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IS-IS Traffic Engineering (TE) Metric LAN Extensions

Abstract

In certain networks, network-performance criteria (e.g., latency) are becoming as critical to data-path selection as other metrics. This document describes extensions to IS-IS Traffic Engineering (TE) Metric Extensions (RFC 8570) for LAN subnetworks. These extensions provide a way to distribute and collect network-performance information in LAN subnetworks.

Requirements Language

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in BCP 14 [RFC2119] [RFC8174] when, and only when, they appear in all capitals, as shown here.

Status of This Memo

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Table of Contents

1. Introduction

In certain networks, network-performance criteria (e.g., latency) are becoming as critical to data-path selection as other metrics. This document describes extensions to IS-IS Traffic Engineering (TE) Metric Extensions (RFC 8570) for LAN subnetworks. These extensions provide a way to distribute and collect network-performance information in LAN subnetworks.

In LAN subnetworks, the Designated Intermediate System (DIS) is elected and originates the Pseudonode LSP (PN LSP) including all neighbors of the DIS. Since, on LANs, each router only advertises one adjacency to the DIS (and doesn't advertise any other adjacency), each router should advertise the TE metric for each of its neighbors.

2. Sub-TLV Details

This document registers new IS-IS TE sub-TLVs in the "Sub-TLVs for TLVs 22, 23, 141, 222, and 223" registry. These new sub-TLVs provides ways to distribute network-performance information in LAN subnetworks.

This document registers new sub-TLVs:

Type	Description
TBD	Unidirectional Link Delay LAN Sub-TLV
TBD	Min/Max Unidirectional Link Delay LAN Sub-TLV
TBD	Unidirectional Delay Variation LAN Sub-TLV
TBD	Unidirectional Link Loss LAN Sub-TLV
TBD	Unidirectional Residual Bandwidth LAN Sub-TLV
TBD	Unidirectional Available Bandwidth LAN Sub-TLV
TBD	Unidirectional Utilized Bandwidth LAN Sub-TLV

Figure 1: Figure 1

2.1. Unidirectional Link Delay LAN Sub-TLV

This sub-TLV advertises the average link delay between two real connected IS-IS neighbors in LAN. Each router advertises the average link delay for each of its neighbors inside a newly defined sub-TLV that is a part of the TLV advertising the adjacency to the DIS (e.g., TLV-22). The format of this sub-TLV is shown in the following diagram:

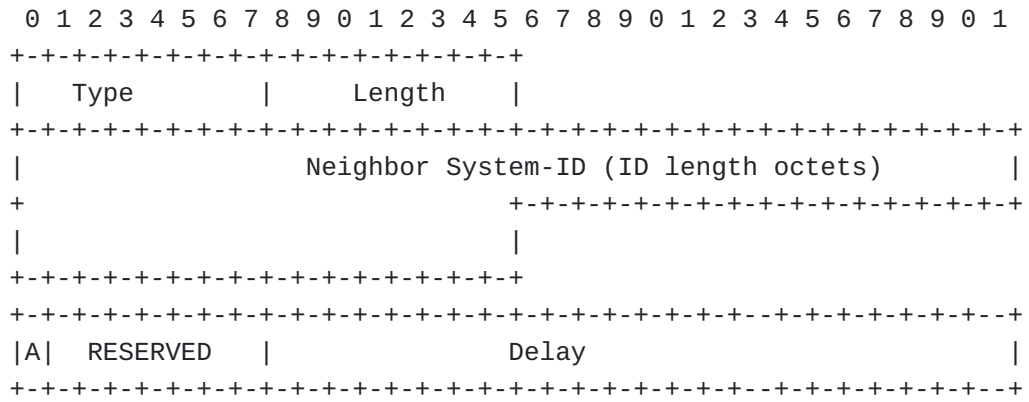

Figure 2: Figure 2: Unidirectional Link Delay LAN Sub-TLV

Type: TBD (suggested value 41) is to be assigned by IANA.

Length: 4 + System-ID length.

