

PCEP Extension for DetNet Bounded Latency

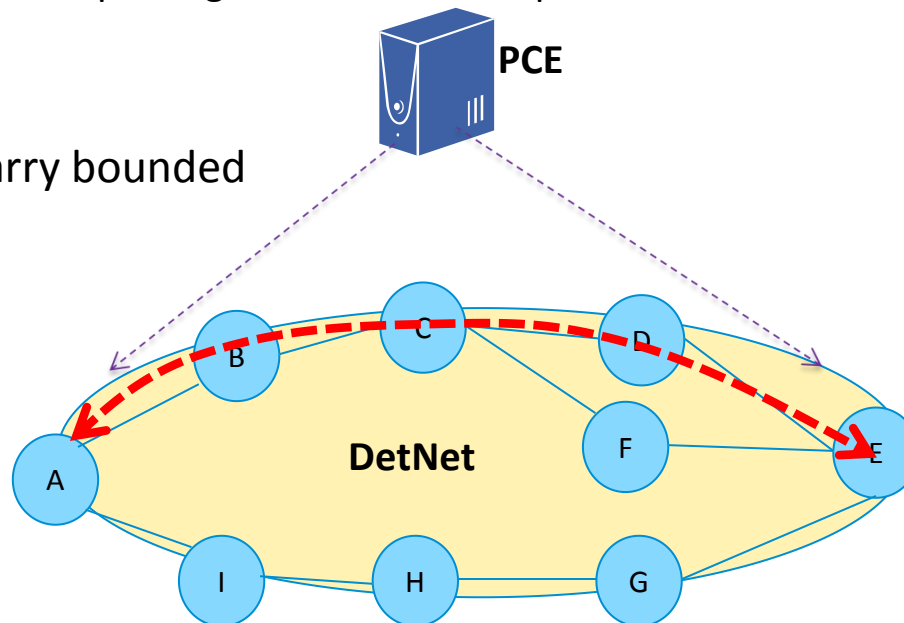
draft-xiong-pce-detnet-bounded-latency-00

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Overview

- In Deterministic Networking (DetNet), it is required to consider the bounded latency for path selection to achieve the DetNet QoS such as minimum and maximum end-to-end latency and bounded jitter.
 - As per [draft-ietf-detnet-controller-plane-framework], explicit path should be calculated and established in control plane to guarantee the deterministic transmission. The end-to-end bounded latency constraints should be taken into consideration in path computation.
 - As per [draft-ietf-detnet-bounded-latency], the end-to-end delay bounds can be presented as the sum of non queuing delay bound and queuing delay bound along the path. The queuing mechanisms and parameters should be determined during path computation.
- This document describes the extensions to PCEP to carry bounded latency constraints and distribute deterministic paths for end-to-end path computation in DetNet service.



PCEP Extensions

- METRIC Object
- End-to-End Bounded Latency Metric
 - This document proposes the End-to-End Bound Latency metric. A PCC MAY use the End-to-End Bounded Latency metric in a PCReq message to request a deterministic path to meet the end-to-end latency constraint.
- End-to-End Bounded Jitter Metric
 - This document proposes the End-to-end Bounded Jitter metric. A PCC MAY use the End-to-End Bounded Jitter metric in a PCReq message to request a deterministic path to meet the end-to-end delay variation constraint.
- LSP-EXTENDED-FLAG TLV in LSP Object defined in [draft-ietf-pce-lsp-extended-flags]
 - * T=TBD1: End-to-End Bounded Latency Metric.
 - * The value of End-to-End Bounded Latency Metric is the encoding in units of microseconds with 32 bits.
 - * The B bit **MUST** be set to suggest a maximum bound for the end-to-end latency of deterministic path. The end-to-end latency must be less than or equal to the value.
 - * T=TBD2: End-to-End Bounded Jitter Metric.
 - * The value of End-to-End Bounded Jitter Metric is the encoding in units of microseconds with 32 bits.
 - * The B bit **MUST** be set to suggest a maximum bound for the end-to-end jitter of deterministic path. The end-to-end jitter must be less than or equal to the value.
 - D (Request for Deterministic Path) : If the bit is set to 1, it indicates that the PCC requests PCE to compute the deterministic path. A PCE would also set this bit to 1 to indicate that the deterministic path is included by PCE and encoded in the PCRep, PCUpd or PCInitiate message.

