

PCEP Extension for DetNet Bounded Latency

draft-xiong-pce-detnet-bounded-latency-02

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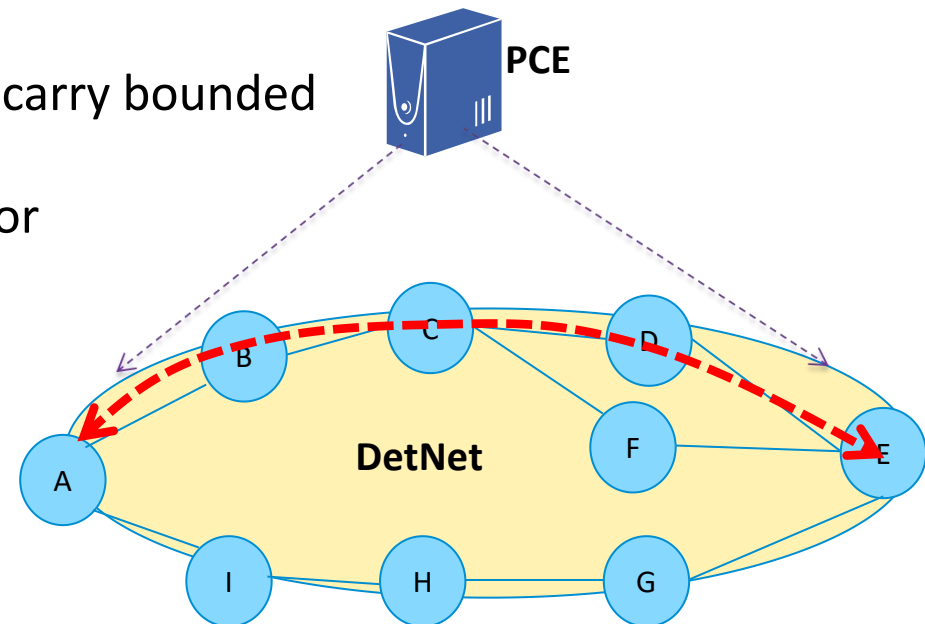
IETF 116 PCE, 2023

Updates from last versions

- Presented at IETF#114 and comments on the mailing list are appreciated from :
 - Dhruv Dhody / Andrew Stone/Lou Berger/Janos Farkas
- Updates from version -00
 - Align with the terminologies of requirements [draft-ietf-detnet-scaling-requirements] which has proposed the Deterministic Networking (DetNet) data plane enhancement requirements and this work is still go on.
 - Aglin with the DetNet common data field defined in [draft-xiong-detnet-data-fields-edp].
 - Clarification for PCE to get bounded latency capabilities by underlying IGP extensions including IS-IS and OSPF.
 - Change the extensions from ERO to Deterministic Path Object.
 - Add Rakesh Gandhi as the co-author to collaborate on this work.

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. In enhanced DetNet, the end-to-end bounded latency constraints should be taken into consideration in path computation.
 - As per [RFC9320], 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 services.



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 RFC9357
 - * 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

- **Deterministic Path Object**

- As defined in [RFC9320], the end-to-end delay bounds depends on the queuing mechanisms deployed along the deterministic path.
- This document defines Deterministic Path Object (DPO) to distribute the deterministic latency information through DetNet networks.

