Packet Expiration Time in 6LoWPAN Routing Header
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Overview

• Deadline-6LoRHE type for 6LoWPAN dispatch page 1
  – Carries Packet Expiration 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
WG Comments on …-00 version

• The 6Lo RH Header was declared as an elective header and the size field was altered - Pascal
• Origination Time as well as Expiration - Thomas
  – Added (optional) Origination Time field
• Feedback from Dale
  – Renamed Timestamp-6LoRH to Deadline Header
  – Scheme for compressed time representation
  – Several editorial corrections
• Thanks Pascal, Thomas and Dale!
Deadline-6LoRH Elective Header for Packet Expiration Time

0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5
1 0 1 Length Type

Length of 6LoRHE expressed in bytes
6LoRHE Header type

Deadline-6LoRPAN Routing Header

0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5
1 0 1 Length 6LoRH Type = TBD O D ER ETL OR OTL Rsv EXP

ET (Variable length) OT (Optional) (variable length)

Deadline-6LoRH Format
Deadline-6LoRH Message Format

• Length (5 bits) : Length of the Expiration Time in octets

• 6LoRH Type (8 bits) : TBD

• ‘O’ flag (1 bit) : Origination Time field
  1 : Origination Time is present
  0 : Origination Time is absent

• ‘D’ flag (1 bit) : On Time Expiration
  1 : Drop
  0 : Ignore and forward

• ‘ER’ (2 bits) : Units of Expiration Time
  00 : Time in microseconds
  01 : Time in milliseconds
  10 : Time in seconds
  11 : User Defined
Deadline-6LoRH Message Format (Cont’d)

• ‘ETL’ (3 bits [bbb]) :  [bbb]+1 = Length of Expiration Time
  e.g., 000 : Length of ETL is “1 octet”,
  111 : Length of ETL is “8 octets”

• ‘OR’ (2 bits) :  Units of Origination Time

• ‘OTL’ (3 bits [bbb]) :  [bbb]+1 = Length of Origination Time field
  e.g., 000 : Length of OTL is “1 octet”,
  111 : Length of OTL is “8 octets”

• ‘Rsv’ (2 bits) :  Reserved

• ‘EXP’ (3 bits) :  Multiplication factor (exponent of base 2)

• ‘ET’ (Variable length) :  Expiration Time value

• ‘OT’ (Variable length) :  Origination Time value
Origination Time Procedure

• Delay incurred by packets is useful for network diagnostics and performance monitoring

• Origination Time Computation

\[ OT_{\text{new}_{\text{net}}} : \text{Origination Time in new network} \]
\[ CT_{\text{new}_{\text{net}}} : \text{Current Time in new network} \]
\[ D_{\text{prev}_{\text{net}}} : \text{Delay already incurred in previous network(s)} \]

\[ OT_{\text{new}_{\text{net}}} = CT_{\text{new}_{\text{net}}} - D_{\text{prev}_{\text{net}}} \]
Next Steps?

- Should ASN be a choice for scale of ET and OT units?

Comments and Questions

Thanks !!!