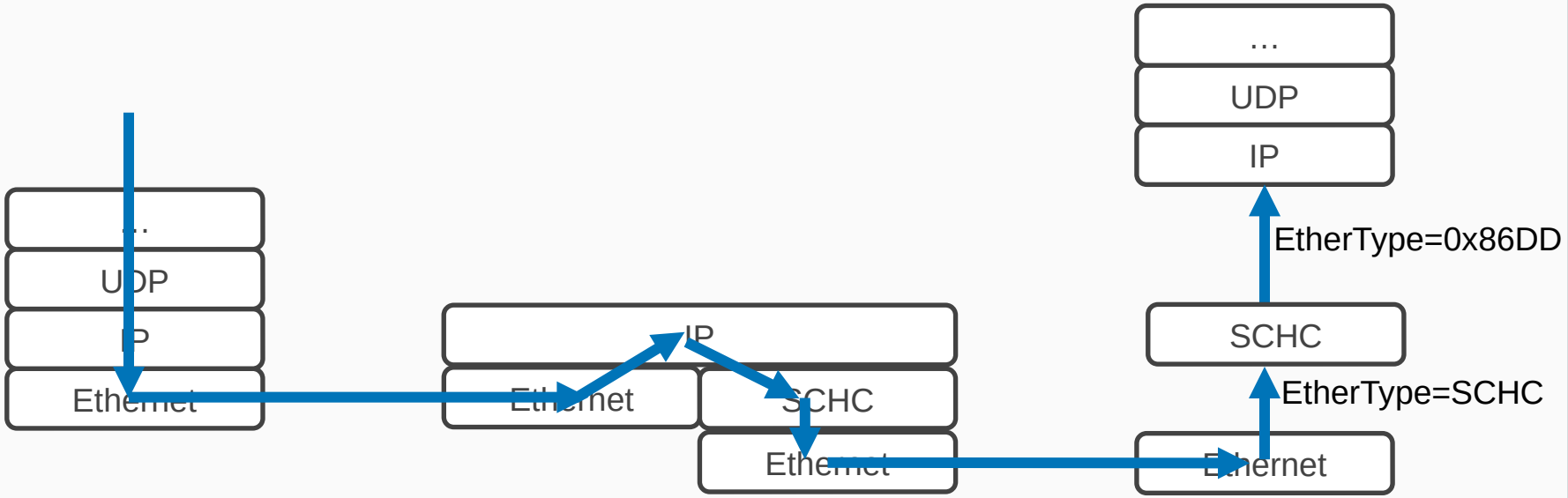
The trip of a little packet fellow



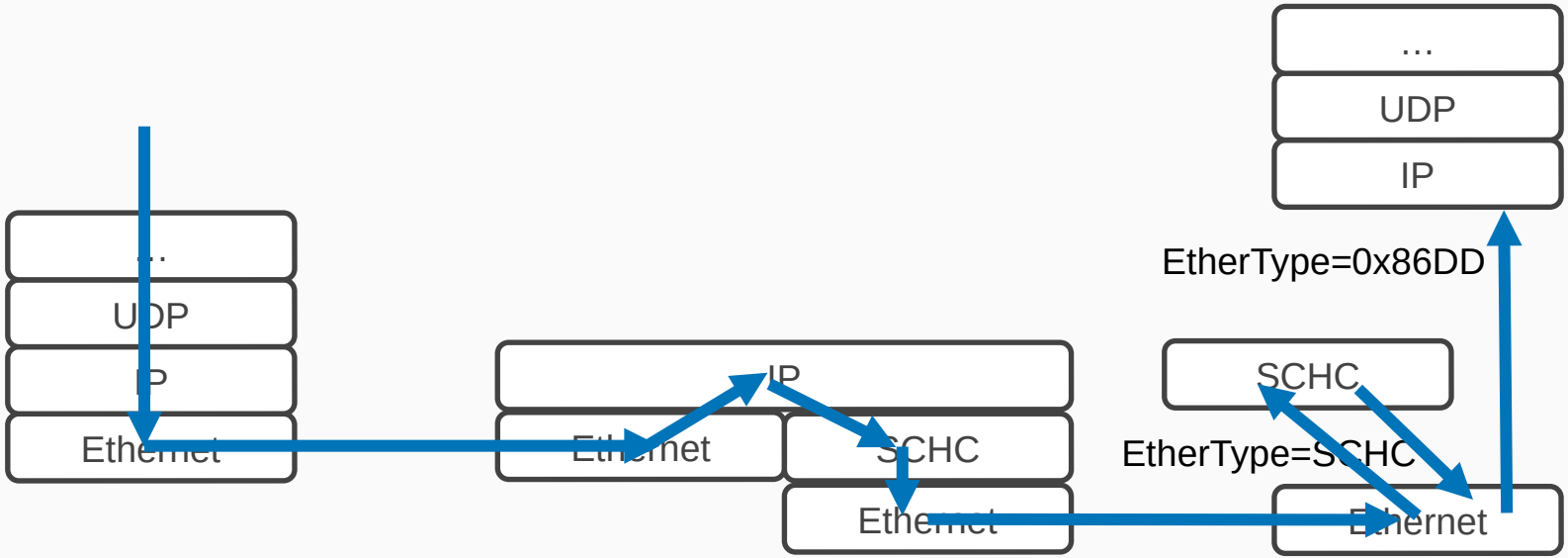
The trip of a little packet fellow



The trip of a little packet fellow

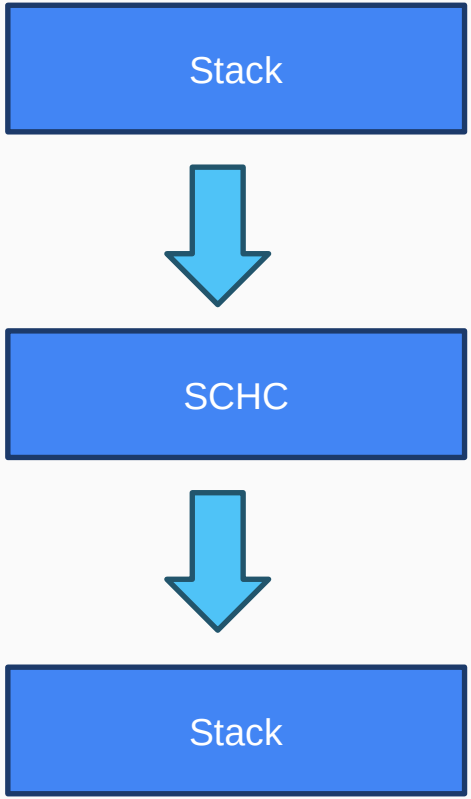


The trip of a little packet fellow



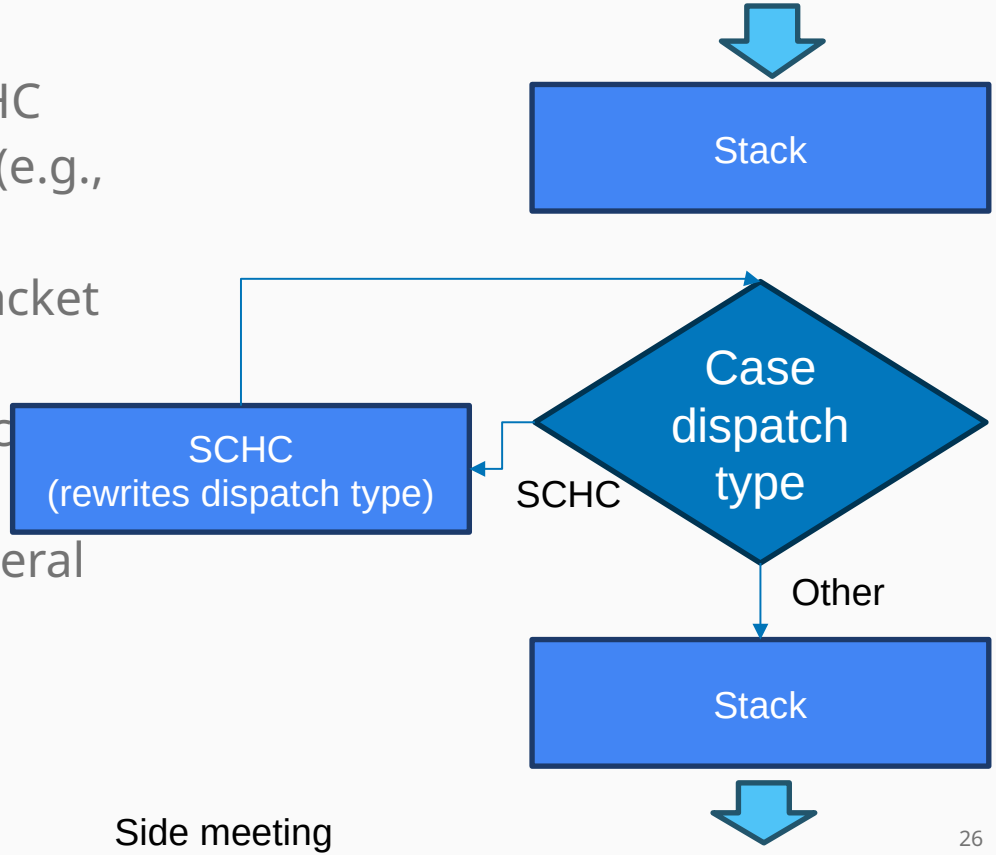
Bump In the Stack

- Stack « knows » to dispatch to SCHC (e.g., no choice)
- SCHC (un) compresses
- SCHC « knows » how to give the back to the stack
- Ideal for IoT constrained device with dedicated stack



Loop In the Stack

- Stack « dispatches » SCHC based on dispatch type (e.g., NH, ethertype, port)
- SCHC « rewrites » the packet including dispatch type
- SCHC « returns » the pac to the dispatcher
- More generic stack, general case



Fundamental definitions

SCHC end-point. An entity (e.g., Device, Application and Network Gateway) involved in the SCHC process.

Think of the software process performing the SCHC operations, e.g. a running code.

