Workgroup: LSR
Internet-Draft:
draft-liu-lsr-mpls-inspection-msd-04
Published: 18 September 2023
Intended Status: Standards Track
Expires: 21 March 2024
Authors: Y. Liu
ZTE

Signaling MPLS Readable Label Depth(RLD)

Abstract

This document defines a new type of MSD to reflect the Readable Label Depth(RLD), and the mechanism to signal this MSD using IGP and BGP-LS.

Status of This Memo

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

Internet-Drafts are working documents of the Internet Engineering Task Force (IETF). Note that other groups may also distribute working documents as Internet-Drafts. The list of current Internet-Drafts is at https://datatracker.ietf.org/drafts/current/.

Internet-Drafts are draft documents valid for a maximum of six months and may be updated, replaced, or obsoleted by other documents at any time. It is inappropriate to use Internet-Drafts as reference material or to cite them other than as "work in progress."

This Internet-Draft will expire on 21 March 2024.

Table of Contents

1. Introduction

[I-D.ietf-mpls-mna-fwk] specifies an architectural framework for the MPLS Network Actions (MNA) technologies. MNA technologies are used to indicate actions for Label Switched Paths (LSPs) and/or MPLS packets and to transfer data needed for these actions. And an MNA solution is envisioned as a set of network action sub-stacks(NAS), plus possible post-stack data. In order to put the NAS(s) at the appropriate place into the MPLS label stack, [I-D.ietf-mpls-mna-fwk] introduces the concept of Readable Label Depth(RLD), and puts forward the need for signaling of RLD via MPLS signaling protocols.

Maximum SID Depth (MSD)[RFC8491] is originally introduced for SR-MPLS to express the number of SIDs supported by a node or a link on a node. In a non-SR MPLS network, MSD defines the maximum label depth.

This document defines a new type of MSD for RLD, and the mechanism to signal this MSD using IGP and BGP-LS.

2. Conventions Used in This Document

2.1. 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 [RFC2119] [RFC8174] when, and only when, they appear in all capitals, as shown here.

2.2. Abbreviations

MNA: MPLS Network Actions

NAS: Network Action ub-stack

EL: Entropy Label

ERLD: Entropy Readable Label Depth

RLD: Readable Label Depth

3. RLD MSD

The RLD MSD MAY be used by NAS imposing node to determine the position of the NAS. When the label stacks are determined by a centralized controller, the RLD MSD of each intermediate LSR SHOULD be sent to the controller.

With RLD MSD, new application/network action-specified MSDs analogous to ERLD-MSD[RFC9088] [RFC9089] MAY not be needed. For example, a node can signal certain network action capability and the RLD MSD to indicate that it can process this network action within the MSD.

Editor's note: The reason why ERLD-MSD is not reused to reflect the RLD is that the definition of ERLD is strongly related the router's ability to process entropy label. As specified in [RFC8662], the ERLD means that the router will perform load-balancing using the EL if the EL is placed within the first ERLD labels, and a router capable of reading N labels but not using an EL located within those N labels MUST consider its ERLD to be 0. Considering that implementations in strict accordance with the definition of ERLD may exist, defining a new MSD instead of reusing/updating ERLD is preferred in this document.

4. Advertising RLD MSD Using IGP

A new IGP MSD-Type, called RLD MSD, is defined. The MSD-Type code is to be assigned by IANA. The MSD-Value field is set to the maximum number of labels a router can read in the range between 0 to 255. The scope of the advertisement depends on the application. This MSD can be advertised on the per-node and/or per-link basis as in IS-IS [RFC8491] and OSPF [RFC8476].

The absence of RLD MSD advertisements indicates only that the advertising node does not support advertisement of this capability.

5. Signaling Base MPLS Inspection MSD in BGP-LS

The IGP extensions defined in this document can be advertised via BGP-LS (distribution of Link-State and TE information using BGP) [RFC7752] using existing BGP-LS TLVs.

The RLD MSD is advertised via the Node MSD TLV and/or the Link MSD TLV as defined in [RFC8814].

6. Security Considerations

This document specifies the ability to advertise additional node capabilities using IS-IS, OSPF and BGP-LS. As such, the security considerations as described in [RFC5340], [RFC7684], [RFC7752], [RFC7770], [RFC7794], [RFC7981], [RFC8476], [RFC8491], [RFC8662], [RFC8814], [RFC9085] are applicable to this document.

Incorrectly setting of the RLD MSD value may lead to poor or no execution of the network action.

7. IANA Considerations

This document requests the following allocation from IANA:

Type TBA in the IGP MSD-Types registry is requested to be assigned for RLD MSD.

8. Acknowledgement

The author would like to thank Greg Mirsky, Les Ginsberg, Tony Li and Gyan Mishra for their helpful review and comments.