- **Deadline TLV**

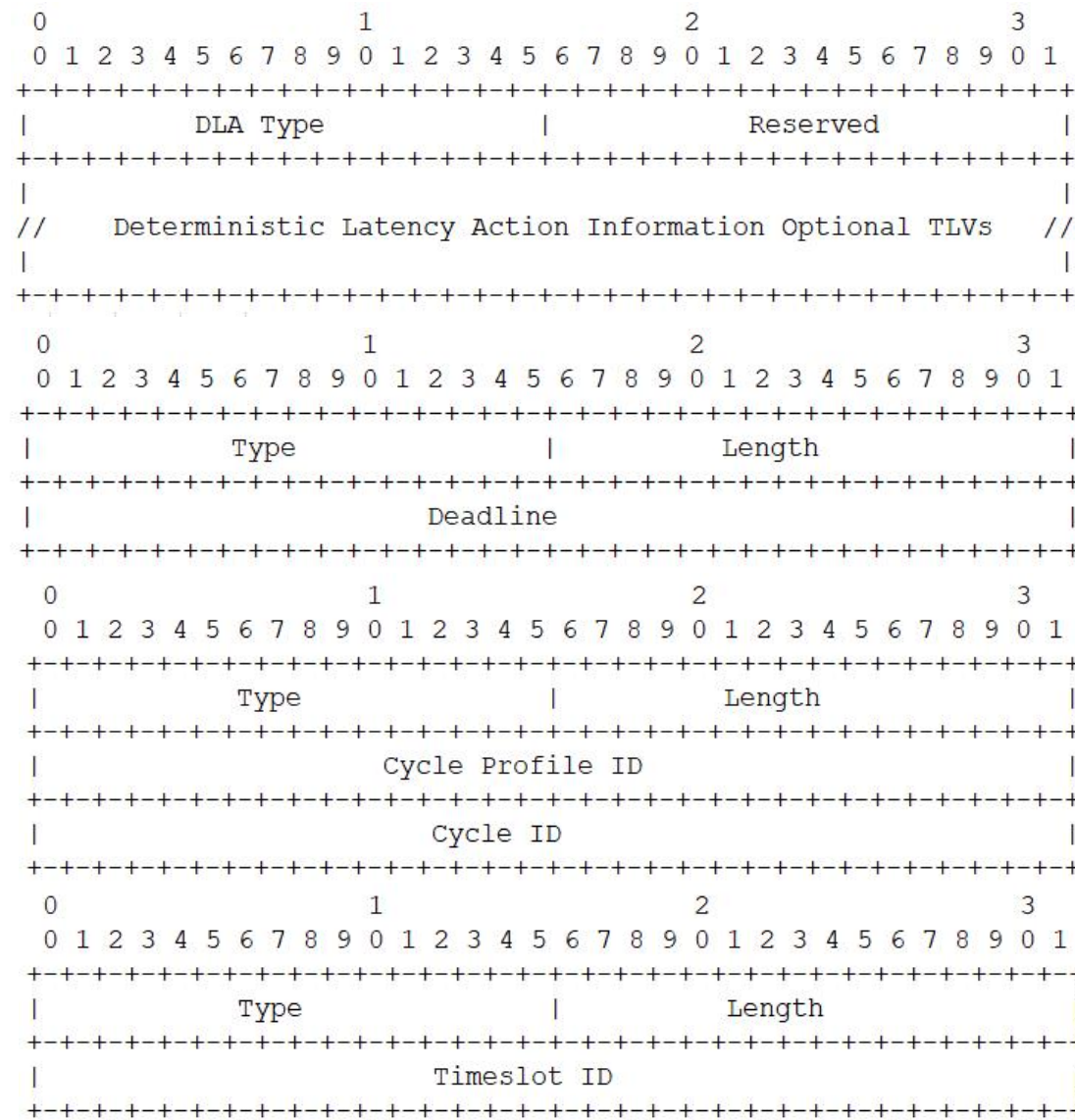
- it is optional and deadline-based queuing mechanism has been proposed in [draft-stein- srtsn] and [draft-peng-detnet-deadline-based-forwarding].

- **Cycle TLV**

- it is optional and cyclic-based queuing mechanism has been proposed in [IEEE802.1Qch] and improved in [draft-dang-queuing-with-multiple-cyclic-buffers].

- **Timeslot TLV**

- it is optional and timeslot-based queuing mechanism has been proposed in in [draft-peng-detnet-packet-timeslot-mechanism].



Next Step

- Align with the terminologies of requirements and queuing information and the work of DetNet DT.
- Comments and suggestions are very welcome!
- Thanks!