SoR (Set of rules). Group of Rules used in a SCHC end-point.

The static set of rules, which the software uses to perform the SCHC operation (compression, fragmentation, etc.)

The SoR doesn't change while processing a packet/SCHC Datagram. It can be changed by an external process (e.g. management).

Context. All the information related to the Rules.

(nota: in RFC8724: A set of Rules used to compress/decompress headers, or to fragment/reassemble a packet.)

The SCHC Context at the end point includes a reference to the SoR along with the dynamic processing state needed to handle packets for a given peer SCHC end-point.

Fundamental definitions

SCHC Stratum. A SCHC Stratum is the SCHC analoguous to a classical layer in the IP architecture, but its operation may cover multiple IP layers or only a subset of a layer.

SCHC Instance. The session between SCHC end points in two or more peer nodes operating SCHC to communicate using a common SoR and a matching SoV.

SCHC Instance is a little bit larger than the notion of a ”session”. E.g. RFC9011 there is no notion of opening a session. In PPP, or IPsec there is a session! In 6LO Single-Instance networks, there doesn’t seem to be the need for a ”session”.

SCHC Instance Manager. Provides the management of SCHC end points, the SoR of each end point and the dialog between hosts to keep the SCHC synchronization, and the establishment of SCHC Instances with peer nodes.

Discriminator. The key to determine how to decompress a SCHC Stratum Header in a stratum is called a Discriminator. The Discriminator is typically extrinsic to the stratum data.

Examples: LoRaWAN DevEUI, EtherType, Next header field, TLS association, etc.

Things that are NOT formally defined as of today (but are fairly simple to add if OK)

SCHC Node

SCHC Datagram

SCHC Stratum Instance

SCHC Payload Instance

Set of Variables

SCHC Header

Probably the Rule Manager is the same thing as the SCHC Instance Manager