Timeslot Queueing and Forwarding (TQF)

draft-peng-detnet-packet-timeslot-mechanism-08

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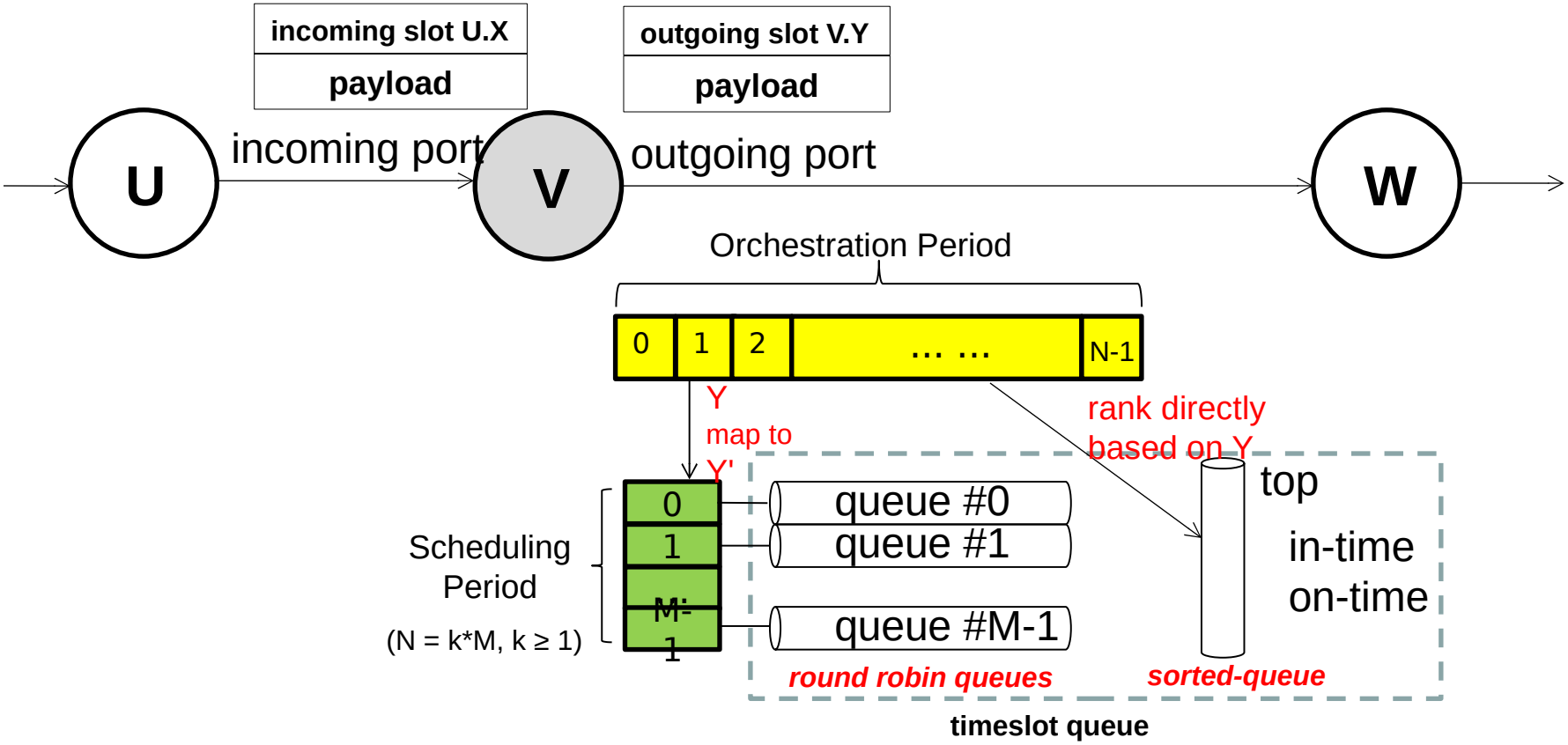
Report the Split and Give a Quick Status Update