Neighbor System-ID: IS-IS System-ID of length "ID Length" as defined in [ISO10589].

The other fields are the same as defined in [RFC8570] for Unidirectional Link Delay Sub-TLV.

This sub-TLV is optional.

2.2. Min/Max Unidirectional Link Delay LAN Sub-TLV

This sub-TLV advertises the minimum and maximum delay values between two real connected IS-IS neighbors in LAN. Each router advertises the minimum and maximum delay for each of its neighbors inside a newly defined sub-TLV that is a part of the TLV advertising the adjacency to the DIS (e.g., TLV-22). The format of this sub-TLV is shown in the following diagram:

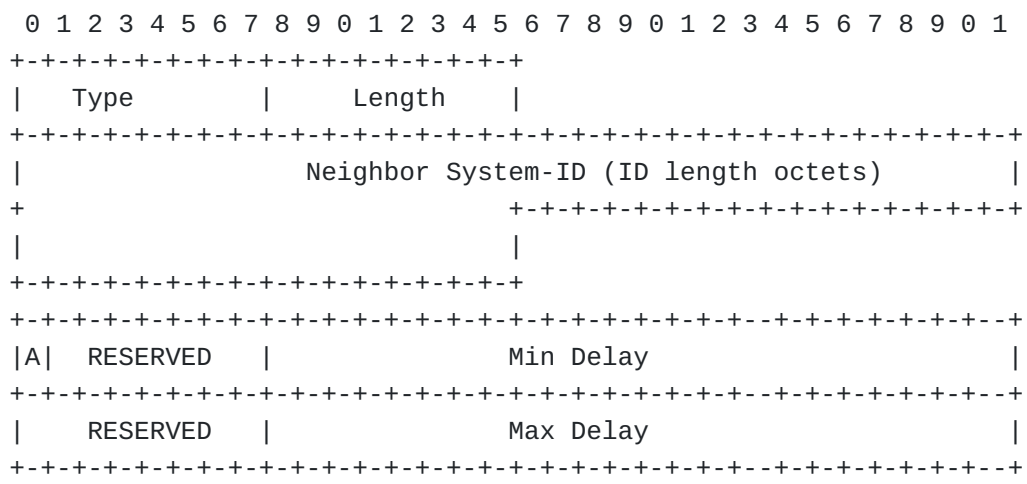

Figure 3: Figure 3: Min/Max Unidirectional Link Delay LAN Sub-TLV

Type: TBD (suggested value 42) is to be assigned by IANA.

Length: 8 + System-ID length.

Neighbor System-ID: IS-IS System-ID of length "ID Length" as defined in [ISO10589].

The other fields are the same as defined in [RFC8570] for Min/Max Unidirectional Link Delay Sub-TLV.

This sub-TLV is optional.

2.3. Unidirectional Delay Variation LAN Sub-TLV

This sub-TLV advertises the average link delay variation between two real connected IS-IS neighbors in LAN. Each router advertises

average link delay variation for each of its neighbors inside a newly defined sub-TLV that is a part of the TLV advertising the adjacency to the DIS (e.g., TLV-22). The format of this sub-TLV is shown in the following diagram:

