LSP Data Plane for Cyclic Queuing and Forwarding (Bounded Latency)

draft-chen-mpls-cqf-lsp-dp-00

Zhe Chen (Huawei)

Li Qiang (Huawei)

Prague

2019.3

Large-scale Deterministic Network (LDN) Background

- Large-scale Deterministic Network (LDN) [draft-qiang-detnet-large-scale-detnet-04] aims to achieve bounded latency forwarding on layer-3 networks that contain long-distance links, large number of nodes and flows

- LDN requires that all packets sent from the upstream router in a specific cycle MUST be sent by the downstream router within another (one) specific cycle

- Therefore, LDN requires a data plane mechanism to indicate which upstream node's cycle a packet belongs to, so that the downstream node could use this indication to put the packet into the right receiving queue

- **Considering a specific packet, once the cycle for sending the packet in the ingress node is determined, the one in the egress node is determined, thus achieving end-to-end bounded latency**
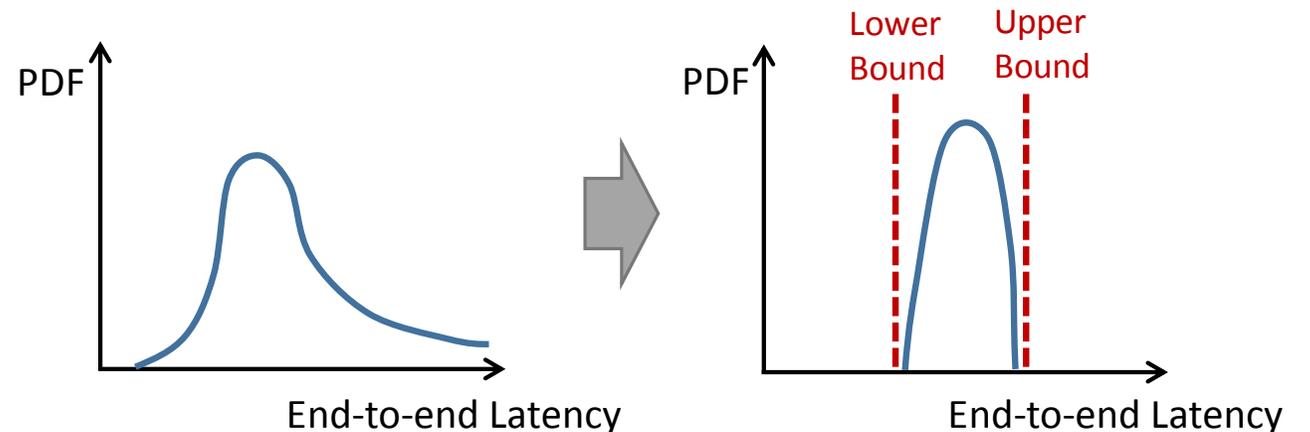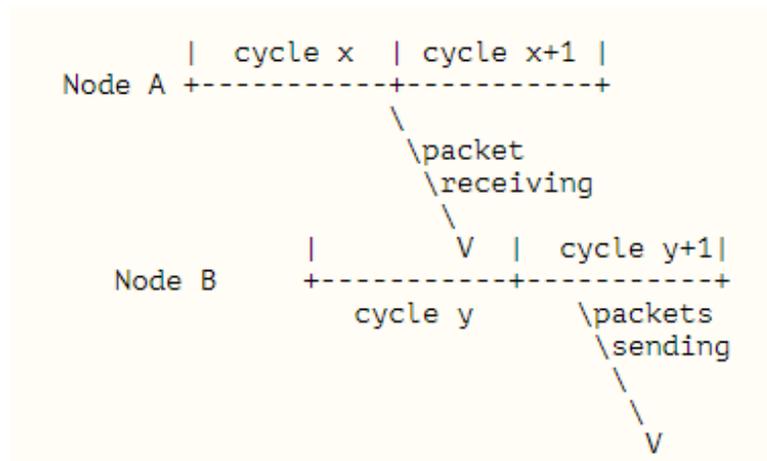
LSP Data Plane for CQF

- The downstream node allocates three different MPLS labels (i.e., 1000, 1002, and 1003) for LSP1, and advertises this information to the upstream node by using signaling protocols such as RSVP-TE