- According to the received comments, the original draft-tqf-06 is divided into two documents:
  - draft-peng-detnet-packet-timeslot-mechanism-08, for the data plane solution. (https://www.ietf.org/archive/id/draft-peng-detnet-packet-timeslot-mechanism-08.txt)
  - draft-peng-detnet-tqf-controller-plane-00, for the controller plane solution. (https://www.ietf.org/archive/id/draft-peng-detnet-tqf-controller-plane-00.txt)
- This slides focuses on the data plane. Main updates (from version 06 to 08):
  - Some editorial text reflecting the characteristics of TQF.
  - Supplement the BTM or BOM detection method reference:
    - draft-xp-ippm-detnet-stamp-00.
  - Supplement encapsulation of timeslot stack method reference:
    - Short index based: draft-pb-6man-deterministic-crh-00

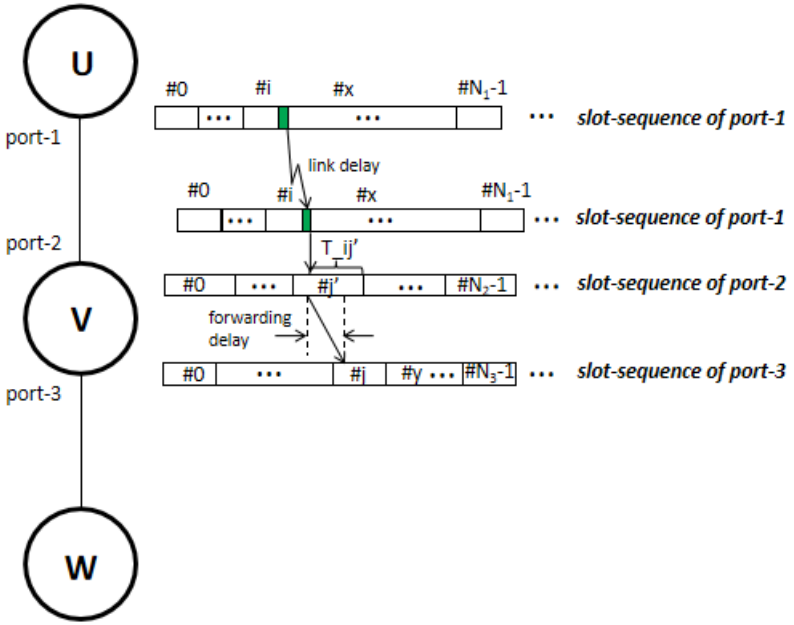
Overview of TQF Mechanism (**no significant updates**)



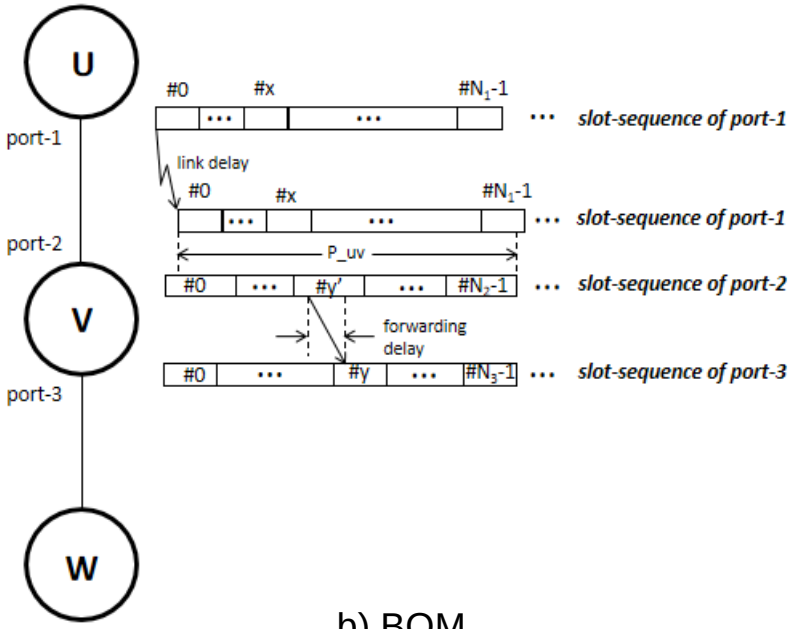
- **Orchestration Period Length (OPL)** identifies the related TQF instance enabled on the link.
  - **Orchestration Period** is similar to the gating cycle of TSN TAS.
  - All nodes/links within the DetNet path interwork with the same OPL.
  - For the same **OPL**, different links may configure different **timeslot length (TL)**.
  - TQF instance may instantiate **Scheduling Period** that construct M (<= N) slots.
  - TQF instance may further configure in-time mode (for low delay) or on-time mode (for low jitter).
- TQF is a layer-3 solution and can operate over different types of QoS sensitive layer-2 including TSN (i.e., release conforming traffic per slot to L2 network) but is not an alternative to TSN.

