

# Transmission of SCHC-compressed packets over IEEE 802.15.4 networks

`draft-gomez-61o-schc-15dot4-04`

**Carles Gomez**

Universitat Politècnica de Catalunya (UPC)

carles.gomez@upc.edu

**Ana Minaburo**

Acklio

ana@ackl.io

# Introduction (I)

Assumptions:

- Best case, global addr.
- CoAP
  - a) No header options
  - b) Table 6, RFC 8824

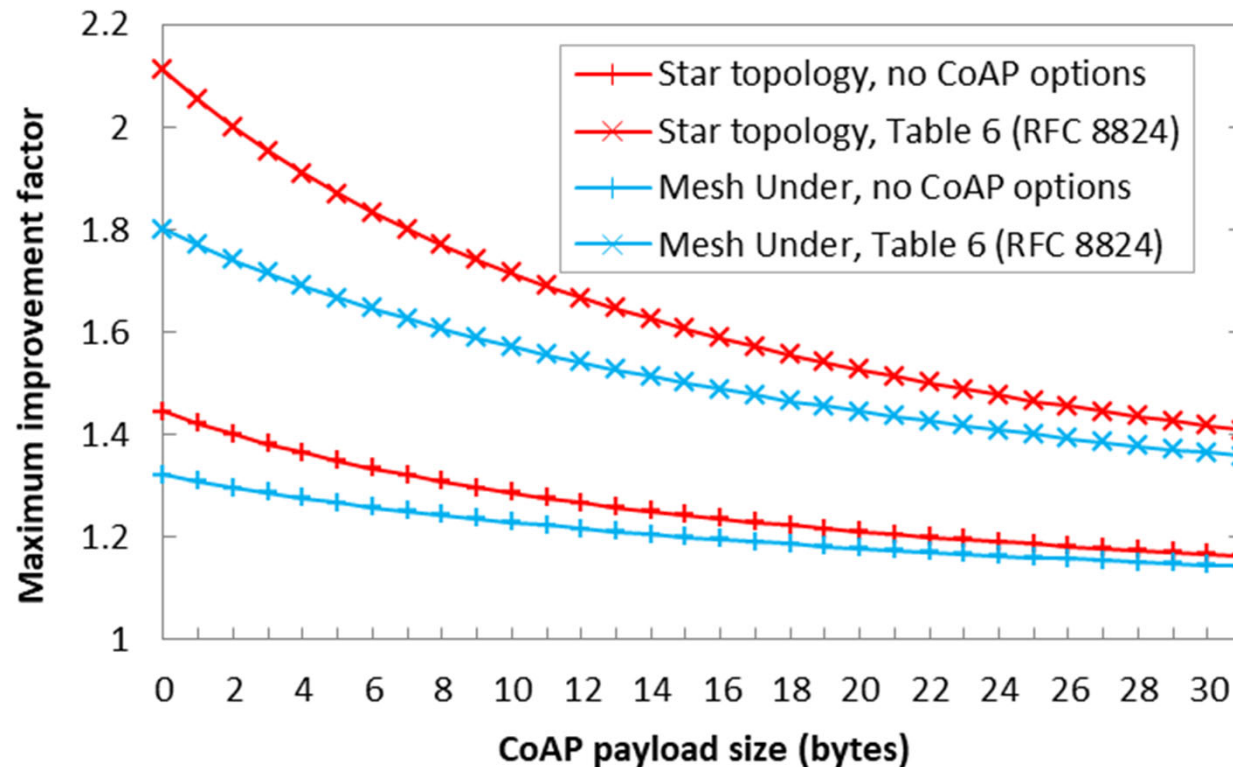
- IPv6/UDP/CoAP header size

	IPv6/UDP (bytes)	CoAP (bytes)		TOTAL (bytes)	
		a)	b)	a)	b)
No compression	48	4	16	52	64
6Lo(WPAN) - RFC 6282	7	4	16	11	23
SCHC - RFC 8724, 8824	1	1	1	2	2

- SCHC: static context, a priori knowledge of header field values
- Theoretical battery lifetime improvement over IEEE 802.15.4 by a factor up to >2
  - **Actual improvement will be lower**, depending on device HW, MAC/adaptation/application layer settings, payload size, network topology, etc.