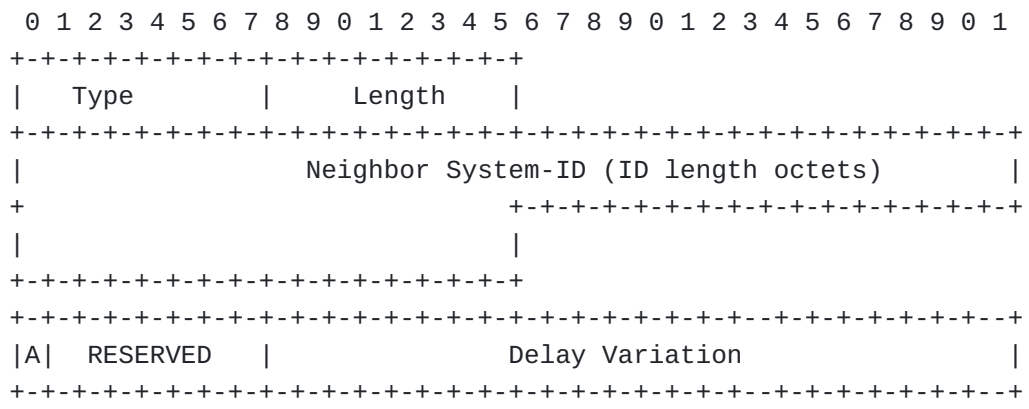

Figure 4: Figure 4: Unidirectional Delay Variation LAN Sub-TLV

Type: TBD (suggested value 43) is to be assigned by IANA.

Length: 4 + System-ID length.

Neighbor System-ID: IS-IS System-ID of length "ID Length" as defined in [ISO10589].

The other fields are the same as defined in [RFC8570] for Unidirectional Delay Variation Sub-TLV.

This sub-TLV is optional.

2.4. Unidirectional Link Loss LAN Sub-TLV

This sub-TLV advertises the loss (as a packet percentage) between two real connected IS-IS neighbors in LAN. Each router advertises the link loss for each of its neighbors inside a newly defined sub-TLV that is a part of the TLV advertising the adjacency to the DIS (e.g., TLV-22). The format of this sub-TLV is shown in the following diagram:

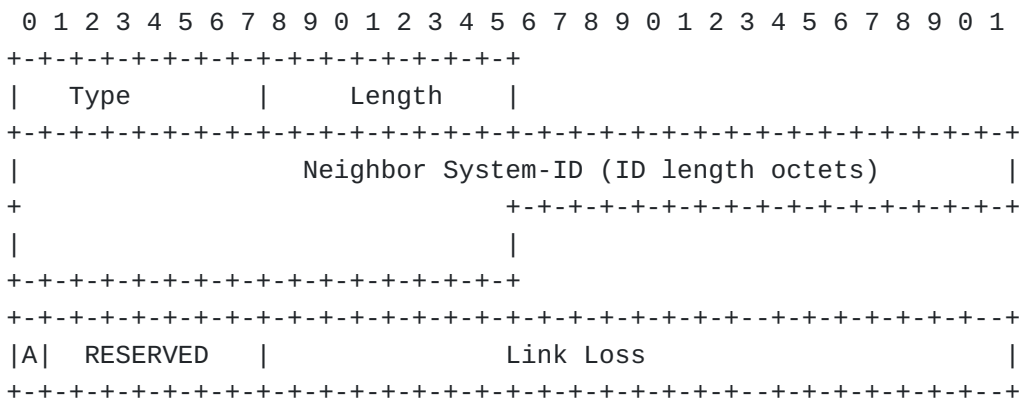

Figure 5: Figure 5: Unidirectional Link Loss LAN Sub-TLV

Type: TBD (suggested value 44) is to be assigned by IANA.

Length: 4 + System-ID length.

Neighbor System-ID: IS-IS System-ID of length "ID Length" as defined in [ISO10589].

The other fields are the same as defined in [RFC8570] for Unidirectional Link Loss Sub-TLV.

This sub-TLV is optional.

2.5. Unidirectional Residual Bandwidth LAN Sub-TLV

This sub-TLV advertises the residual bandwidth between two real connected IS-IS neighbors in LAN. Each router advertises the residual bandwidth for each of its neighbors inside a newly defined sub-TLV that is a part of the TLV advertising the adjacency to the DIS (e.g., TLV-22). The format of this sub-TLV is shown in the following diagram:

