Extensions to the PCEP to compute service aware LSP.

draft-dhody-pce-pcep-service-aware

Dhruv Dhody (dhruv.dhody@huawei.com)

Vishwas Manral (vishwas.manral@hp.com)
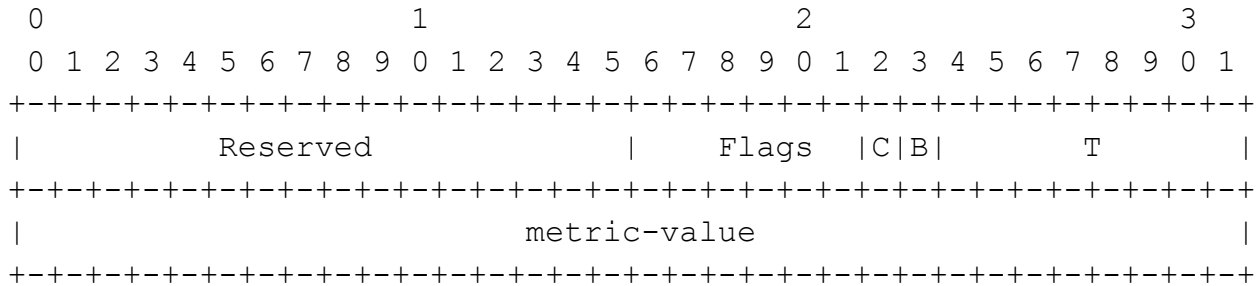
Introduction

- Many service providers SLA depends on performance metrics –
  - Latency (delay)
  - Latency-Variation (jitter)
  - Packet loss

- Important Applications/Scenarios
  - Electronic Financial Market
  - High Performance computing on Cloud

- Moving forward the **service aware** WAN will become more and more critical.

- Extension to PCEP to support Latency, Latency-variation and Loss as constraints for end to end path computation.

Requirement for PCEP

- PCE have capability to compute end-to-end path with latency, latency-variation and packet loss constraints.
    - In itself
    - Combination with other constraints

- PCC able to request new constraints in PCReq
    - Key constraint to be optimized
    - Boundary Condition

- Non-Supporting Service aware PCE

- PCE returns end-to-end value of the computed path

- PCEP should handle multiple domains

PCEP Extension

As per [RFC5440] the format of the METRIC object body is as follows:

```
     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
    +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
    |           Reserved            |      Flags  |C|B|      T      |
    +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
    |                         metric-value                         |
    +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+


      T (Type - 8 bits):  Specifies the metric type.
      Three values are currently defined:
      *  T=1: IGP metric
      *  T=2: TE metric
      *  T=3: Hop Counts
```

- Three new metric types are added
  - * T=13(IANA): end-to-end Latency (delay) metric
  - * T=14(IANA): end-to-end Latency-Variation (Jitter) metric
  - * T=15(IANA): end-to-end Packet Loss metric

PCEP Extension

As explained in [RFC5440], The METRIC object is optional and can be
   used for several purposes. In a PCReq message, a PCC MAY insert one
   or more METRIC objects:

   o   To indicate the metric that MUST be optimized by the path
       computation algorithm (Latency, Latency-Variation or Loss)

   o   To indicate a bound on the path METRIC (Latency, Latency-Variation
       or Loss) that MUST NOT be exceeded for the path to be considered
       as acceptable by the PCC.

Example:

If a PCC sends a path computation request to a PCE where the metric to optimize is the latency and the packet loss must not exceed the value of M

o First METRIC object with B=0, T=13, C=1, metric-value=0x0000
o Second METRIC object with B=1, T=15, metric-value=M

Related work

WG	ID	Details
MPLS	RFC 6374	Packet Loss and Delay Measurement for MPLS Networks
	draft-ietf-mpls-tp-loss-delay-00	Packet Loss and Delay Measurement for MPLS Transport Profile
	draft-fuxh-mpls-delay-loss-rsvp-te-ext-00	RSVP-TE extensions for services aware MPLS
OSPF	draft-giacalone-ospf-te-express-path-02	OSPF Traffic Engineering (TE) Express Path
ISIS	draft-previdi-isis-te-metric-extensions-00	IS-IS Traffic Engineering (TE) Metric Extensions
CCAMP	draft-fuxh-ccamp-delay-loss-te-framework	Framework for latency and loss traffic engineering application

Next Steps

- Continue analysis for
  - Inter-Domain (especially Inter-as-link)
  - Multi-Layer
  - Reoptimization
  - Policy Consideration
  - P2MP

- Managebility and security considerations needs analysis.

Questions
&
Comments?

Thanks!