

# SCHC in deepspace

Laurent Toutain  
Ana Minaburo

[laurent.toutain@imt-atlantique.fr](mailto:laurent.toutain@imt-atlantique.fr)  
[anaminaburo@gmail.com](mailto:anaminaburo@gmail.com)





# What is SCHC

## Defined in RFC 8724:

- Compression and Fragmentation framework
- Example of Compression of IPv6 and UDP

## RFC 8824:

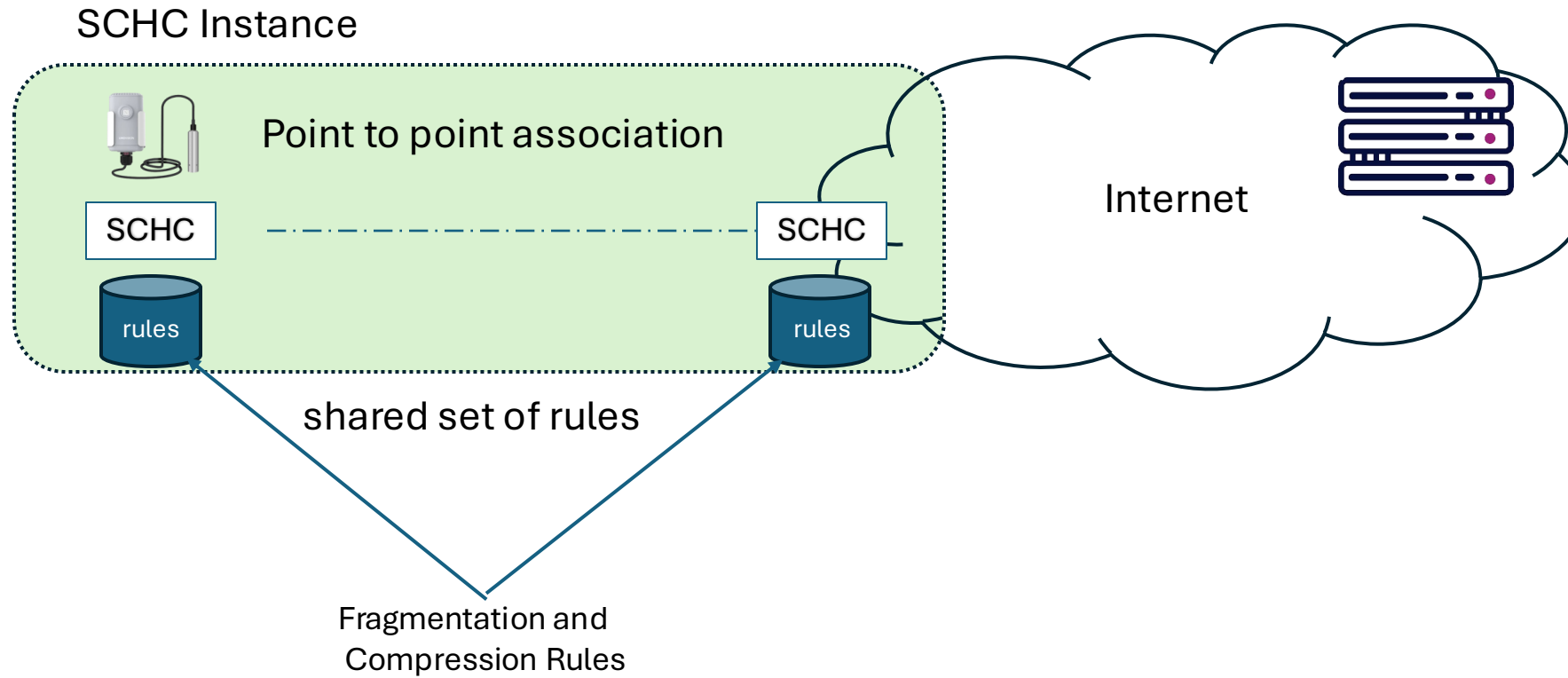
- CoAP and OSCORE
- Management of encryption with OSCORE

