IS-IS Working Group J. Tantsura
Internet-Draft Individual
Intended status: Standards Track U. Chunduri
Expires: July 14, 2018 Huawei Technologies
S. Aldrin
Google, Inc
L. Ginsberg
Cisco Systems
January 10, 2018

Signaling MSD (Maximum SID Depth) using IS-IS
draft-ietf-isis-segment-routing-msd-09

Abstract

This document defines a way for an IS-IS Router to advertise multiple types of supported Maximum SID Depths (MSDs) at node and/or link granularity. Such advertisements allow entities (e.g., centralized controllers) to determine whether a particular SID stack is supportable in a given network. This document only defines one type of MSD (maximum label imposition) - but defines an encoding which can support other MSD types.

Status of This Memo

Copyright Notice

Table of Contents

1. Introduction

When Segment Routing(SR) paths are computed by a centralized controller, it is critical that the controller learns the Maximum SID Depth(MSD) which can be imposed at the node/link a given SR path is applied so as to insure that the SID stack depth of a computed path doesn't exceed the number of SIDs the node is capable of imposing.

PCEP SR extensions draft [I-D.ietf-pce-segment-routing] signals MSD in SR PCE Capability TLV and METRIC Object. However, if PCEP is not supported/configured on the head-end of a SR tunnel or a Binding-SID anchor node and controller does not participate in IGP routing, it has no way to learn the MSD of nodes and links which has been configured. BGP-LS [RFC7752] defines a way to expose topology and associated attributes and capabilities of the nodes in that topology to a centralized controller. MSD signaling by BGP-LS has been defined in [I-D.ietf-idr-bgp-ls-segment-routing-msd]. Typically, BGP-LS is configured on a small number of nodes, that do not necessarily act as head-ends. In order, for BGP-LS to signal MSD for all the nodes and links in the network MSD is relevant, MSD

capabilites should be advertised to every IS-IS router in the network.

Other types of MSD are known to be useful. For example, [I-D.ietf-isis-mpls-elc] defines Readable Label Depth Capability (RLDC) that is used by a head-end to insert Entropy Label (EL) at appropriate depth, so it could be read by transit nodes.

This document defines an extension to IS-IS used to advertise one or more types of MSD at node and/or link granularity. It also creates an IANA registry for assigning MSD type identifiers. It also defines one MSD type called Base MPLS Imposition MSD. In the future it is expected that new MSD types will be defined to signal additional capabilities e.g., entropy labels, SIDs that can be imposed through recirculation, or SIDs associated with another dataplane e.g., IPv6.

1.1. Conventions used in this document

1.1.1. Terminology

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

BMI: Base MPLS Imposition is the number of MPLS labels which can be imposed inclusive of any service/transport labels

IS-IS: Intermediate System to Intermediate System

MSD: Maximum SID Depth - the number of SIDs a node or a link on a node can support

PCC: Path Computation Client

PCE: Path Computation Element

PCEP: Path Computation Element Protocol

SID: Segment Identifier

SR: Segment Routing

1.2. 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 [RFC2119].

2. Node MSD Advertisement

A new sub-TLV "Node MSD sub-TLV" is defined within the body of the IS-IS Router Capability TLV [RFC7981], to carry the provisioned MSD(s) of the router originating the Router Capability TLV. Node MSD is the lowest MSD supported by the node on any interface. MSD values may be learned via a hardware API or may be provisioned.

```
 0                   1
 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5

+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|    Type       |   Length      |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|   MSD-Type    | MSD Value     |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
//     ...................     //
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|   MSD-Type    | MSD Value     |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
```

Figure 1: Node MSD Sub-TLV

The Type (1 byte) of this sub-TLV has value of 23.

Length is variable (minimum of 2, multiple of 2 octets) and represents the total length of value field.

Value field consists of one or more pairs of a 1 octet MSD-Type (IANA Registry) and 1 octet Value.

Node MSD value is a number in the range of 0-255. 0 represents lack of the ability to support SID stack of any depth; any other value represents that of the node. This value MUST represent the lowest value supported by any link associated with the node.

This sub-TLV is optional. The scope of the advertisement is specific to the deployment.

3. Link MSD Advertisement

A new sub-TLV - Link MSD sub-TLV is defined for TLVs 22, 23, 141, 222, and 223 to carry the MSD of the interface associated with the link. MSD values may be learned via a hardware API or may be provisioned.


```
 0                   1
 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5

+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|    Type       |   Length      |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|   MSD-Type    | MSD Value     |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
//     ...................     //
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|   MSD-Type    | MSD Value     |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
```

Figure 2: Link MSD Sub-TLV

The Type (1 byte) of this sub-TLV has value of 15.