9. References

9.1. Normative References

[RFC2119] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", BCP 14, RFC 2119, DOI 10.17487/RFC2119, March 1997, <https://www.rfc-editor.org/info/rfc2119>.

[RFC5340] Coltun, R., Ferguson, D., Moy, J., and A. Lindem, "OSPF for IPv6", RFC 5340, DOI 10.17487/RFC5340, July 2008, <https://www.rfc-editor.org/info/rfc5340>.

[RFC7684] Psenak, P., Gredler, H., Shakir, R., Henderickx, W., Tantsura, J., and A. Lindem, "OSPFv2 Prefix/Link Attribute Advertisement", RFC 7684, DOI 10.17487/RFC7684, November 2015, <https://www.rfc-editor.org/info/rfc7684>.

[RFC7752] 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>.

[RFC7770] Lindem, A., Ed., Shen, N., Vasseur, JP., Aggarwal, R., and S. Shaffer, "Extensions to OSPF for Advertising Optional Router Capabilities", RFC 7770, DOI 10.17487/RFC7770, February 2016, <https://www.rfc-editor.org/info/rfc7770>.

[RFC7794] Ginsberg, L., Ed., Decraene, B., Previdi, S., Xu, X., and U. Chunduri, "IS-IS Prefix Attributes for Extended IPv4 and IPv6 Reachability", RFC 7794, DOI 10.17487/RFC7794, March 2016, <https://www.rfc-editor.org/info/rfc7794>.

[RFC7981] Ginsberg, L., Previdi, S., and M. Chen, "IS-IS Extensions for Advertising Router Information", RFC 7981, DOI 10.17487/RFC7981, October 2016, <https://www.rfc-editor.org/info/rfc7981>.

[RFC8174] Leiba, B., "Ambiguity of Uppercase vs Lowercase in RFC 2119 Key Words", BCP 14, RFC 8174, DOI 10.17487/RFC8174, May 2017, <https://www.rfc-editor.org/info/rfc8174>.

[RFC8476] Tantsura, J., Chunduri, U., Aldrin, S., and P. Psenak, "Signaling Maximum SID Depth (MSD) Using OSPF", RFC 8476, DOI 10.17487/RFC8476, December 2018, <https://www.rfc-editor.org/info/rfc8476>.

[RFC8491] Tantsura, J., Chunduri, U., Aldrin, S., and L. Ginsberg, "Signaling Maximum SID Depth (MSD) Using IS-IS", RFC 8491, DOI 10.17487/RFC8491, November 2018, <https://www.rfc-editor.org/info/rfc8491>.

[RFC8662] Kini, S., Kompella, K., Sivabalan, S., Litkowski, S., Shakir, R., and J. Tantsura, "Entropy Label for Source Packet Routing in Networking (SPRING) Tunnels", RFC 8662, DOI 10.17487/RFC8662, December 2019, <https://www.rfc-editor.org/info/rfc8662>.

[RFC8814] Tantsura, J., Chunduri, U., Talaulikar, K., Mirsky, G., and N. Triantafillis, "Signaling Maximum SID Depth (MSD) Using the Border Gateway Protocol - Link State", RFC 8814, DOI 10.17487/RFC8814, August 2020, <https://www.rfc-editor.org/info/rfc8814>.

[RFC9085] Previdi, S., Talaulikar, K., Ed., Filsfils, C., Gredler, H., and M. Chen, "Border Gateway Protocol - Link State (BGP-LS) Extensions for Segment Routing", RFC 9085, DOI 10.17487/RFC9085, August 2021, <https://www.rfc-editor.org/info/rfc9085>.

9.2. Informative References

[I-D.ietf-mpls-mna-fwk] Andersson, L., Bryant, S., Bocci, M., and T. Li, "MPLS Network Actions Framework", Work in Progress, Internet-Draft, draft-ietf-mpls-mna-fwk-04, 5 September 2023, <https://datatracker.ietf.org/doc/html/draft-ietf-mpls-mna-fwk-04>.

[RFC9088] Xu, X., Kini, S., Psenak, P., Filsfils, C., Litkowski, S., and M. Bocci, "Signaling Entropy Label Capability and Entropy Readable Label Depth Using IS-IS", RFC 9088, DOI 10.17487/RFC9088, August 2021, <https://www.rfc-editor.org/info/rfc9088>.

[RFC9089] Xu, X., Kini, S., Psenak, P., Filsfils, C., Litkowski, S., and M. Bocci, "Signaling Entropy Label Capability and Entropy Readable Label Depth Using OSPF", RFC 9089, DOI 10.17487/RFC9089, August 2021, <https://www.rfc-editor.org/info/rfc9089>.

Author's Address

Yao Liu
ZTE
Nanjing
China

Email: liu.yao71@zte.com.cn