# Introduction (II)

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



NOTE: actual improvement will be lower

# Status

- Previous discussion
  - Related document: draft-gomez-6lo-schc-dispatch
  - Proposal of a dispatch to signal SCHC HC
  - Presented in IETF 110
- draft-gomez-6lo-schc-15dot4
  - Greater scope
    - Transmission of SCHC-compressed packets over IEEE 802.15.4 networks
  - -00 presented in IETF 111
  - -01 presented in IETF 112
  - -02 presented in IETF 113
  - -03 presented in IETF 114
- Revision -04
  - Aims to incorporate the feedback from IETF 114 and discussion on the mailing lists (6lo and lpwan)

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## 3.3. Multihop communication

- 3.3.1. Straightforward Route-Over approach
  - All nodes MUST store all the Rules in use in the network
  - Suitable for small, stable networks, and/or without memory issues

NEW:

- 3.3.2. Tunneled, RPL-based Route-Over approach
  - An endpoint MUST store the Rules for the communications it is involved in (as an endpoint)
  - RPL non-storing mode, IPv6-in-IPv6 tunnels, and RFC 8138
- 3.3.3. Mesh-Under approach
  - An endpoint MUST store the Rules for the communications it is involved in

## 3.3.2. Tunneled, RPL-based R.O. (I)

- RPL non-storing mode
- Overview:
  - Packets sent by a 6LN are tunneled Upward to the root
  - If the final destination is another 6LN, packets are tunneled Downward from the root
- RFC 9008:
  - Downward traffic:
    - IPv6-in-IPv6, except when the root is the packet source
    - Tunnel terminates at the 6LN (if it is a RAL) or last 6LR (if 6LN is a RUL)
  - Upward traffic:
    - IPv6-in-IPv6 by the 6LR, if 6LN is a RUL (no tunnel if destin. is the root)
    - IPv6-in-IPv6 (“may”) from the 6LN, if the 6LN is a RAL

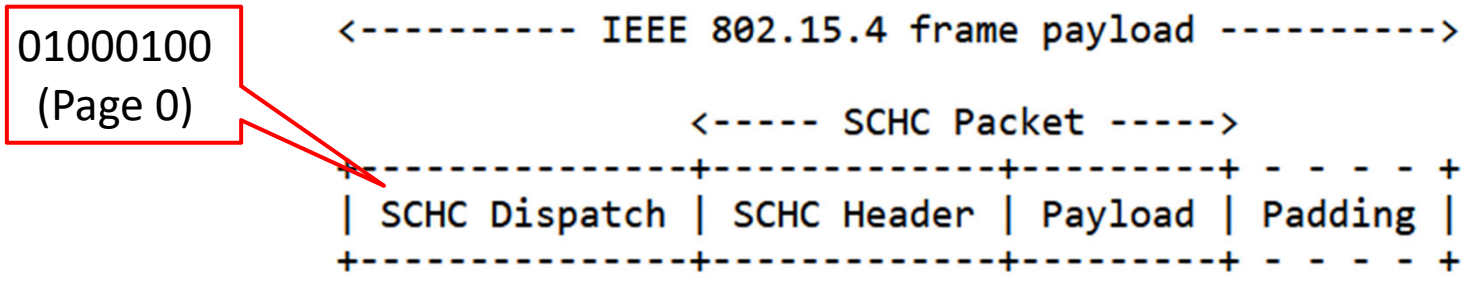
## 3.3.2. Tunneled, RPL-based R.O. (II)

- The present document updates RFC 9008:
  - Downward traffic:
    - When the root generates a packet for a 6LN, and compresses it by using SCHC, the root MUST tunnel the packet by means of IPv6-in-IPv6
  - Upward traffic:
    - When a 6LN transmits a SCHC-compressed IPv6 packet, it MUST be tunneled by means of IPv6-in-IPv6 up to the root, regardless of the final destination
  - TO-DO: address the case of 6LN being a RUL
- RFC 8138 MUST be used to compress:
  - IPv6-in-IPv6 headers
  - RPL Option
  - Source routing header



