Transmission of SCHC-compressed packets over IEEE 802.15.4 networks

Carles Gomez

Universitat Politècnica de Catalunya (UPC)

carlesgo@entel.upc.edu

Ana Minaburo

Acklio

ana@ackl.io

IETF 112 - Virtual, November 2021

Introduction (I/II)

- ## RFC 6282:

  - The basis for header compression in 6Lo(WPAN)

  - Designed for IEEE 802.15.4 as the target technology

  - Adapted/Reused for *relatively* similar IoT technologies

- ## RFC 8724 (aka "SCHC"):

  - A product of the LPWAN WG

  - Adaptation layer functionality

    – Includes header compression

  - Designed for even more constrained (LPWAN) technologies

Introduction (II/II)

- Compressed IPv6/UDP/CoAP header size

  - 6Lo(WPAN) compression: 11 bytes
  - SCHC compression: e.g. 2 bytes

  > - Best case, global addresses
  > - No CoAP header options

- Theoretical battery lifetime improvement over IEEE 802.15.4 by up to ~40%

  - Including a 1-byte SCHC Dispatch (see later)
  - Actual improvement will be lower, depending on various parameters and features: device hardware, MAC settings, application settings, payload size, etc.

Status

- ## draft-gomez-6lo-schc-15dot4
  - ### Related document: draft-gomez-6lo-schc-dispatch-01
  - ### Greater scope
    - Transmission of SCHC-compressed packets over IEEE 802.15.4 networks

- ## Revision -01
  - ### New content, improved structure
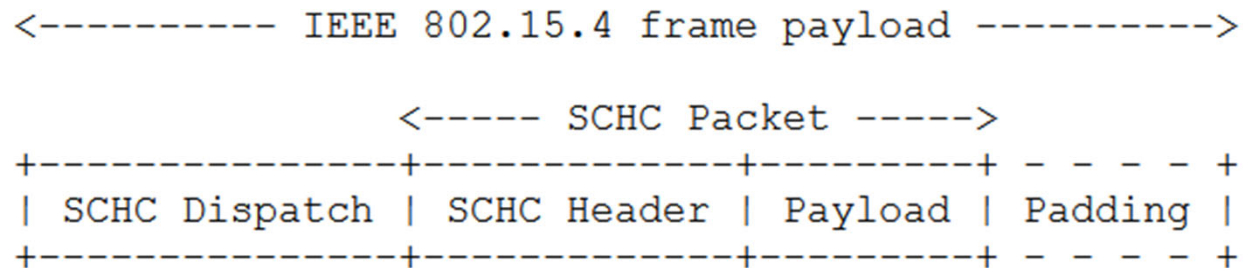 - ### Aims to incorporate the feedback from IETF 111

Table of Contents

4. Frame format

- Frame format (i.e. L2 frame payload)
    - Encapsulated SCHC compressed packet:

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

                      <----- SCHC Packet ----->
+--------------+------------+---------+ - - - - +
| SCHC Dispatch | SCHC Header | Payload | Padding |
+--------------+------------+---------+ - - - - +
```

    - SCHC Dispatch:
        - 01000100 (Page 0)   -- To be confirmed by IANA

    - RuleID size: 8 bits

5.1. IPv6/UDP header compression

- As per Section 10 of RFC 8724
- Exception: IPv6 addresses and UDP ports
  - Dev and App terms (RFC 8724) to allow a single Rule to be usable in both directions
  - However, Dev and App do not always apply in 802.15.4 networks (e.g. two endpoints within a mesh network)
  - If an IID is based on L2 header fields, Compute-IID is used instead of CDAs DevIID and AppIID
  - Another consequence:
    - Uplink and Downlink terms (RFC 8724) do not always apply
    - New terms: Transmit (Tx) and Receive (Rx)

8. Security considerations

- No header compression functionality beyond the one in RFC 8724
  - Security considerations of Sec. 12.1 (RFC 8724) apply

- Safety measure
  - A SCHC decompressor MUST NOT reconstruct a packet larger than 1500 bytes

Thanks!
Thoughts? Questions? Comments?

Carles Gomez

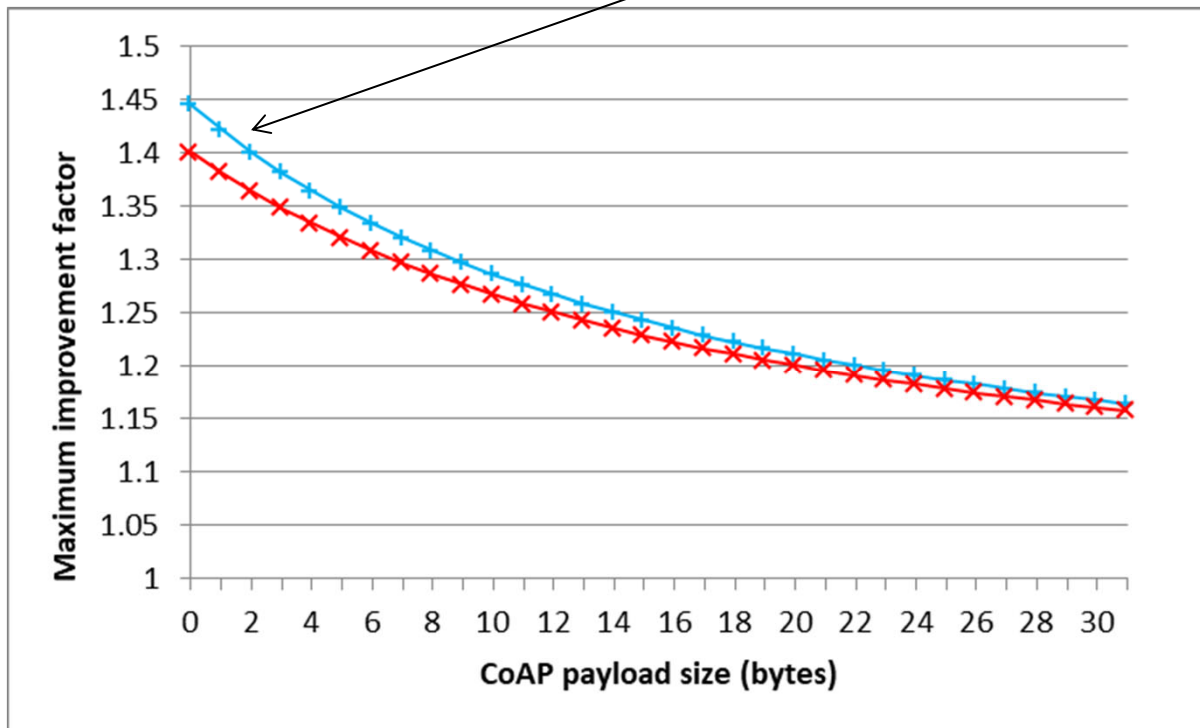Universitat Politècnica de Catalunya (UPC)

carlesgo@entel.upc.edu

Ana Minaburo

Acklio

ana@ackl.io

Annex

- ## Maximum lifetime improvement factor
  - ### Short MAC addresses, intra-PAN
  - ### E.g. a battery-operated sensor that periodically sends a message over IEEE 802.15.4

Star topology

NOTE: actual improvement will be lower