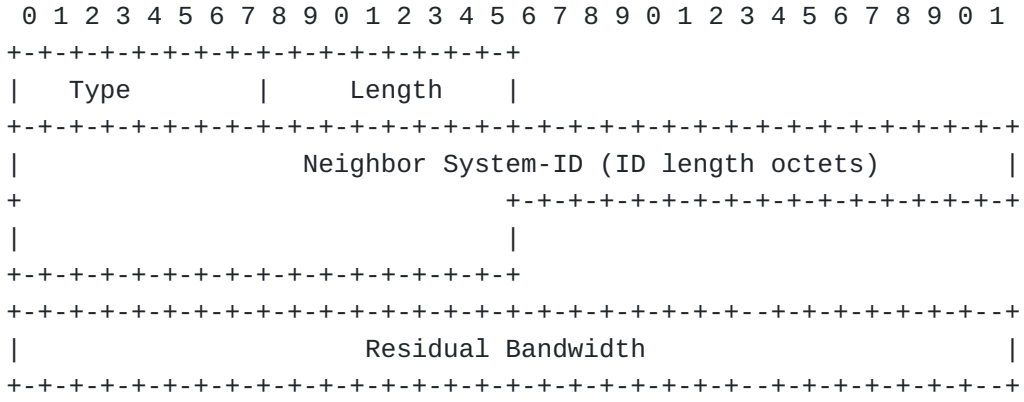

Figure 6: Figure 6: Unidirectional Residual Bandwidth LAN Sub-TLV

Type: TBD (suggested value 45) is to be assigned by IANA.

Length: 4 + System-ID length.

Neighbor System-ID: IS-IS System-ID of length "ID Length" as defined in [ISO10589].

The other fields are the same as defined in [RFC8570] for Unidirectional Residual Bandwidth Sub-TLV.

This sub-TLV is optional.

2.6. Unidirectional Available Bandwidth LAN Sub-TLV

This sub-TLV advertises the available bandwidth between two real connected IS-IS neighbors in LAN. Each router advertises the available bandwidth for each of its neighbors inside a newly defined sub-TLV that is a part of the TLV advertising the adjacency to the DIS (e.g., TLV-22). The format of this sub-TLV is shown in the following diagram:

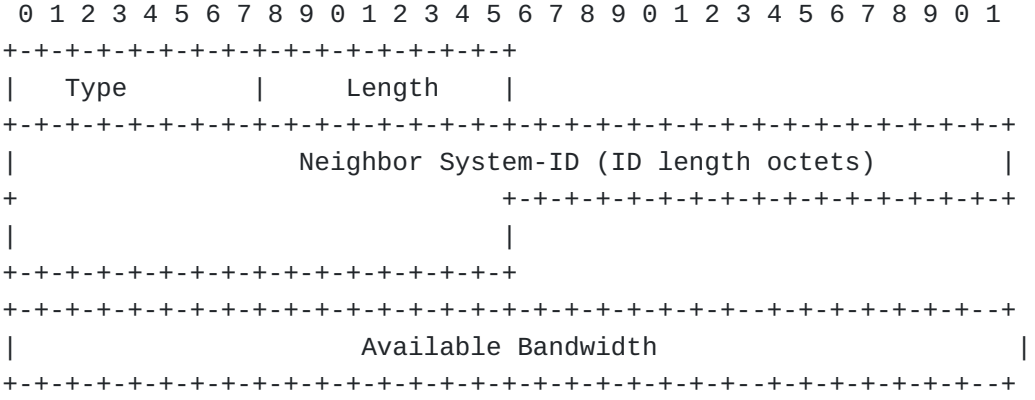

Figure 7: Figure 7: Unidirectional Available Bandwidth LAN Sub-TLV

Type: TBD (suggested value 46) is to be assigned by IANA.

Length: 4 + System-ID length.

Neighbor System-ID: IS-IS System-ID of length "ID Length" as defined in [ISO10589].

The other fields are the same as defined in [RFC8570] for Unidirectional Available Bandwidth Sub-TLV.

This sub-TLV is optional.

