

Transmission of SCHC-compressed packets over IEEE 802.15.4 networks

`draft-gomez-61o-schc-15dot4-05`

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Introduction (I)

Assumptions:

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

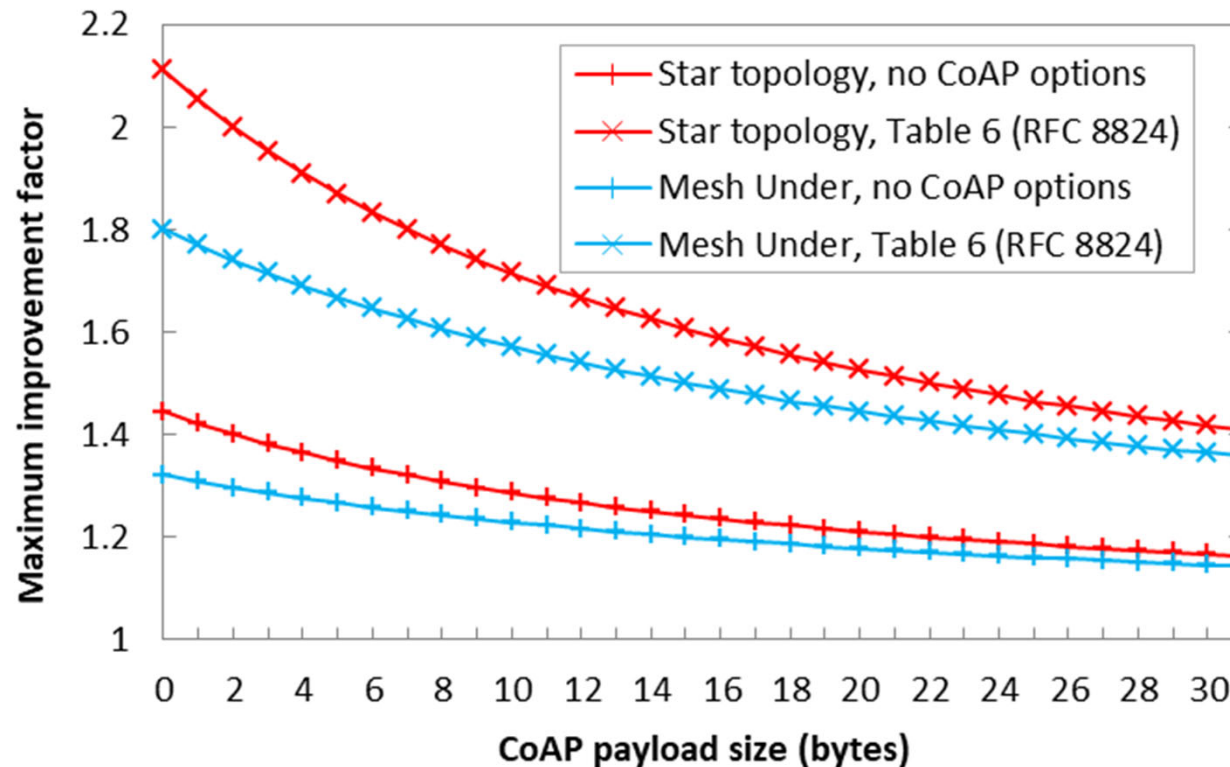
- IPv6/UDP/CoAP header size

	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
- Revisions -04 and -05
 - Aim 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)

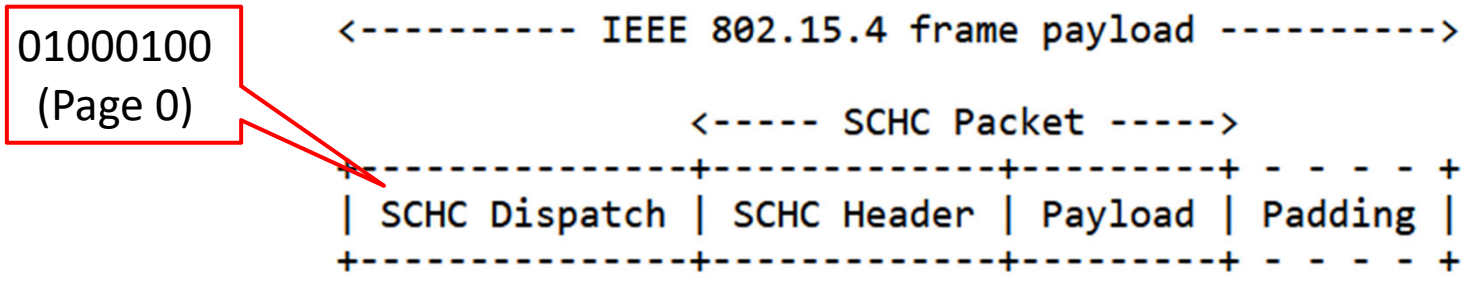
- RPL non-storing mode
- Overview:
 - Packets sent by a 6LN are tunneled Upward to the root
 - If the final destination is another 6LN, packets are tunneled Downward from the root
- RFC 9008:
 - Downward traffic:
 - IPv6-in-IPv6 tunnel (except when the root is the packet source)
 - Tunnel terminates 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:
 - 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

