MPLS Sub-Stack Encapsulation for Deterministic Latency Action (DLA)

draft-sx-detnet-mpls-queue

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Updates

- Gap analysis
- Added terminology
- Updated resolution
- Updated MPLS Sub-Stack for DLA
- Updated Flag field and IANA registry

Gap Analysis

- Basis
  - end_to_end_delay_bound = non_queuing_delay_bound + queuing_delay_bound
  - end_to_end_latency_bound_of_flow_f = C12 + C23 + C34 + S4
  - DetNet PREOF addresses traffic congestion, jitter reduction and service protection problem.
- What is the gap
  - TSN carries queue information in packets to support time-sensitive services
  - DetNet can't support time-sensitive services without queue processing functions in large scale.
- How to resolve the Gap
  - Right queue selection
  - Mapping of network resources with specific queues
  - Necessary latency information encapsulated in packets
  - Latency information processed hop by hop
- Where we are
  - Two data plane drafts were submitted
  - draft-sx-detnet-mpls-queue-02 and draft-xiong-detnet-6man-queuing-option-02
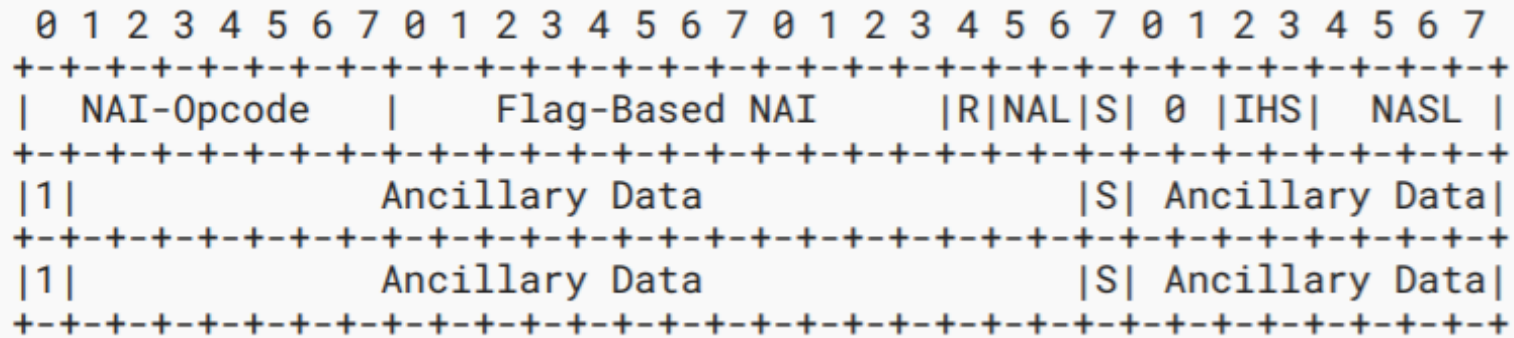
Terminology

- DL (Deterministic Latency) [Term ref: draft-liu-detnet-large-scale-requirements]
  - The bound of network latency and delay variation between two network endpoints. It may includes parameters such as bounded latency, bounded delay variation, etc.

- DLA (Deterministic Latency Action)
 - Used to indicate deterministic latency actions for MPLS Sub-Stack.

Resolution

- Selection for right queue options
  - Right queue mechanisms should be selected first to satisfy differentiated SLAs of deterministic networking service.
  - Options may include TAS (Time-Aware Shaper), CBS (Credit-Based Shaper), CQF (Cyclic Queuing and Forwarding), etc.
- Mapping of network resources with queues
  - Per flow-id, src-des-addr, mpls label, etc.
- Necessary information encapsulated in packets
  - DLA indicator
  - Specific queue option
  - Latency detailed information
  - Etc.
- DLA information processed hop by hop