## RFC 9363:

- YANG Data Model for rule management
- Implementation of CORECONF serialization (÷ 20 XML size)

Initially targeting for LPWAN networks (low bandwidth, asymmetric)

# Architecture



# Rule Example



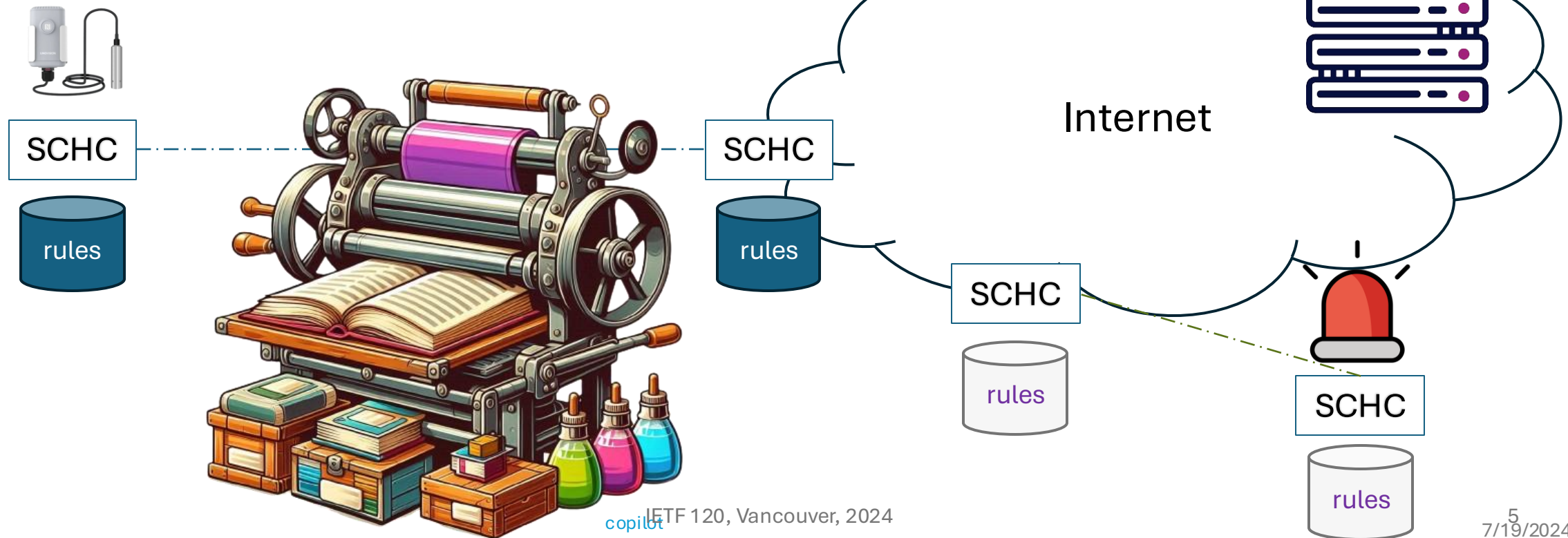
```
*****
Device: None
/-----\
|Rule 5/3          101 |
|-----+-----+-----+-----+-----+-----+-----+-----\
|IPV6.VER          | 4| 1|BI|          06|EQUAL          |NOT-SENT          |
|IPV6.TC           | 8| 1|BI|          01|EQUAL          |NOT-SENT          |
|IPV6.FL           |20| 1|BI|          023456|EQUAL          |NOT-SENT          |
|IPV6.LEN          |16| 1|BI|-----|IGNORE          |COMPUTE-LENGTH   |
|IPV6.NXT          | 8| 1|BI|          11|EQUAL          |NOT-SENT          |
|IPV6.HOP_LMT     | 8| 1|BI|-----|IGNORE          |VALUE-SENT       |
|IPV6.DEV_PREFIX  |64| 1|BI|          fe80000000000000|MATCH-MAPPING   |MAPPING-SENT     |
:                  : . :. :. :          200141d003022200 :          :          :
|IPV6.DEV_IID     |64| 1|BI|          000000000000013b3|EQUAL          |NOT-SENT          |
|IPV6.APP_PREFIX  |64| 1|BI|          200141d004040200|MATCH-MAPPING   |MAPPING-SENT     |
:                  : . :. :. :          fe80000000000000 :          :          :
|IPV6.APP_IID     |64| 1|BI|          0000000000000002|EQUAL          |NOT-SENT          |
|UDP.DEV_PORT     |16| 1|BI|-----|IGNORE          |VALUE-SENT       |
|UDP.APP_PORT     |16| 1|BI|          1630|MSB(12)       |LSB              |
|UDP.LEN          |16| 1|BI|          00|IGNORE          |COMPUTE-LENGTH   |
|UDP.CKSUM        |16| 1|BI|          00|IGNORE          |COMPUTE-CHECKSUM |
\-----+-----+-----+-----+-----+-----+-----+-----/
```