PCEP Extensions

- ERO Object
- Queuing Information Structure
 - As defined in [draft-ietf-detnet-bounded-latency], the end-to-end delay bounds depends on the queuing mechanisms deployed along the deterministic path.
 - carried in ERO/SR-ERO/SRv6-ERO to distribute the path computation.
- Deadline Sub-TLV
 - it is optional and deadline-based queue mechanism has been proposed in [draft-stein-srtsn] and [draft-peng-detnet-deadline-based-forwarding].
- Cycle Sub-TLV
 - it is optional and cyclic-based queue mechanism has been proposed in [IEEE802.1Qch] and improved in [draft-dang-queuing-with-multiple-cyclic-buffers].

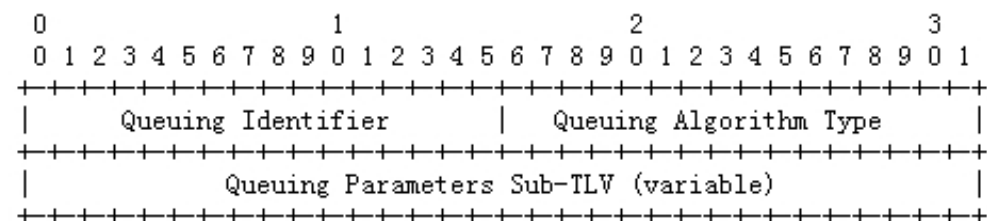


Figure 1: Queuing Information Structure

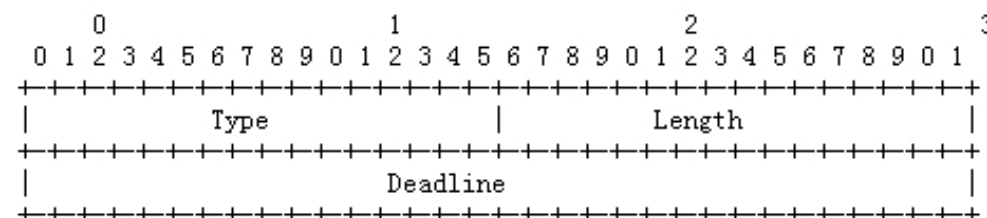


Figure 2: Deadline Sub-TLV

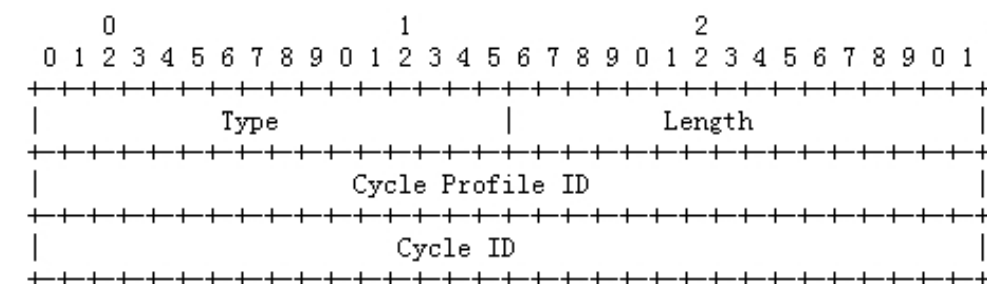


Figure 3: Cycle Sub-TLV

Next Step

- Thank the comments from Dhruv in the mailing list. Consider to propose new Queuing sub-objects for PCEP extension and parallel with the RSVP-TE signaling in next version.
- List out the requirements for PCEP and get confirmation from DetNet.
- Comments and suggestions are very welcome!
- Thanks!