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Signalling ERLD using BGP-LS
draft-ietf-idr-bgp-ls-segment-routing-rld-03

Abstract

This document defines the attribute encoding to use for BGP-LS to expose ERLD "Entropy capable Readable Label Depth" from a node to a centralised controller (PCE/SDN).

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 RFC 2119 [1].

Status of This Memo

This Internet-Draft is submitted in full conformance with the provisions of BCP 78 and BCP 79.

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This Internet-Draft will expire on June 16, 2019.

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1. Introduction

When Segment Routing tunnels are computed by a centralised controller, it is beneficial that the controller knows the ERLD (Entropy capable Readable Label Depth) of each node or link a tunnel traverses. A network node signalling an ERLD MUST support the ability to read the signalled number of labels before any action is done upon the packet and SHOULD support entropy awareness found within the signalled ERLD depth.

ERLD awareness of each node will allow a network SDN controller to influence the path used for each tunnel. The SDN controller may for example only create tunnels with a label stack smaller or equal as the ERLD of each node on the path. This will allow the network to behave accordingly (e.g. make use of Entropy Labels to improve ECMP) upon the imposed Segment Routing label stack on each packet.

This document describes how to use BGP-LS to expose the ERLD of a node.

2. Conventions used in this document

2.1. Terminology

BGP-LS: Distribution of Link-State and TE Information using Border Gateway Protocol

ERLD: Entropy capable Readable Label Depth

PCC: Path Computation Client

PCE: Path Computation Element

PCEP: Path Computation Element Protocol

SID: Segment Identifier

SR: Segment routing

3. Problem Statement

In existing technology both ISIS [4] and OSPF [3] have proposed extensions to signal the RLD (Readable Label Depth) and ELC (Entropy Label Capability) of a node. However, if a network SDN controller is connected to the network through a BGP-LS session and not through ISIS or OSPF technology, then both RLD and ELC needs to be signalled using BGP-LS encoding. This document describes the extension BGP-LS requires to transport the combined RLD and ELC into an ERLD (Entropy capable Readable Label Depth) attribute.

A network SDN controller having awareness of the ERLD can for example use it as a constraint on path computation to make sure that high bandwidth LSPs are not placed on LAG (Link Aggregation Group), containing links with smaller member bandwidth, if they know the Entropy Label cannot be processed by the node at the ingress to the link.

4. Origination of ERLD in BGP-LS

Both ISIS [4] and OSPF [3] have proposed extensions to signal the RLD (Readable Label Depth) and ELC (Entropy Label Capability) for a node. A BGP-LS router exporting the IGP LSDB, MUST NOT encode the IGP RLD value in an BGP-LS ERLD attribute, if the associated node ELC is not signalled.

5. ERLD support by a node

Node ERLD is encoded in a new Node Attribute TLV, as defined in RFC7752 [2].

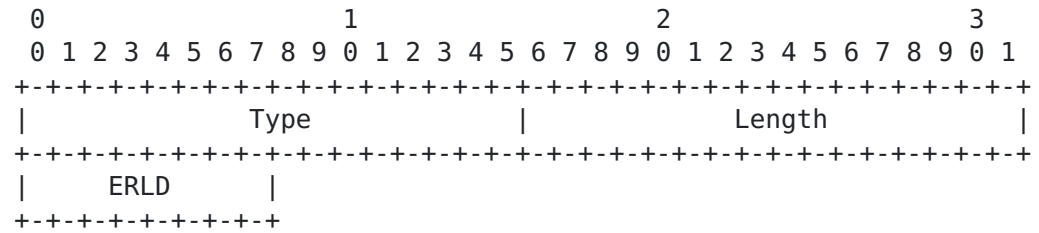

Figure 1

Type : A 2-octet field specifying code-point of the new TLV type. Code-point: TBA from BGP-LS Node Descriptor, Link Descriptor, Prefix Descriptor, and Attribute TLVs registry

Length: A 2-octet field that indicates the length of the value portion

ERLD: Node ERLD is a number in the range of 0-254. The value of 0 represents lack of ability to read a label stack of any depth, any other value represents the readable label depth of the node.

6. Security Considerations

This document does not introduce security issues beyond those discussed in RFC7752 [2]

7. Acknowledgements

Thanks to discussions with Acee Lindem, Jeff Tantsura, Stephane Litkowski, Bruno Decraene, Kireeti Kompella, John E. Drake and Carlos Pignataro to bring the concept of combining ELC and RLD into a single ERLD signalled parameter more suitable for SDN controller based networks.

8. IANA Considerations

This document requests assigning a new code-points from the BGP-LS Node Descriptor, Link Descriptor, Prefix Descriptor, and Attribute TLVs registry as specified in section 5.

Note: placeholder IANA request

Request Node ERLD codepoint

BGP-LS TLV Code Point: TBD1

ISIS TLV 242/TBD2

Note: There is nothing in IANA from draft draft-ietf-isis-mpls-elc

Note: Draft talks only about ELC/RLD and that is mismatch with ERLD

OSPF RI TLV TBD5

OSPF ELC in Non-OSPF functionality Capability Bits (TBD6)

9. References

9.1. Normative References

[1] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", BCP 14, RFC 2119, March 1997, <http://xml.resource.org/public/rfc/html/rfc2119.html>.

[2] Gredler, H., Ed., Medved, J., Previdi, S., Farrel, A., and S. Ray, "North-Bound Distribution of Link-State and Traffic Engineering (TE) Information Using BGP", RFC 7752, DOI 10.17487/RFC7752, March 2016, <https://www.rfc-editor.org/info/rfc7752>.

9.2. Informative References

[3] Xu, X., Kini, S., Sivabalan, S., Filsfils, C., and S. Litkowski, "draft-ietf-ospf-mpls-elc", January 2018.

[4] Xu, X., Kini, S., Sivabalan, S., Filsfils, C., and S. Litkowski, "draft-ietf-isis-mpls-elc", January 2018.

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