Transmission of SCHC-compressed packets over IEEE 802.15.4 networks

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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
  • 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
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 also 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-shc-15dot4-00

• Strictly speaking, not really a -00:
  • Extended version of draft-gomez-6lo-shc-dispatch-01
  • Greater scope
    – Transmission of SCHC-compressed packets over IEEE 802.15.4 networks
  • Aims to incorporate feedback from previous meetings
Protocol stack

Current 6Lo(WPAN)

Proposed alternative 6Lo(WPAN)
Frame format (I/II)

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

```
<-------- IEEE 802.15.4 frame payload -------->
+------------------------------------------+--+-+--+
| SCHC Dispatch | SCHC Header | Payload | Padding |
+------------------------------------------+--+-+--+
```

- SCHC Dispatch:
  - Signal that a SCHC Packet comes next
  - 6LoWPAN Dispatch Type for SCHC header compression
  - SCHC Dispatch pattern is the Paging Dispatch (1111WXYZ)
  - Whole page (RFC 8025)
  - 1-byte bit pattern: 11110010 (Page 2)
Frame format (II/II)

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

    +---------------------------------+-------+
    |     SCHC Dispatch               | Payload|
    +---------------------------------+-------+

– SCHC Packet:
  • A packet with a header compressed by using SCHC

– Padding:
  • To align to an octet boundary
SCHC compression for IPv6, UDP, and CoAP headers

• SCHC header compression may be applied to different protocols or sets of protocols. E.g.:
  • IPv6, IPv6/UDP, IPv6/UDP/CoAP
  • TO-DO: Rule ID (base compressed header) details

• IPv6 and UDP header fields MUST be compressed as per section 10 of RFC 8724
  – TO-DO: adapt DevIID and AppIID for IEEE 802.15.4

• CoAP header fields MUST be compressed as per sections 4 to 6 of RFC 8824
Thanks!

Thoughts? Questions? Comments?

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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

NOTE: actual improvement will be lower