

# Optimized 6LoWPAN Fragmentation Header

draft-gomez-6lo-optimized-fragmentation-header-00

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# Overview

- 6LoWPAN fragmentation (RFC 4944)
  - IPv6 MTU requirement: 1280 bytes
  - IEEE 802.15.4
    - Maximum frame size of 127 bytes
  - Fragmentation header
    - 4-byte header (first fragment)
    - 5-byte header (subsequent fragments)
- Optimized 6LoWPAN Fragmentation Header (6LoFH)
  - 3-byte header
    - Lower overhead
    - Additionally: supports S0 technologies (L2 MTU  $\geq$  4 bytes)
    - Intended originally for LPWAN
      - SIGFOX L2 MTU: 12 bytes (Uplink), 8 bytes (Downlink)
      - LoRaWAN L2 MTU: 11 bytes (DR0, US)
  - s/Optimized/3-byte

# Proposed new format

- Optimized 6LoWPAN Fragmentation Header (6LoFH)
- First fragment

```

                                1                                2
    0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3
    +--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+
    |1 1 0 0 1|    datagram_size    |  datagram_tag  |
    +--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+
```

- Subsequent fragments

```

                                1                                2
    0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3
    +--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+
    |1 1 0 1 0|  datagram_offset    |  datagram_tag  |
    +--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+
```

# Changes from RFC 4944 and rationale

- datagram\_size field only included in the first fragment
  - The format still supports reordering
- datagram\_tag field size reduced to 1 byte
  - Ambiguities due to wrapping not expected
    - Low message rate
- datagram\_offset increased from 8 bits to 11 bits
  - Allows to express the offset in 1-byte increments

# Benefits of 6LoFH

- Simple, byte-exact, short format
  - Supports maximum L2 payloads  $\geq 4$  bytes
- Overhead (adapt. layer fragm. header bytes)

IPv6 datagram size (bytes)									
	40		100		640		1280		
L2 payload (bytes)	4944	6LoFH	4944	6LoFH	4944	6LoFH	4944	6LoFH	
10	----	18	----	45	----	276	----	549	
20	19	9	59	18	394	114	794	228	
40	0	0	19	9	99	54	199	105	
60	0	0	9	6	69	36	134	69	
80	0	0	9	6	44	27	89	51	
100	0	0	0	0	39	21	74	42	

# IANA considerations

- 6LoFH allocates 16 Dispatch values:
  - 11001 000 through 11001 111
  - 11010 000 through 11010 111

# Relation with other fragmentation work

- draft-thubert-6lo-forwarding-fragments
  - Defines recoverable fragments
  - Solves a different problem
  - Provides selective ACKs (and retries)
  - Requires adding new functionality to the fragmentation header

# Interest from the WG?

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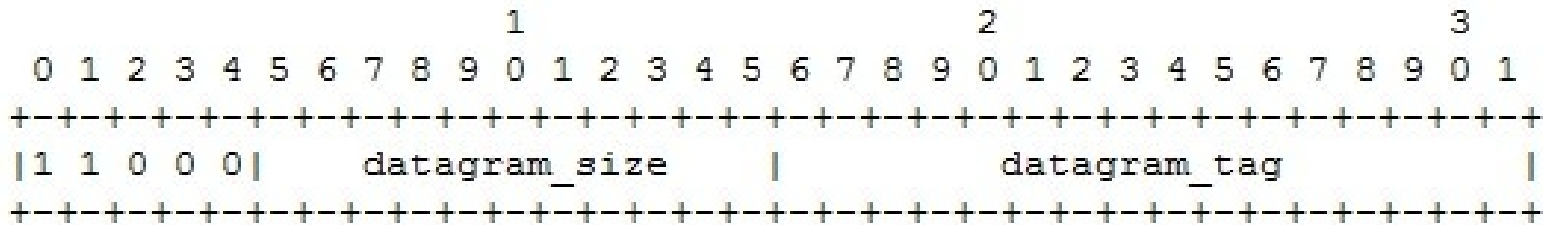
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# Back-up slide: RFC 4944 fragmentation header format

- First fragment



- Subsequent fragments