# INTERNET ARCHITECTURE EVOLUTION



- Datagram
- ~~Same packet format~~

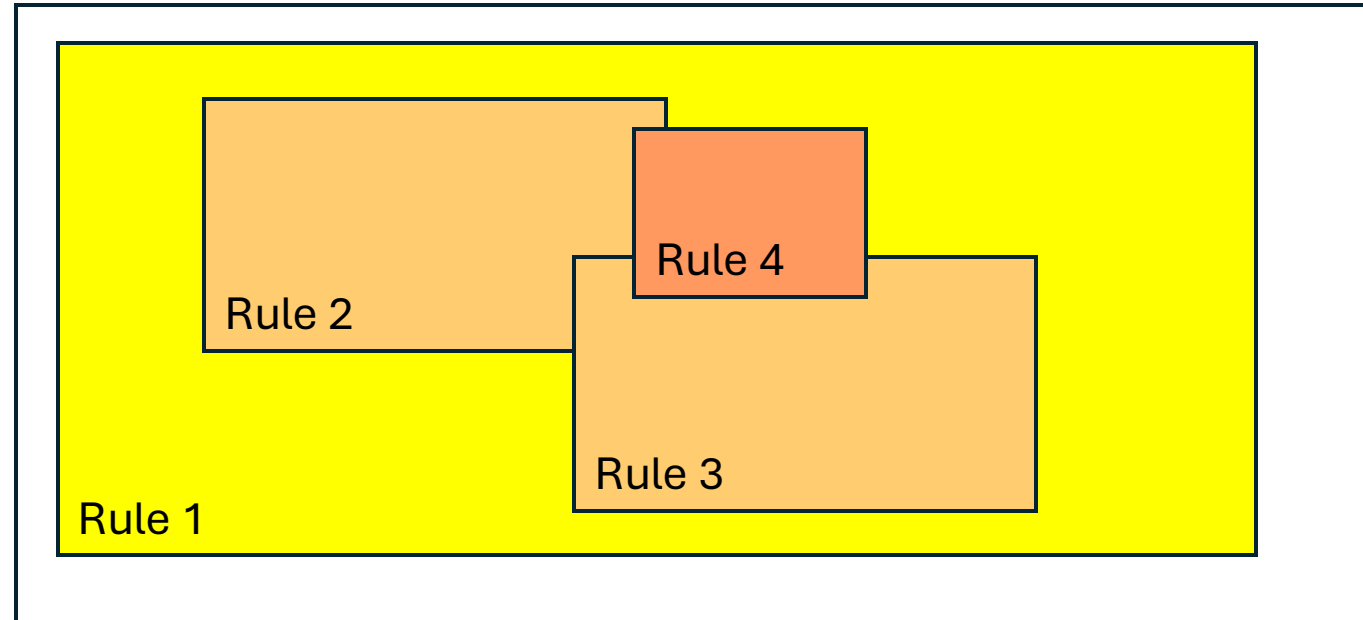
- Datagram
- Same packet format



# Flexible rules matching



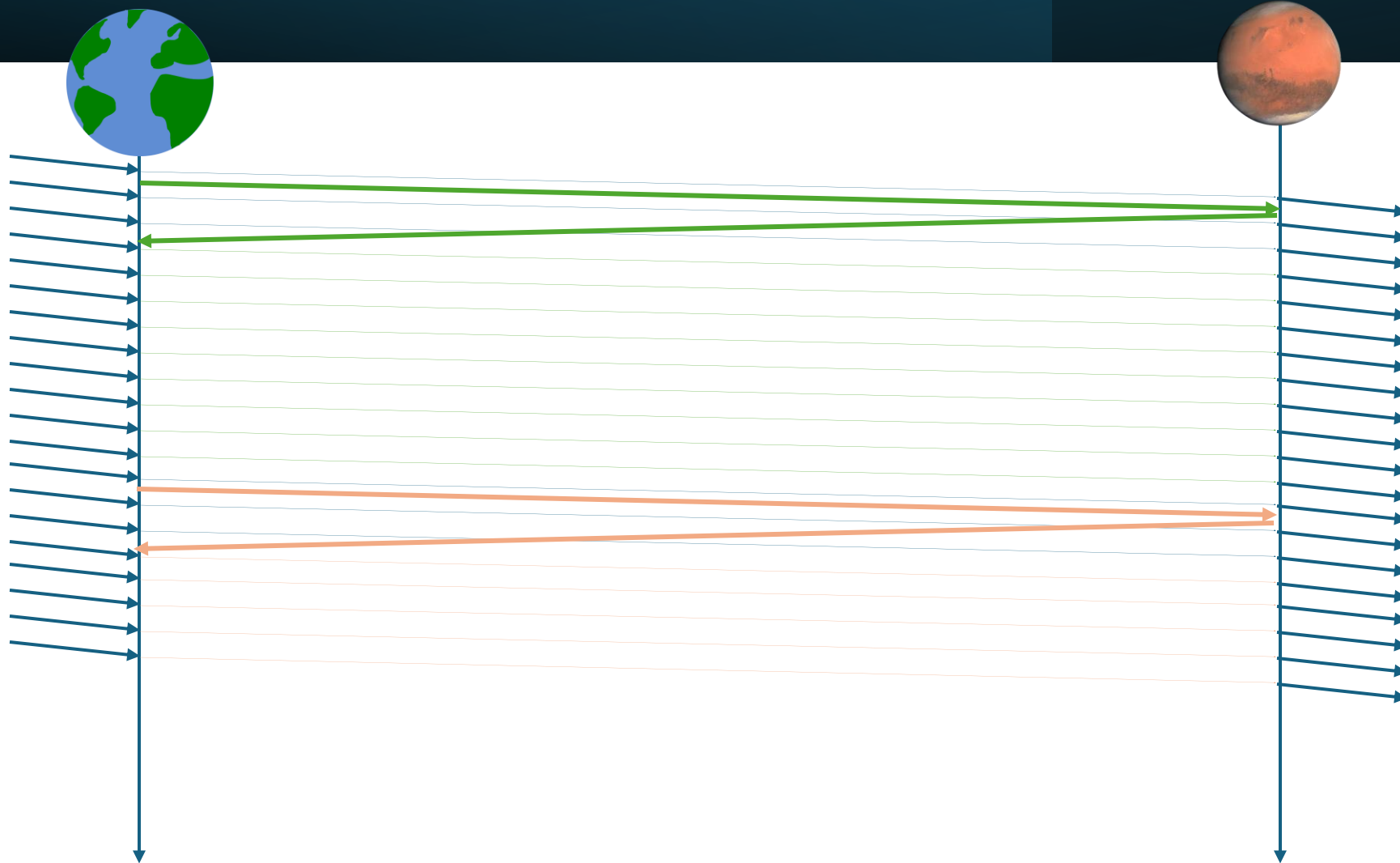
- Each packet is compressed independently
- Rule can be different for each packet
- No dependencies between Compressed packet
  - Eg. No delta encoding
- Good performances for Satellite communications



