

Advertise Maximum SID Depth by IS-IS and OSPF to BGP-LS

In a Segment Routing (SR) enabled network a centralized controller that programs SR tunnels needs to know the Maximum Segment Identifier (SID) Depth (MSD) supported by the head-end at node and/or link granularity to push the SID stack of an appropriate depth. MSD is relevant to the head-end of a SR tunnel or binding-SID anchor node where binding-SID expansions might result in creation of a new SID stack.

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Restrictions for Advertise Maximum SID Depth by IS-IS and OSPF to BGP-LS

- In IOS-XE as there no line cards, link-MSD is not advertised.

Information About Advertise Maximum SID Depth by IS-IS and OSPF to BGP-LS

Note This feature is enabled by default and no specific configuration is required to enable this functionality.

Maximum SID Depth

You can use IGPs to signal the MSD of a node or link to a centralized controller by:

- Advertising node-MSD to its peers.
- Providing the MSD information to BGP-LS.

Path Computation Element Protocol (PCEP) SR extensions signal 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. BGP-LS defines a way to expose topology and associated attributes and capabilities of the nodes in that topology to a centralized controller. 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 SR capable nodes in the network, MSD capabilities should be advertised by every IGP router in the network.

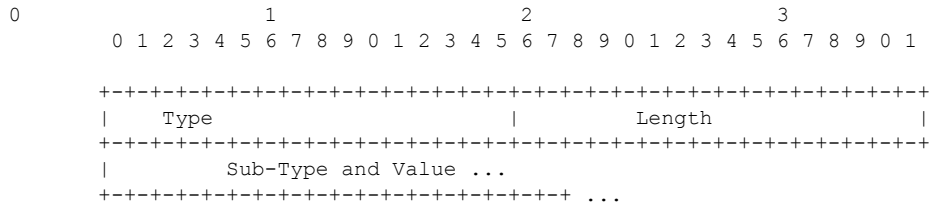
Readable Label Depth Capability (RLDC) is used by a head-end to insert Entropy Label (EL) at appropriate depth, so it could be read by transit nodes. MSD in contrary signals ability to push SID's stack of a particular depth.

MSD of type 1 (IANA registry) is used to signal the number of SIDs a node is capable of imposing to be used by a path computation element/controller. It is only relevant to the part of the stack created as the result of the computation. MSD advertises the total number of labels that a node is capable of imposing regardless of the number of service labels.

Node Maximum SID Depth Advertisement

A new Type/Length/Value (TLV) within the body called node MSD TLV is defined to carry the provisioned SID depth of the router originating the Router Information (RI) Link State Advertisement (LSA). Node MSD is the lowest MSD supported by the node.

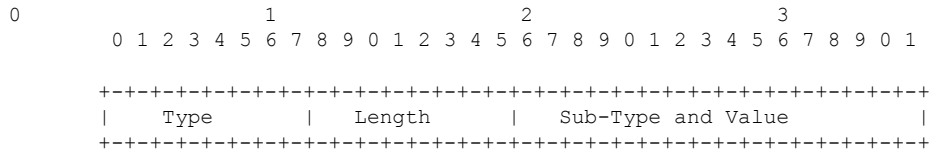
Node Maximum SID Depth Advertisement for OSPF



The Type (2 bytes) of this TLV is 12 (that is the suggested value to be assigned by IANA). Length is variable (minimum of 2, multiple of 2 octets) and represents the total length of value field. Value field consists of a 1 octet sub-type (IANA Registry) and 1 octet value.

Sub-Type 1, MSD and the value field contains maximum MSD of the device originating the RI LSA. Node maximum MSD falls in the range of 0-254. 0 represents lack of the ability to push MSD of any depth; any other value represents that of the node. This value should represent the lowest value supported by node.

Node Maximum SID Depth Advertisement for IS-IS



Node MSD is a sub-TLV for TLV 242. The type of this sub-TLV is 23. Length is variable (minimum of 2, multiple of 2 octets).

Sub-Type 1, MSD and the value field contains maximum MSD of the device originating the RI LSA. Node maximum MSD falls in the range of 0-254. 0 represents lack of the ability to push MSD of any depth; any other value represents that of the node. This value should represent the lowest value supported by node.

Getting the Node MSD from Hardware

IS-IS and OSPF are updated about the maximum SID Depth for the node from the underlying hardware. Based on that IS-IS and OSPF update the value in its TLVs.

Advertising the MSD to BGP-LS

lGP sends the information to LSLIB to make the MSD information available to BGP-LS. It can be node MSD or link MSD information. You also need to configure **distribute linkstate** under IS-IS for MSD to work. Perform the following steps to configure distribute link-state:

```
Device# configure terminal
Device(config)# router isis
Device(config-router)# distribute link-state
```

Verifying Advertise Maximum SID Depth by IS-IS and OSPF to BGP-LS

Verifying Advertise Maximum SID Depth Using IS-IS

The following show command is used to verify the node MSD TLV:

```
Device# show isis database verbose
Router CAP:   10.10.10.1, D:0, S:0
    Segment Routing: I:1 V:0, SRGB Base: 16000 Range: 8000
       Segment Routing Algorithms: SPF, Strict-SPF
      Router CAP:   10.2.2.2, D:0, S:0
    Segment Routing: I:1 V:0, SRGB Base: 16000 Range: 8000
    Segment Routing Algorithms: SPF, Strict-SPF
    Node-MSD
      MSD: 16
```

Verifying Advertise Maximum SID Depth Using OSPF

The following show command is used to verify the node MSD TLV:

```
Device# show ip ospf database opaque-area type router-information
TLV Type: Segment Routing Node MSD
   Length: 2
     Sub-type: Node Max Sid Depth, Value: 16
```

Feature Information for Advertise Maximum SID Depth by IS-IS and OSPF to BGP-LS

The following table provides release information about the feature or features described in this module. This table lists only the software release that introduced support for a given feature in a given software release train. Unless noted otherwise, subsequent releases of that software release train also support that feature.

Use Cisco Feature Navigator to find information about platform support and Cisco software image support. To access Cisco Feature Navigator, go to https://cfnng.cisco.com/. An account on Cisco.com is not required.

Table 1: Feature Information for Advertise Maximum SID Depth by IS-IS and OSPF to BGP-LS

Feature Name	Releases	Feature Information
Advertise Maximum SID Depth by IS-IS and OSPF to BGP-LS	Cisco IOS XE Amsterdam 17.3.2	In a Segment Routing (SR) enabled network a centralized controller that programs SR tunnels needs to know the Maximum Segment Identifier (SID) Depth (MSD) supported by the head-end at node and/or link granularity to push the SID stack of an appropriate depth. MSD is relevant to the head-end of a SR tunnel or binding-SID anchor node where binding-SID expansions might result in creation of a new SID stack. The following commands were introduced or modified by this feature: **distribute link-state**, **show isis database verbose**, **show ip ospf database opaque-area type router-information**.