2.7. Unidirectional Utilized Bandwidth LAN Sub-TLV

This sub-TLV advertises the bandwidth utilization between two real connected IS-IS neighbors in LAN. Each router advertises the bandwidth utilization (for each of its neighbors) inside a newly defined sub-TLV that is a part of the TLV advertising the adjacency to the DIS (e.g., TLV-22). The format of this sub-TLV is shown in the following diagram:

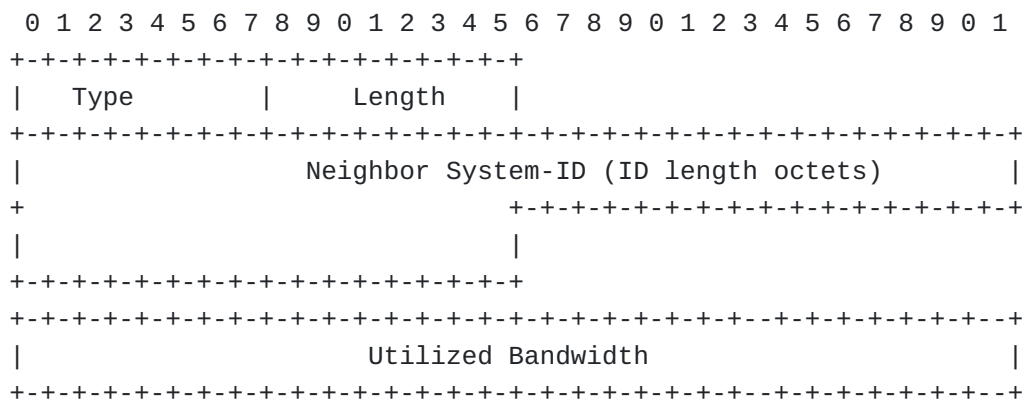

Figure 8: Figure 8: Unidirectional Utilized Bandwidth LAN Sub-TLV

Type: TBD (suggested value 47) is to be assigned by IANA.

Length: 4 + System-ID length.

Neighbor System-ID: IS-IS System-ID of length "ID Length" as defined in [ISO10589].

The other fields are the same as defined in [RFC8570] for Unidirectional Utilized Bandwidth Sub-TLV.

This sub-TLV is optional.

3. Announcement Thresholds and Filters

This document uses the same principle for announcement thresholds and filters as described in RFC 8570.

4. Announcement Suppression

This document uses the same principle for announcement suppression as described in RFC 8570.

5. Network Stability and Announcement Periodicity

This document uses the same principle for network stability and announcement periodicity as described in RFC 8570.

6. Enabling and Disabling Sub-TLVs

Implementations MUST make it possible to enable or disable each sub-TLV based on configuration.

7. Compatibility

Unrecognized sub-TLVs should be silently ignored.

8. Acknowledgements

TBD.

9. IANA Considerations

This document requests that IANA allocates new sub-TLV types from the "Sub-TLVs for TLVs 22, 23, 25, 141, 222, and 223 (Extended IS reachability, IS Neighbor Attribute, L2 Bundle Member Attributes, inter-AS reachability information, MT-ISN, and MT IS Neighbor Attribute TLVs)" registry as specified.

Value	Description
TBD	Unidirectional Link Delay LAN Sub-TLV
TBD	Min/Max Unidirectional Link Delay LAN Sub-TLV
TBD	Unidirectional Delay Variation LAN Sub-TLV
TBD	Unidirectional Link Loss LAN Sub-TLV
TBD	Unidirectional Residual Bandwidth LAN Sub-TLV
TBD	Unidirectional Available Bandwidth LAN Sub-TLV
TBD	Unidirectional Utilized Bandwidth LAN Sub-TLV

Figure 9: Figure 9

10. Security Considerations

These extensions to IS-IS do not add any new security issues to the existing IGP.

11. References

[RFC5305] Li, T. and H. Smit, "IS-IS Extensions for Traffic Engineering", RFC 5305, DOI 10.17487/RFC5305, October 2008, <https://www.rfc-editor.org/info/rfc5305>.

[RFC8570] Ginsberg, L., Ed., Previdi, S., Ed., Giacalone, S., Ward, D., Drake, J., and Q. Wu, "IS-IS Traffic Engineering (TE) Metric Extensions", RFC 8570, DOI 10.17487/RFC8570, March 2019, <https://www.rfc-editor.org/info/rfc8570>.

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