

NORTEL NETWORKS

Multiple Metrics for Traffic Engineering with IS-IS and OSPF

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Multiple Metrics for Traffic Engineering

- **There is a need for more than one metric for traffic engineering**
- **MPLS TE path selection makes efficient use of multiple metrics**
- **A different metric may be used for an LSP**
 - Administrative cost
 - Delay
 - Bandwidth
 - Hop count
 - Delay-jitter
 - Loss or error probability
 - Economic cost
 - Others?

The main desire is to have a delay metric option

Recommendation for Advertising Multiple Metrics

- **Currently have one TE metric and a set of link attributes**
 - Default TE metric
 - Bandwidth reserved at holding priority
 - Maximum link bandwidth
 - Maximum reservable bandwidth
 - Resource class or color
- **Expand the TLV to advertise up to three additional metrics**
 - Support for one or more of these is optional
 - Up to four TE metrics total

Proposed Encoding for the Metrics

- **For IS-IS**

- The optional metrics are sub-TLVs carried within the Extended IS Reachability TLV, whose TLV type is 22
- Traffic Engineering Optional Metric 1 (sub-TLV type 19, length 3 octets)
- Traffic Engineering Optional Metric 2 (sub-TLV type 20, length 3 octets)
- Traffic Engineering Optional Metric 3 (sub-TLV type 21, length 3 octets)

- **For OSPF**

- The optional metrics are sub-TLVs carried within the Link TLV, whose TLV type is 2
- Traffic Engineering Optional Metric 1 (sub-TLV type 10, length 4 octets)
- Traffic Engineering Optional Metric 2 (sub-TLV type 11, length 4 octets)
- Traffic Engineering Optional Metric 3 (sub-TLV type 12, length 4 octets)

Why Are the Actual Metrics Left Undefined?

- **Different metrics will be important to different service providers**
 - Standardizing each metric separately would mean a constant process of standardizing new TLVs every time a new metric is desired
- **Using this proposal new metrics can be introduced in the network (or removed) easily by configuration without the need for changing routing code**

This is common practice for metrics

Next Steps

- **This proposal is an update of a draft presented in Washington**
- **We would like to see this work adopted as a Working Group document in the IS-IS and OSPF WGs**
- **What is the status of the TE documents in the OSPF and IS-IS WGs?**