- Each of these labels is associated with a specific queue in the upstream node
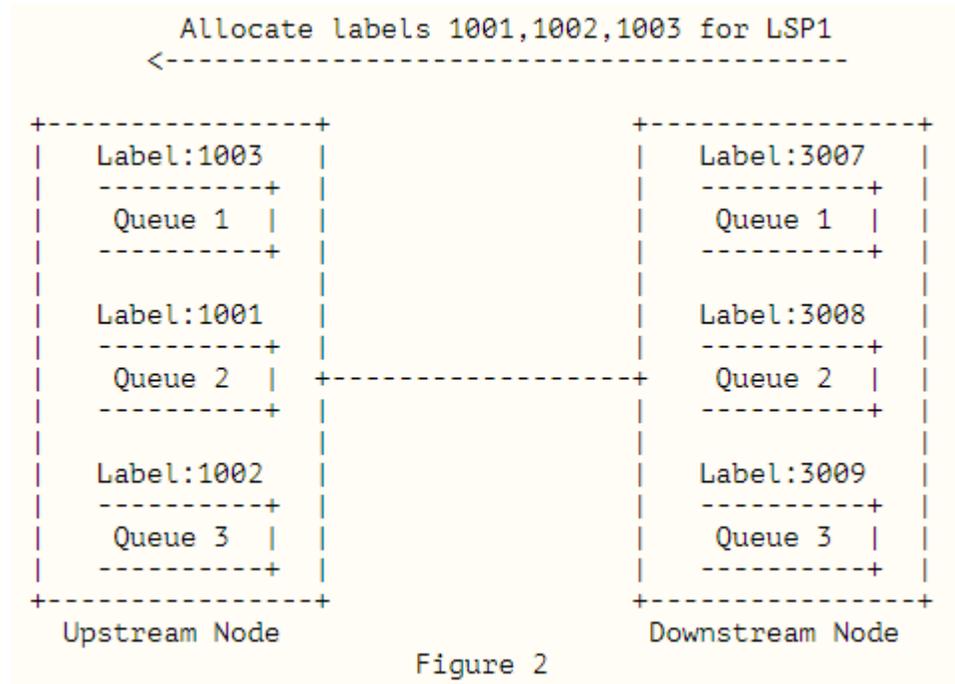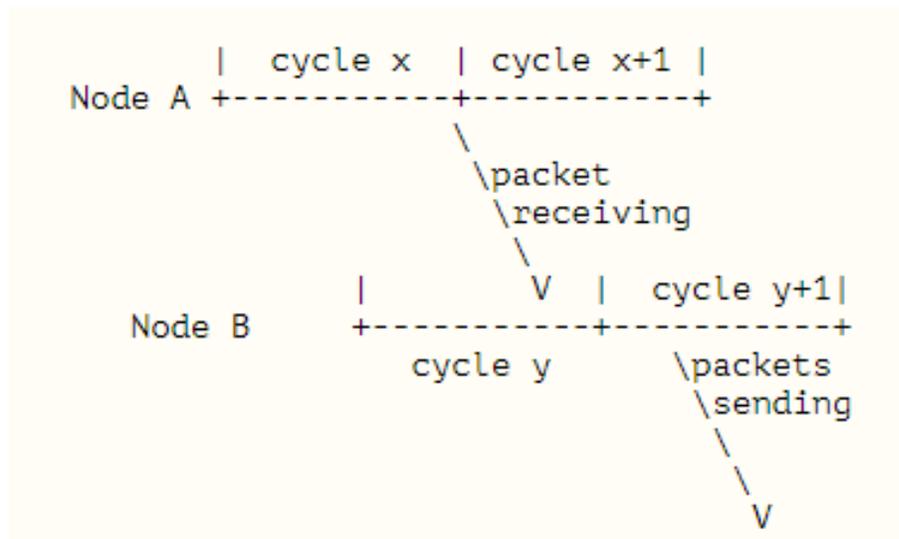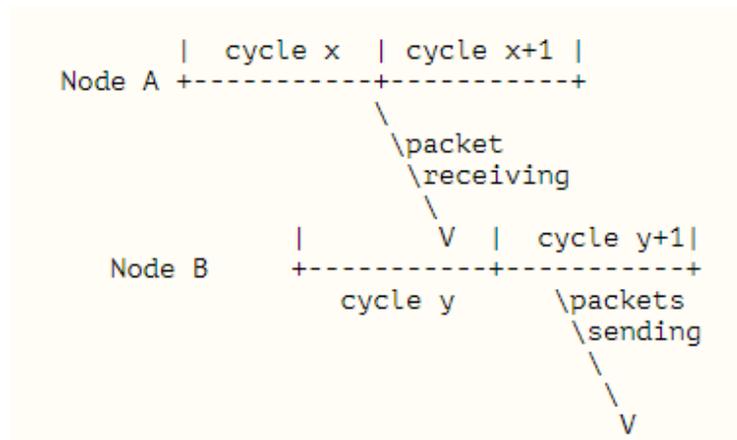

Figure 2

FIB Installation

- Assume that packets sent from the upstream node's queue 1, queue 2, and queue 3 SHOULD be put into the downstream node's queue 3, queue1, and queue 2, respectively

- Note that how to establish such mapping relationships will be described in the future version of this document

- Therefore, the packets sent from the upstream node's queue 1 will be put into the downstream node's queue 3, so on and so forth …

- In this way, end-to-end latency could be bounded, as per [draft-qiang-detnet-large-scale-detnet-04]

```
        | cycle x  | cycle x+1 |
Node A +----------+----------+
                    \
                     \packet
                      \receiving
                       \
        |            V  | cycle y+1|
Node B        +----------+----------+
            cycle y      \packets
                          \sending
                           \
                            \
                             V
```

```
                  Downstream Node's FIB
+------------+------------+------------+---------------+
| In-label   | OutIF      | OutQ       | Out-label     |
+------------+------------+------------+---------------+
|    1003    |    3       |    3       |     3009      |
+------------+------------+------------+---------------+
|    1001    |    3       |    1       |     3007      |
+------------+------------+------------+---------------+
|    1002    |    3       |    2       |     3008      |
+------------+------------+------------+---------------+
```

Next Steps

- Describe how to establish the mapping relationships
- Suggestions and comments on this work are highly needed …

Thank You!