draft-ietf-lpwan-schc-over-lorawan

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Presentation agenda

- Particularities of LoRaWAN
- Changes since IETF104
- Technical discussion

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LoRaWAN specificities

- 3 classes of devices
- Confirmed and unconfirmed messages
- A number of different network servers and device stack implementations
- FOpts and FPort
- Different regional settings
  - Different spreading factors and different MTUs

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LoRaWAN headers

```
| MHDR    | Dev Addr | FCtl   | FCnt    | FOpts         | FPort   | Payload |
+------- + -------- + ------ + ------- + ----------- + ------ + ------- +
| 1 byte | 4 bytes  | 1 byte | 2 bytes | 0..15 bytes | 1 byte | N bytes |
```

Recap since IETF 104

- What has happened since IETF104?
  - draft-petrov-lpwan-ipv6-schc-over-lorawan -03 became the WG draft draft-ietf-lpwan-schc-over-lorawan -00
  - -01 and -02 published
  - Some very useful feedback

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Changes in -01

- Updated references to LPWAN overview document
- Switched to **Ack-on-error** for uplink fragmentation
- Updated Architecture figure
- Some reminders of mapping between LoRaWAN terminology and IETF terminology provided as we go for clarity
- The generic term **devices** is replaced by the more precise **end-devices** wherever that is appropriate

Changes in -01

- **FPortUp** is split into **FPortUpShort** and **FPortUpDefault** => goal to optimize overhead for short fragmented payloads
- **Tile** size 3 was selected
- Updated to the terminology of -18 of SCHC draft
- Added Extra examples
- Authors list reorganized
- Taken into account feedback from the WG
- Typos + more clear wording (bytes instead of octets, etc)

```
LoRaWAN Header|FPort| Data
```

FPortUpShort: AoE fragmentation
- No RuleID in data, 1 header byte

Frag

Ack

```
| DTag  | FCN    | Payload |   | DTag  | C     | Encoded bitmap (if C = 0) | Padding (0s) |
+ ----- + ------ + ------- +   + ----- + ----- + ------------------------- + ------------ +
| 1 bit | 7 bits |         |   | 1 bit | 1 bit | 0 to 127 bits             | 7 or 0 bits  |
```

FPortUpDefault: Frag and compression
- Rule ID in data
- Fragmentation rule format

Frag

```
| RuleID  | DTag  | W      | FCN    | Payload |
+ ------  + ----- + ------ + ------ + ------- +
| 6 bits  | 1 bit | 2 bits | 7 bits |         |
```

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Changes in -02

- Figure 6 fixed
- Updated to reference -19 of SCHC draft
- Fixed some uplink examples
- Extra examples for downlinks

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Upcoming changes

- Removing the restriction on ruleID size
  - Recommend use of specific rule IDs for fragmentation
  - Leave it up to the application to device ruleID sizes
- Fixing some confusing typos and clarifying penultimate tile size

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Technical details

- FPending
- Confirmed vs unconfirmed messages

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Technical discussion

- Why tile size of 3 bytes
  - This size is the best optimization to fit all LoraWAN MTUs with or without FOpts, while keeping max SCHC payload MTU greater than 1280 bytes
  - Bigger tile size improves bitmap size
  - We need to be able to send mac commands in FOpts
  - Some regions have MTU of 11 bytes

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Remaining to do

- Finalize IID computation

Next steps

- Get more reviews
- Ready for WGLC before next IETF?

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Thank you for your attention

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Types of uplink packets

- Last fragment
```
| RuleID | DTag  | W      | FCN=All-1 | MIC     | Payload            |
+ ------ + ----- + ------ + --------- + ------- + ---------------- +
| 6 bits | 1 bit | 2 bits | 7 bits    | 32 bits | Last tile, if any |
```


- MIC check
```
| RuleID | DTag  | W     | C     | Encoded bitmap (if C = 0) |
+ ------ + ----- + ----- + ----- + ------------------------- +
| 6 bits | 1 bit | 2 bit | 1 bit | 0 to 127 bits             |
```

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Types of downlink packets

- Regular fragment
```
| RuleID | W     | FCN = b'0 | Payload |
+ ------ + ----- + --------- + ------- +
| 6 bits | 1 bit | 1 bits    | X bytes |
```

- Last fragment
```
| RuleID | W     | FCN = b'1 | MIC     | Payload            |
+ ------ + ----- + --------- + ------- + ------------------ +
| 6 bits | 1 bit | 1 bit     | 32 bits | Last tile, if any  |
```

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Types of downlink packets

- MIC OK ACK

```
| RuleID | W     | C = b'1 |
+ ------ + ----- + ------- +
| 6 bits | 1 bit | 1 bit   |
```

- Receiver abort

```
| RuleID | W     | C = b'0 | b'11111111 |
+ ------ + ----- + ------- + ---------- +
| 6 bits | 1 bit | 1 bits  | 8 bits     |
```

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