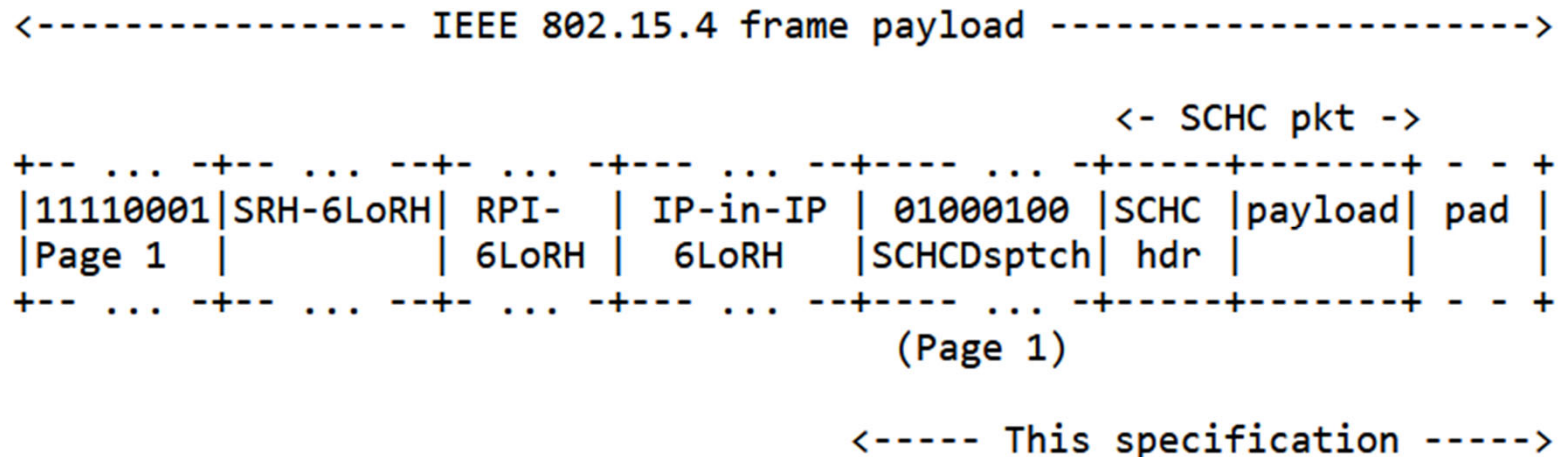
# 4. Frame formats (I)

- 4.1. Single-hop or Straightforward Route-Over:



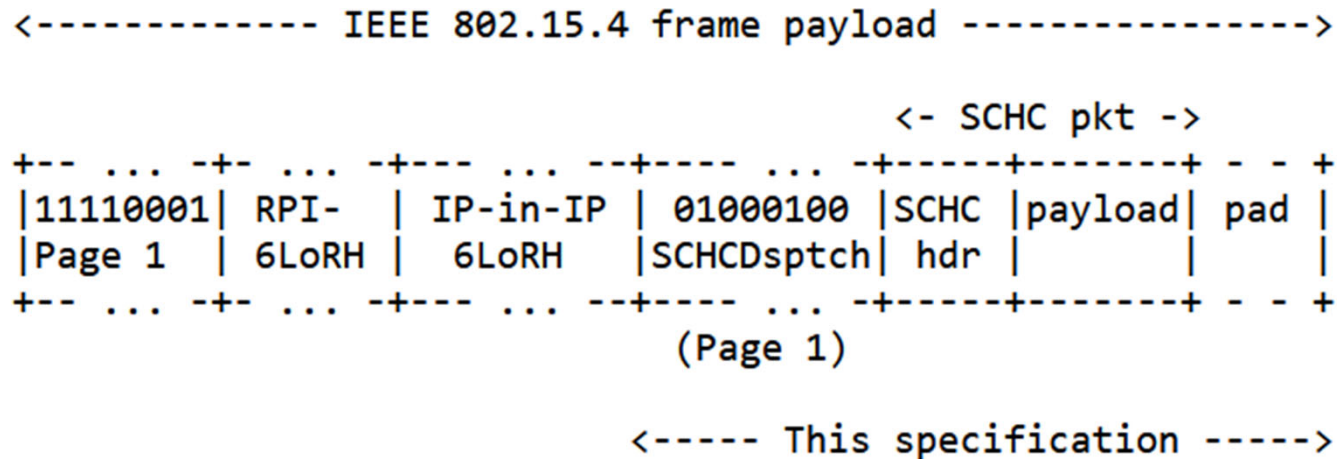
- 4.2. Tunneled, RPL-based Route-Over:

- Downward:



# 4. Frame formats (II)

- 4.2. Tunneled, RPL-based Route-Over:
  - Upward:



- 4.3. Mesh-Under
  - As in RFC 4944, but with SCHC header compression

# Other updates

- 5. SCHC compression
  - Each Rule defines the set of protocols whose headers are compressed
  - Example:
    - RuleIDs 1 to 3: IPv6 only
    - RuleIDs 4 to 7: IPv6/UDP
    - RuleIDs 8 to 15: IPv6/UDP/CoAP
- 7. IANA considerations
  - Allocate Dispatch Type 01000100 also in Page 1
- Keep the ROLL WG in the loop as well?

**WG adoption?**

# Comments/Questions?

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carles.gomez@upc.edu

**Ana Minaburo**

Acklio

ana@ackl.io

# Annex

- 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
  - Compressed IPv6/UDP header size of **7 bytes**
    - Best case, with global addresses
- RFC 8724 (aka “SCHC”), a product of the LPWAN WG
  - Adaptation layer functionality:
    - **Header compression**
    - Fragmentation
  - Designed for even more constrained (LPWAN) technologies
- SCHC header compression
  - Compressed IPv6/UDP header size of e.g. **1 byte**
    - Best case, with global addresses
  - Static Context: exploit a priori knowledge of header field values