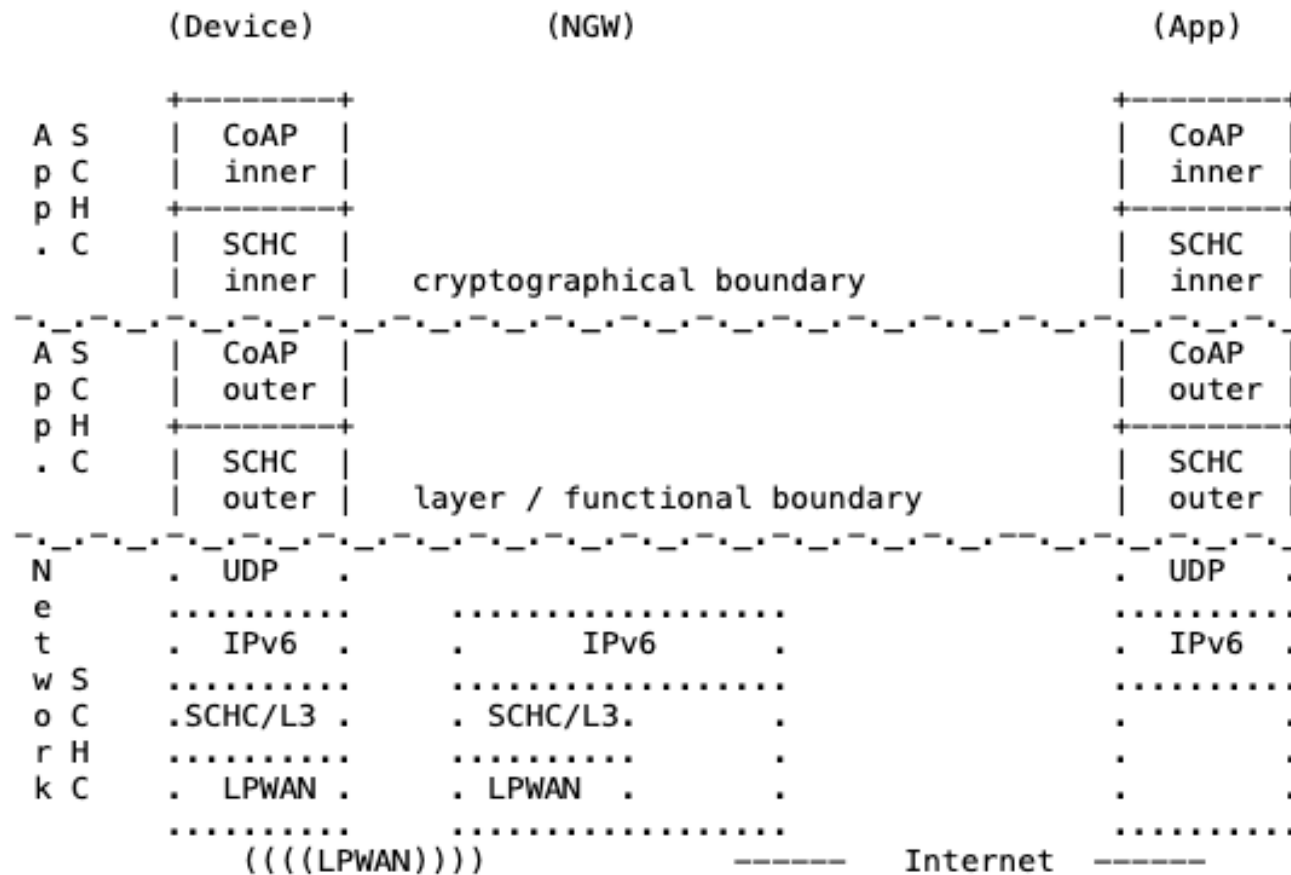


# Flow management

draft-minaburo-schc-flow-compression



# Quic ?







# LPWAN and Deepspace: the same battle

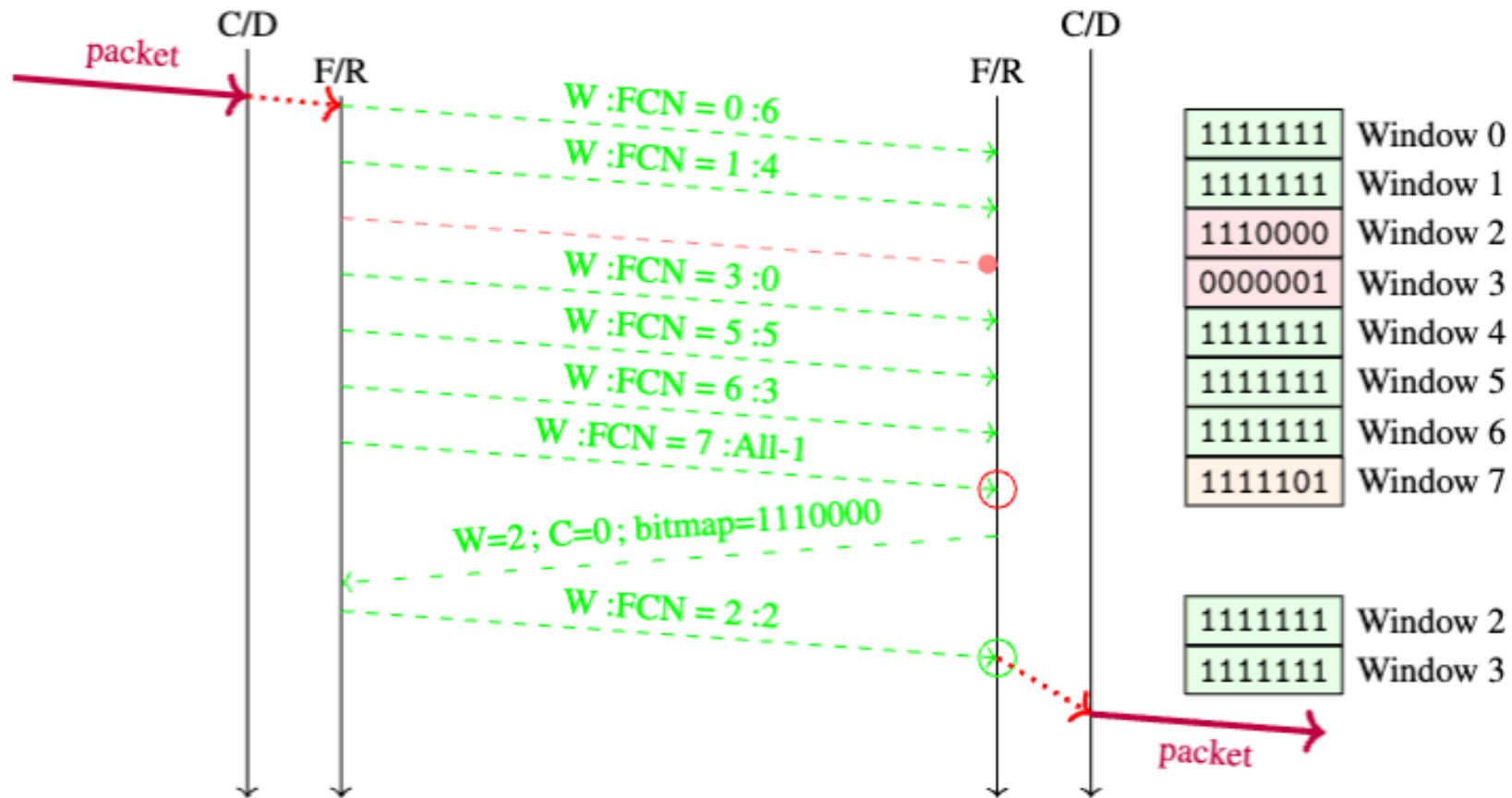
In LPWAN: Downlink is the enemy.

In deepspace: RTT is the enemy

=> Avoid ACK

- More transmission in one direction, to limit the other direction.

# SCHC Fragmentation





# SCHC Fragmentation improvement

## Add FEC in uplink:

- Bitmap is set for all the Tiles when covered by FEC

## Suppress last positive ACK

- More redundancy on sender side.



# Conclusion

SCHC is a flexible  
compression/fragmentation  
mechanism

Not connection oriented

Can be adapted easily for QUIC