Packet Delivery Deadline Time in 6LoWPAN Routing Header

draft-ietf-6lo-deadline-time-04

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Overview

• Deadline-6LoRHE type for 6LoWPAN dispatch page 1
  – Carries Packet Delivery Deadline Time
  – Optional Packet Origination Time

• Enables delay-aware forwarding and scheduling decisions

• Operates on time-synchronized constrained networks

• Handles different time zones over heterogeneous networks
Draft History

- **IETF 97** - Presented the first version of draft: `<draft-lijo-6lo-expiration-time>`

- **IETF 98** - 1st and 2nd revision
  - Included Origination Time (OT)
  - Provided Header compression mechanism

- **IETF 99** - 3rd and 4th revision
  - Network ASN included as new Time Unit (TU) representation
  - Provided Header compression mechanism

- **Implemented** the draft in OpenWSN platform for a 6tisch network and the code has been merged with OpenWSN

- **IETF 100** - Adopted as a WG Document: `<draft-ietf-6lo-deadline-time>`

- **IETF 101** – 1st revision
  - Few editorial corrections and added references for time synchronization protocols

- **IETF 103** – 3rd revision
  - Editorial corrections and updates based on the review comments
Draft Reviewers

- Dale Worley (Gen-ART)
- Charlie Kaufman (Security Directorate)
- Dan Frost (Routing Directorate)
- Tal Mizrahi
- Abdussalam Baryun

Thanks to all reviewers!!
Draft Updates

- Replaced OT (Origination Time) field by OTD (Origination Time Delta), allowing a more compressed representation that needs less processing during transitions between networks.

- Changed representation for DTL, OTL, DT, OTD. Eliminated EXP in favor of BinaryPt.

- Revised the figures and examples to use new parameters

- Added new section on Synchronization Aspects to supply pertinent information about how nodes agree on the meaning of t=0.

- Responded to numerous reviewer comments to improve editorial consistency and improve terminology.
# Deadline-6LoRHE Format

## Previous format

| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 0 | 1 |
| 1 | 0 | 1 | Length | 6LoRH Type = TBD | O | D | DTL | OTL | TU | EXP | RSV |
| DT (Variable length) | OT (Optional) (variable length) |

## Current format

| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 0 | 1 |
| 1 | 0 | 1 | Length | 6LoRH Type = TBD | D | TU | DTL | OTL | BinaryPt |
| DT (Variable length) | OTD (variable length) (Optional) |
# Deadline New Format

<table>
<thead>
<tr>
<th>1</th>
<th>0</th>
<th>1</th>
<th>Length</th>
<th>6LoRH Type = TBD</th>
<th>D</th>
<th>TU</th>
<th>DTL</th>
<th>OTL</th>
<th>BinaryPt</th>
</tr>
</thead>
<tbody>
<tr>
<td>DT (Variable length)</td>
<td>OTD (variable length) (Optional)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**D flag (1 bit)**
- Drop flag
  - 1: MUST drop the packet if the deadline time is elapsed
  - 0: MAY ignore and forward

**TU (2 bits)**
- Indicates the time units for DT and OT
  - 00: Time represented in seconds and fractional seconds
  - 01: Reserved
  - 10: Network ASN
  - 11: Reserved

**DTL (4 bits [bbbb])**
- \( [bbbb] = \) Length of DT field
  - 0000: Length of DTL is “1 hex digits (4 bits)”
  - 1111: Length of DTL is “16 hex digits (64 bits)”

**OTL (3 bits [bbb])**
- \( [bbb] = \) Length of OTD field
  - 000: OTD field is absent
  - 111: Length of OTL is “7 hex digits (28 bits)”

**Binary Pt (6 bits)**
- A signed integer indicating the position of binary point within the value for the DT
  - 0: Number of bits of the integer part and number of bits of fractional part of DT are same
  - +ve: Number of bits of the integer part for the DT is increased by value of BinaryPt
  - -ve: Number of bits of the integer part for the DT is decreased by value of BinaryPt

**DT (Variable length)**
- Deadline Time value (4..64-bit)

**OTD (Variable length)**
- Origination Time as a negative offset from the DT value (Optional) (4..28-bit)
Comments and Questions

Thanks !!!