Length is variable (minimum of 2, multiple of 2 octets) and represents the total length of value field.

Value field consists of one or more pairs of a 1 octet MSD-Type (IANA

Registry) and 1 octet Value.

Link MSD value is a number in the range of 0-255. 0 represents lack of the ability to support SID stack of any depth; any other value represents that of the link when used as an outgoing link.

This sub-TLV is optional. The scope of the advertisement is specific to the deployment.

4. Using Node and Link MSD Advertisements

When Link MSD is present for a given MSD type, the value of the Link MSD MUST be used in preference to the Node MSD.

The meaning of the absence of both Node and Link MSD advertisements for a given MSD type is specific to the MSD type. Generally it can only be inferred that the advertising node does not support advertisement of that MSD type. However, in some cases the lack of advertisement might imply that the functionality associated with the MSD type is not supported. The correct interpretation MUST be specified when an MSD type is defined.

5. Base MPLS Imposition MSD

Base MPLS Imposition MSD (BMI-MSD) signals the total number of MPLS labels a node is capable of imposing, including any service/transport labels.

Absence of BMI-MSD advertisements indicates only that the advertising node does not support advertisement of this capability.

6. IANA Considerations

This document requests IANA to allocate a sub-TLV type code for the new sub TLV proposed in Section 2 of this document from IS-IS Router Capability TLV Registry as defined by [RFC7981].

The following value has been allocated by IANA:

Value	Description	Reference
23	Node MSD	This document

Figure 3: Node MSD

This document requests IANA to allocate a sub-TLV type code as defined in Section 3 from Sub-TLVs for TLVs 22, 23, 141, 222 and 223 registry.

The following value has been allocated by IANA:

Value	Description	Reference
15	Link MSD	This document

Figure 4: Link MSD

Per TLV information where Link MSD sub-TLV can be part of:

TLV	22	23	25	141	222	223
	y	y	y	y	y	y

Figure 5: TLVs where LINK MSD Sub-TLV can be present

This document requests creation of a new IANA managed registry under a new category of "Interior Gateway Protocol (IGP) Parameters" IANA

registries to identify MSD types as proposed in Section 2 and Section 3. The registration procedure is "Expert Review" as defined in [RFC8126]. Suggested registry name is "MSD types". Types are an unsigned 8 bit number. The following values are defined by this document

Value   Name   Reference

-----	---------------------	-------------
0	Reserved	This document
1	Base MPLS Imposition MSD	This document
2-250	Unassigned	This document
251-254	Experimental	This document
255	Reserved	This document

Figure 6: MSD Types Codepoints Registry

7. Security Considerations

Security considerations, as specified by [RFC7981] are applicable to this document

8. Contributors

The following people contributed to this document:

Peter Psenak

Email: ppsenak@cisco.com

9. Acknowledgements

The authors would like to thank Stephane Litkowski and Bruno Decraene for their reviews and valuable comments.

10. References

10.1. 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>.

[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>.

10.2. Informative References

[I-D.ietf-idr-bgp-ls-segment-routing-msd]
Tantsura, J., Chunduri, U., Mirsky, G., and S. Sivabalan, "Signaling Maximum SID Depth using Border Gateway Protocol Link-State", draft-ietf-idr-bgp-ls-segment-routing-msd-01 (work in progress), October 2017.

[I-D.ietf-isis-mpls-elc]
Xu, X., Kini, S., Sivabalan, S., Filsfils, C., and S. Litkowski, "Signaling Entropy Label Capability and Readable Label-stack Depth Using IS-IS", draft-ietf-isis-mpls-elc-03 (work in progress), January 2018.

[I-D.ietf-pce-segment-routing]
Sivabalan, S., Filsfils, C., Tantsura, J., Henderickx, W., and J. Hardwick, "PCEP Extensions for Segment Routing", draft-ietf-pce-segment-routing-11 (work in progress), November 2017.

[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>.

[RFC8126] Cotton, M., Leiba, B., and T. Narten, "Guidelines for Writing an IANA Considerations Section in RFCs", BCP 26, RFC 8126, DOI 10.17487/RFC8126, June 2017, <https://www.rfc-editor.org/info/rfc8126>.

Authors' Addresses

Jeff Tantsura
Individual

Email: jefftant.ietf@gmail.com

Uma Chunduri
Huawei Technologies

Email: uma.chunduri@huawei.com

Sam Aldrin
Google, Inc

Email: aldrin.ietf@gmail.com

Les Ginsberg
Cisco Systems

Email: ginsberg@cisco.com