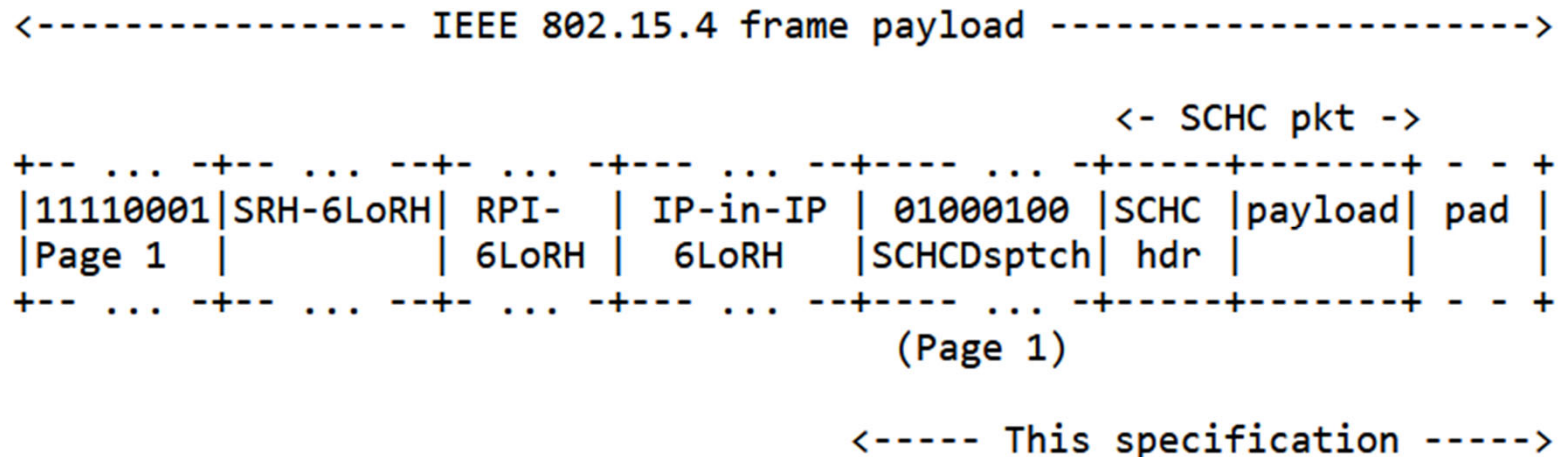
4. Frame formats (I)

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



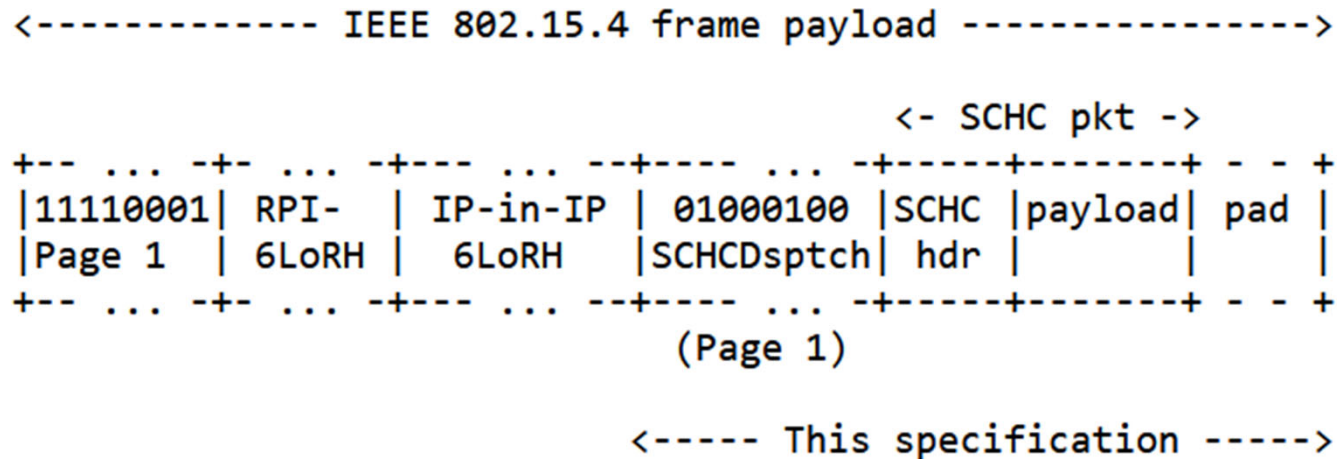
- 4.2. Tunneled, RPL-based Route-Over:

- 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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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