draft-ietf-lpwan-schc-over-lorawan

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Presentation agenda

- Particularities of LoRaWAN
- Changes since IETF104
- Technical discussion
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
## LoRaWAN headers

<table>
<thead>
<tr>
<th></th>
<th>MHDR</th>
<th>Dev Addr</th>
<th>FCtl</th>
<th>FCnt</th>
<th>FOpts</th>
<th>FPort</th>
<th>Payload</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1 byte</td>
<td>4 bytes</td>
<td>1 byte</td>
<td>2 bytes</td>
<td>0..15 bytes</td>
<td>1 byte</td>
<td>N bytes</td>
</tr>
</tbody>
</table>

LoRaWAN headers
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
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

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

### Fragmentation Table

<table>
<thead>
<tr>
<th>RuleID</th>
<th>DTag</th>
<th>W</th>
<th>FCN</th>
<th>Payload</th>
</tr>
</thead>
<tbody>
<tr>
<td>6 bits</td>
<td>1 bit</td>
<td>2 bits</td>
<td>7 bits</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Frag</th>
<th>Ack</th>
</tr>
</thead>
<tbody>
<tr>
<td>DTag</td>
<td>C</td>
</tr>
<tr>
<td>1 bit</td>
<td>1 bit</td>
</tr>
<tr>
<td>DTag</td>
<td>C</td>
</tr>
<tr>
<td>1 bit</td>
<td>1 bit</td>
</tr>
<tr>
<td>Payload</td>
<td>Padding (0s)</td>
</tr>
<tr>
<td>7 or 0 bits</td>
<td></td>
</tr>
</tbody>
</table>
Changes in -02

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

- FPending
- Confirmed vs unconfirmed messages
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
Remaining to do

- Finalize IID computation
Next steps

- Get more reviews
- Ready for WGLC before next IETF?
Thank you for your attention
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               |
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 |
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   |