MPLS Sub-Stack for DLA

```
0 1 2 3 4 5 6 7 0 1 2 3 4 5 6 7 0 1 2 3 4 5 6 7 0 1 2 3 4 5 6 7
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|   NAI-Opcode   |     Flag-Based NAI    |R|NAL|S| 0 |IHS|  NASL |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|1|            Ancillary Data            |S| Ancillary Data|
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|1|            Ancillary Data            |S| Ancillary Data|
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
```

```
0                   1                   2                   3
0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|     Type      |     Length      |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|       Special Queuing Ancillary Data                          |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
```

```
0 1 2 3 4 5 6 7 0 1 2 3 4
+-+-+-+-+-+-+-+-+-+-+-+-+-+
|T|P|C|                   |
+-+-+-+-+-+-+-+-+-+-+-+-+-+
```

MPLS DLA Sub-Stack

- NAI-Opcode field, DLA indicator
- Flag-Based NAI field, flags for DLA queuing mechanisms
- NAL field value MUST set to 2, used for indication of the numbers of LSE (Label Stack Entry)
- R bit, reserved for future use
- S bit, indicator for bottom of MPLS stack
- IHS field, selection for E2E or HBH
- NASL field, indicates the total length of MPLS DLA sub-stack
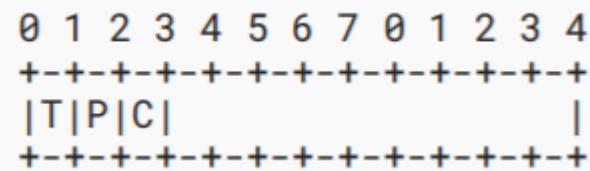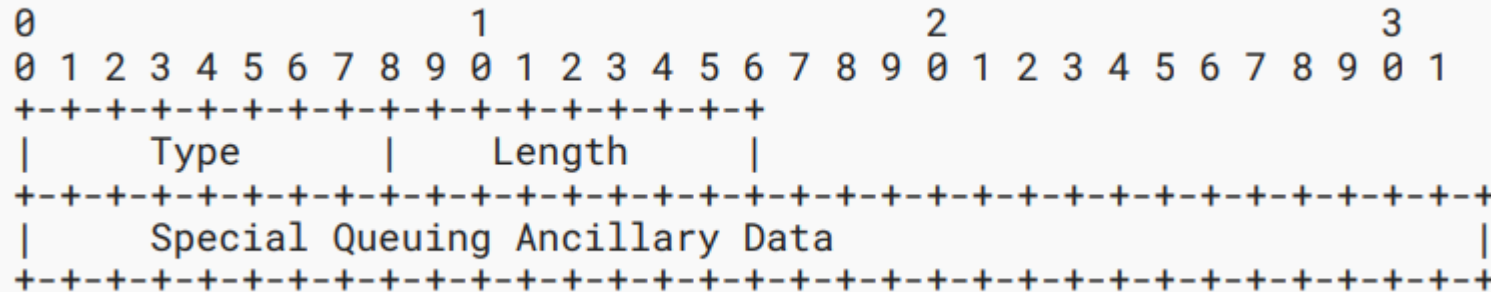
Reference [I-D.ietf-mpls-mna-fwk] and [I-D.jags-mpls-mna-hdr].

Flags Field and IANA Registry

Thank you comments from IANA review and comments, thank you Amanda! The new updates indicated in the document-v03.

Value	Description	Reference
Unassigned	NAI-Opcode	this document

Bit Position	Symbol	Description	Reference
0	T	TAS Flag	this document
1	P	CBS Flag	this document
2	C	CQF Flag	this document
3-11	Unassigned	Unassigned	this document

- IANA registry name is "NAI-Opcode"
- Assigned for DLA Indicator
- Value is "unassigned"
- Value ranges [0,255]

- IANA registry name is "Flag-based-NAIs"
- Assigned for Queue flag for DLA
- Bit Position 0-2 is used in this document
- Bit Position 3-11 is for future use

Next Steps

- Update terminology and resolution section

- Continue update packet format encapsulation to align with the progress of MPLS WG

- Welcome comments and questions

Thank You