BTM or BOM Detection

- For an unidirectional link, the **BTM** (base timeslot mapping) or **BOM** (base ochestration-period mapping) detection, a STAMP extension is defined in https://www.ietf.org/archive/id/draft-xp-ippm-detnet-stamp-00.txt.



a) BTM



b) BOM

- Based on the **BTM or BOM**, a DetNet flow may be asigned outgoing timeslot on ecah link and obtain **FTM** (forwarding timeslot mapping) that has bounded latency.

Encapsulation of Timeslot-id Stack

- Design considerations:

  1) On each link, timeslot-id is used to identify the timeslot resource. It is better to **decouple timeslot-id and any type of topology instructions** (such as IP address, MAC address, MPLS Label, SRv6 SID, etc.) to save topology instructions and the related signaling advertisement.

  2) The encapsulation **should be compressed** to support explicit routes of DetNet path.

- A short index based compressed encapsulation is defined in https://www.ietf.org/archive/id/draft-pb-6man-deterministic-crh-00.txt

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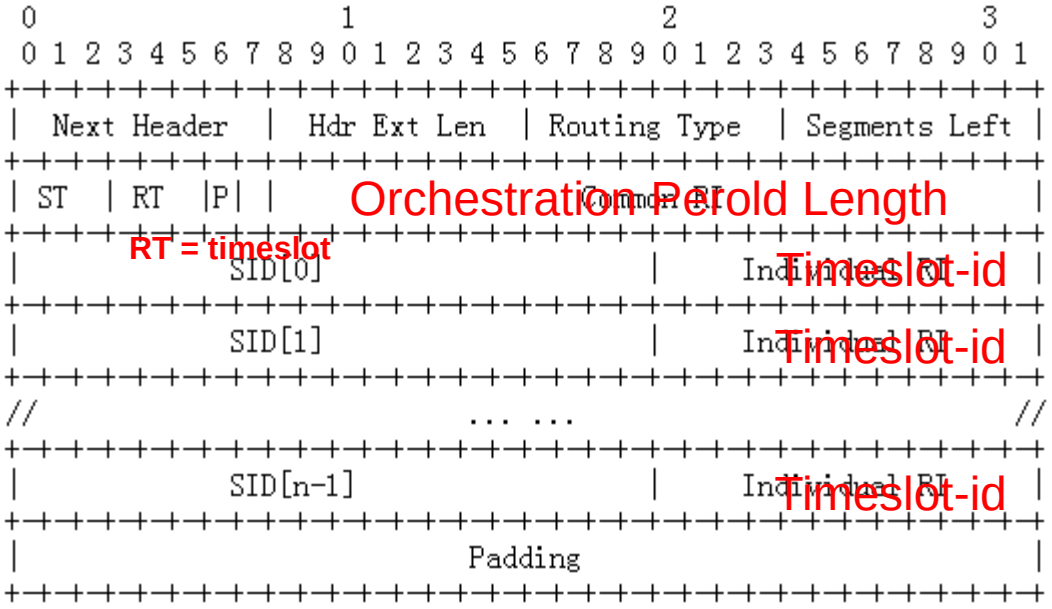

