Transmission of IPv6 Packets over LoRaWAN

draft-vilajosana-lpwan-lora-hc-00
Status

Latest version published on 2016-07-08

Draft summary

• Address auto-configuration
• Neighbor discovery? Using ND? Context distribution?
• Static Header compression for LoRaWAN
• Fragmentation particularities for LoRaWAN

• Idea for this draft:
  – Define a profile with the specific (if any) details for LoRaWAN.
  – Leverage/Reuse from LPWAN general drafts.
Protocol Stack

Figure 2: Protocol Stack for IPv6 over LoRaWAN

- Upper Layer Protocols
  - IPv6
  - IPv6-LoRaWAN Addressing Binding
  - Activities
    - Digital Protocol
    - RF Analog
- Transport and Application Layer
  - Network Layer
  - LoRaWAN Link Layer
  - LoRaWAN Physical Layer
IPv6 Address Auto-configuration

A LoRaWAN end device performs stateless address auto-configuration as per [RFC4862]. A 64-bit Interface identifier (IID) for a LoRaWAN interface MAY be formed by utilizing the 64-bit LoRaWAN DevEUI. That IID MAY guarantee a stable IPv6 address and MUST be used along the lifetime of the network.
Neighbor Discovery

Explore Static Context distribution.
  – Using ND?

- Options
  – Use 6LoWPAN Context Option (6CO) + ND Distribution
  – Use Static contexts (lora-yang) + distribution
    • Distribution: Predefined/ Application/ Out of band.
Header Compression

Considerations:
- Use 6LowPAN IPHC + 6CO from ND
  LoRaWAN MAC Header → EUI64 representing Src or Dst
  • IPv6 Compression as per RFC6282. SAC/DAC?

- Use Static context
draft-toutain-lpwan-yang-static-context-hc.
draft-toutain-lpwan-ipv6-static-context-hc.
Fragmentation

Approach by draft-gomez-lpwan-ipv6-analysis-00
- first packet includes datagram size
- subsequent fragments don’t
- datagram_tag to identify all fragments of a packet.

Considerations:
- Different Spreading Factors mandate different packet sizes if ADR active. Fragment size may be constrained by the SF.
- Possible Solution, fragment size = SF 12 payload size. (59B frame)
- Problem → overhead due to fragmentation header in SF < 12 packets.
Fragmentation

<table>
<thead>
<tr>
<th>DataRate</th>
<th>Configuration</th>
<th>Indicative physical bit rate [bit/s]</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>LoRa: SF12 / 125 kHz</td>
<td>250</td>
</tr>
<tr>
<td>1</td>
<td>LoRa: SF11 / 125 kHz</td>
<td>440</td>
</tr>
<tr>
<td>2</td>
<td>LoRa: SF10 / 125 kHz</td>
<td>980</td>
</tr>
<tr>
<td>3</td>
<td>LoRa: SF9 / 125 kHz</td>
<td>1760</td>
</tr>
<tr>
<td>4</td>
<td>LoRa: SF8 / 125 kHz</td>
<td>3125</td>
</tr>
<tr>
<td>5</td>
<td>LoRa: SF7 / 125 kHz</td>
<td>5470</td>
</tr>
<tr>
<td>6</td>
<td>LoRa: SF7 / 250 kHz</td>
<td>11000</td>
</tr>
<tr>
<td>7</td>
<td>FSK: 50 kbps</td>
<td>50000</td>
</tr>
<tr>
<td>8..15</td>
<td>RFU</td>
<td></td>
</tr>
</tbody>
</table>

Table 14: Data rate and TX power table

<table>
<thead>
<tr>
<th>DataRate</th>
<th>M</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>59</td>
<td>51</td>
</tr>
<tr>
<td>1</td>
<td>59</td>
<td>51</td>
</tr>
<tr>
<td>2</td>
<td>59</td>
<td>51</td>
</tr>
<tr>
<td>3</td>
<td>123</td>
<td>115</td>
</tr>
<tr>
<td>4</td>
<td>230</td>
<td>222</td>
</tr>
</tbody>
</table>
Thanks!

• Q&A