Transmission of SCHC-compressed packets over IEEE 802.15.4 networks

`draft-ietf-6lo-schc-15dot4-10`

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Main goal

```
+-------------+          +-------------+
| CoAP, other|          | CoAP, other|
+-------------+          +-------------+
| UDP, other |          | UDP, other |
+-------------+          +-------------+
|    IPv6    |          |    IPv6    |
+-------------+          +-------------+
| 6LoWPAN HC |          |  SCHC HC   |  <-- NEW
+-------------+          +-------------+
|6LoWPAN Frag|          |6LoWPAN Frag|
+-------------+          +-------------+
|  802.15.4  |          |  802.15.4  |
+-------------+          +-------------+
```

Traditional SCHC-based

SCHC (RFC 8724) exploits a priori knowledge of header field values

Status

- WG adoption
  - draft-ietf-6lo-schc-15dot4-00
  - In January 2023

- Version -10
  - Transition Protocol Stack (TPS)
  - Appendix B
  - Many editorial improvements

Table of Contents

- Stable structure

Transition Protocol Stack (TPS)

```
                                                 +-------------+
                                                 |    CoAP     |
+-------------+   +-------------+                +-------------+
| CoAP, other |   | CoAP, other |                |     UDP     |
+-------------+   +-------------+                +-------------+
| UDP, other  |   | UDP, other  |                |   SCHC HC   |  <-- NEW
+-------------+   +-------------+                +-------------+
|    IPv6     |   |    IPv6     |                |    IPv6     |
+-------------+   +-------------+                +-------------+
| 6LoWPAN HC  |   |   SCHC HC   |  <-- NEW       | 6LoWPAN HC  |
+-------------+   +-------------+                +-------------+
|6LoWPAN Frag |   |6LoWPAN Frag |                |6LoWPAN Frag |
+-------------+   +-------------+                +-------------+
|  802.15.4   |   |  802.15.4   |                |  802.15.4   |
+-------------+   +-------------+                +-------------+
```

Traditional SCHC-based Transition Protocol Stack

5. Enabling the TPS

- SCHC Stratum Header identifies the SCHC end point and SoR for C/D
- Formats:

```
<---------------- IEEE 802.15.4 frame payload ------------------>
+------------------------+-------------------+--------------+ - - +
| RFC6282-compressed     | SCHC-compressed   |              |     |
|     IPv6 header        | UDP/CoAP headers  | CoAP Payload | Pad |
|(NH=0,Next Header=SCHC)| (includes SCHC    |              |     |
|                        | Stratum Header)   |              |     |
+------------------------+-------------------+--------------+ - - +
```

```
<------------------------- IEEE 802.15.4 frame payload ------------------------>
+--------+------------+------------------+-----------------+--------------+ - - +
|11110001|8138-cmprssd|  6282-compressed | SCHC-comprssd   |              |     |
|(Page 1)|  routing   |    IPv6 header   | UDP/CoAP hdrs   | CoAP Payload | Pad |
|        | artifacts  |(NH=0,NxtHdr=SCHC)| (incl. SCHC     |              |     |
|        |            |                  | Stratum Header)|              |     |
+--------+------------+------------------+-----------------+--------------+ - - +
```

5.1. SCHC compression for the TPS

- Detailed view:

```
<---------------- IEEE 802.15.4 frame payload ------------------>
+------------------------+-------------------+--------------+ - - +
| RFC6282-compressed     | SCHC-compressed   |              |     |
|     IPv6 header        | UDP/CoAP headers  | CoAP Payload | Pad |
|(NH=0,Next Header=SCHC)|(includes SCHC     |              |     |
|                        | Stratum Header(s)|              |     |
+------------------------+-------------------+--------------+ - - +
                        /                   \
               |-------/                     \------------|
               +-------------------+---------------------+
               |   SCHC Stratum    |    SCHC Payload     |
               |       Header      | (RuleID + cmp. rsd. |
               | for UDP and CoAP  | of UDP/CoAP header) |
               +-------------------+---------------------+
```

1 SCHC Stratum for joint UDP/CoAP header C/D

- TPS-only device:
  - Fully compressed (0 bits) SCHC Stratum Header
- TPS+ device:
  - Fully compr. SCHC Stratum Header when talking to TPS-only device
  - Not fully compressed SCHC Stratum Header otherwise

IPv6 address as Discriminator

5.1. SCHC compression for the TPS

- Non-compressed SCHC Stratum Header for UDP/CoAP C/D:

```
+-----------+-----------+
|Protocol ID|Port number|
+-----------+-----------+
Protocol ID = 17 (UDP)
Port number = 5683 (CoAP)
```

- Compressed SCHC Stratum Header for UDP/CoAP C/D:

```
+---------+- - - - - - - - - - -+
| Rule ID | Compression Residue |
+---------+- - - - - - - - - - -+
```

- C/D Rule for TPS-only devices:
  - RuleID not sent

```
RuleID
+--------------+--+---+--+----+------+----------+
|      FID     |FL|POS|DI| TV |  MO  |   CDA    |
+--------------+--+---+--+----+------+----------+
| SCHC.proto   | 8| 1 |Bi| 17 |equal | not-sent |
+--------------+--+---+--+----+------+----------+
| SCHC.portnum |16| 1 |Bi|5683|equal | not-sent |
+--------------+--+---+--+----+------+----------+
```

Appendix B. Analysis of RO multihop

- Minor updates to align with the latest descriptions of SRO, TRO, PRO

- Completed “B.4. Summary”
  - SRO: best suited for small and static-SCHC-context networks
    - Otherwise, trade-off between header compression performance and/or SCHC context management cost
  - PRO and TRO offer greater network scalability
  - TRO best applicability is for networks where upwards traffic is dominant

Next steps

- Complete the examples in Appendix A
- Stabilize section 5 ?
- Continue monitoring and aligning with the SCHC architecture draft

Comments/Questions?

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