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IS-IS Extensions for Link Bit Error Ratio  
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## 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](#)). This draft provides the necessary IS-IS extensions about the link bit error ratio (LBER) that need to be used to describe network-performance.

## 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.

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## [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](#)). This draft provides the necessary IS-IS extensions about the link bit error ratio (LBER) that need to be used to describe network-performance. A new sub-TLV is introduced for IS-IS.

As other IS-IS TE Metric Extensions (e.g., unidirectional link loss,

unidirectional link delay), Unidirectional link bit error ratio described in this document is also meant to be used as part of the operation of the routing protocol to enhance Constrained Shortest Path First (CSPF), or for other uses such as supplementing the data used by the controller to compute the policy path.

2. LBER Extensions to IS-IS

This document registers a new IS-IS TE sub-TLV in the "Sub-TLVs for TLVs 22, 23, 141, 222, and 223" registry. This new sub-TLV provides ways to distribute LBER.

This document registers a sub-TLV:

Type	Description
TBD	Unidirectional Link BIT ERROR RATIO

Figure 1

The new sub-TLV include a bit called the Anomalous (or "A") bit. When the A bit is clear (or when the sub-TLV does not include an A bit), the sub-TLV describes steady-state link performance.

3. Sub-TLV Details

3.1. Unidirectional Link BIT ERROR RATIO Sub-TLV

This sub-TLV advertises the bit error ratio between two directly connected IS-IS neighbors. The link bit error ratio advertised by this sub-TLV MUST be the packet bit error from the local neighbor to the remote neighbor (i.e., the forward-path loss). The format of this sub-TLV is shown in the following diagram:

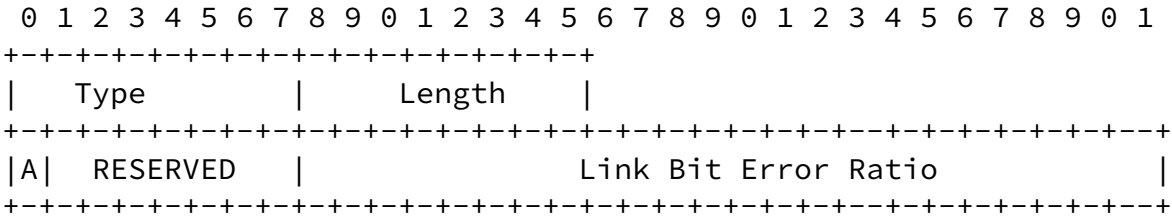


Figure 2: Unidirectional Link BIT ERROR RATIO Sub-TLV for the IS-IS

## extension

Type: TBD (suggested value 40) is to be assigned by IANA.

Length: 4.

A bit: This field represents the Anomalous (A) bit. The A bit is set when the measured value of this parameter exceeds its configured maximum threshold. The A bit is cleared when the measured value falls below its configured reuse threshold. If the A bit is cleared, the sub-TLV represents steady-state link performance.

RESERVED: This field is reserved for future use. It MUST be set to 0 when sent and MUST be ignored when received.

Link Bit Error Ratio: This 24-bit field carries Link Bit Error Ratio as a percentage of the total traffic sent over a configurable interval. The basic unit is 0.000003%, where  $(2^{24} - 2)$  is 50.331642%. This value is the highest link bit error percentage that can be expressed (the assumptions being that (1) precision is more important on high-speed links than the ability to advertise link bit error ratio greater than this and (2) high-speed links with over 50% bit error are unusable). Therefore, measured values that are larger than the field maximum SHOULD be encoded as the maximum value.

This sub-TLV is optional.

#### [4.](#) Announcement Thresholds and Filters

This document uses the same principle for announcement thresholds and filters as described in [RFC 8570](#).

#### [5.](#) Announcement Suppression

This document uses the same principle for announcement suppression as described in [RFC 8570](#).

#### [6.](#) Network Stability and Announcement Periodicity

This document uses the same principle for network stability and announcement periodicity as described in [RFC 8570](#).

## [7.](#) Enabling and Disabling Sub-TLVs

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

## [8.](#) Compatibility

Unrecognized sub-TLVs should be silently ignored.

## [9.](#) Acknowledgements

TBD.

## [10.](#) IANA Considerations

This document requests that IANA allocates new sub-TLV types as defined in [Section 2](#) from the "Sub-TLVs for TLVs 22, 23, 25, 141, 222, and 223 (Extended IS reachability, IS Neighbor Attribute, L2

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Bundle Member Attributes, inter-AS reachability information, MT-ISN, and MT IS Neighbor Attribute TLVs)" registry as specified.

Value	Description	Reference
TBD	Unidirectional LBER	This document

Figure 3: Unidirectional LBER

## [11.](#) Security Considerations

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

## [12.](#) 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)

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