Figure 1: CRH-20

- A common prefix based compressed encapsulation is defined in https://www.ietf.org/archive/id/draft-p-6man-deterministic-eh-00.txt
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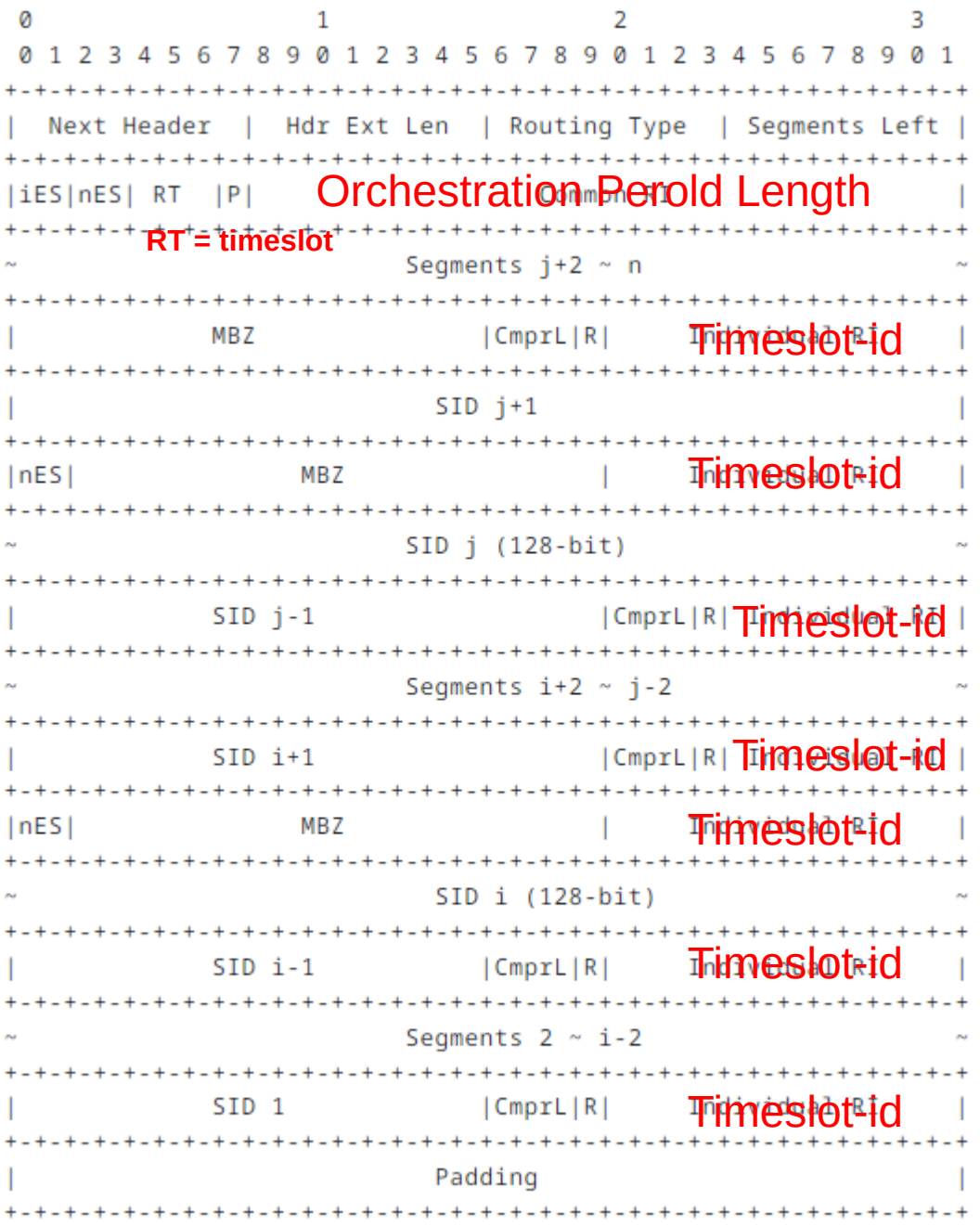

Figure 1: DetNet SRH Format

Review TQF's Taxonomy Considerations

- ***Per hop latency dominant factor***: Timeslot offset of FTM.
- ***Periodic***: Firstly, there is a time period P containing multiple timeslots, and secondly, a flow is assigned repeatly to a particular set of timeslots in the period..
- ***Frequency synchronous***: Crystal frequency aligned to ensure that all nodes have the same time lapse rate.
- ***Class level***: DetNet Flows is grouped by timeslot id.
- ***Work-conserving/non-work-conserving configurable***: Scheduler configured with in-time mode is work-conserving, while configured with on-time mode is non work-conserving.
- ***In-time/on-time configurable***: Scheduler may be configured with in-time mode or on-time mode.
- ***Time based***: A DetNet flow is scheduled based on its outgoing timeslot, rather on its reserved bandwidth (i.e., rate), to fit well the case of low bandwidth consumption but urgent flows.

Next step

- Any questions/comments ?

Thank you!