Label Switched Path (LSP) Ping/Traceroute for Segment Routing (SR)
Egress Peer engineering Segment Identifiers (SIDs) with MPLS Data Plan
draft-hegde-mpls-spring-epe-oam-02

Abstract

Egress Peer Engineering is an application of Segment Routing to solve the problem of egress peer selection. The SR-based BGP-EPE solution allows a centralized (Software Defined Network, SDN) controller to program any egress peer. The EPE solution requires a node to program PeerNodeSID, PeerAdjSID, PeerSetSID as described in [I-D.ietf-spring-segment-routing-central-epe]. This document provides new sub-TLVs for EPE SIDs that would be used in Target stack TLV (Type 1) as defined in [RFC8029] for the EPE SIDs.

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].

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 January 4, 2020.
1. Introduction

Egress Peer Engineering (EPE) as defined in [I-D.ietf-spring-segment-routing-central-epe] is an effective mechanism to select the egress peer link based on different criteria. The EPE SIDs provide means to represent egress peer links. Many network deployments have built their networks consisting of multiple Autonomous Systems either for ease of operations or as a result of network mergers and acquisitions. The inter-AS links connecting the two Autonomous Systems could be traffic engineered using EPE-SIDs in this case as well. It is important to be able to validate the control plane to forwarding plane synchronization for these SIDs so that any anomaly can be detected easily by the operator.

This document provides Target FEC stack TLV definitions for EPE SIDs. Other procedures for mpls ping and traceroute as defined in [RFC8287] are applicable for EPE-SIDs as well.
2. FEC Definitions

As described in [RFC8287] sec 5, 3 new type of sub-TLVs for the Target FEC Stack TLV are defined for the Target FEC stack TLV corresponding to each label in the label stack

2.1. PeerAdjSID Sub-TLV

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<table>
<thead>
<tr>
<th>Type = TBD</th>
<th>Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>Local AS Number (4 octets)</td>
<td></td>
</tr>
<tr>
<td>Remote AS Number (4 octets)</td>
<td></td>
</tr>
<tr>
<td>Local BGP router ID (4 octets)</td>
<td></td>
</tr>
<tr>
<td>Remote BGP Router ID (4 octets)</td>
<td></td>
</tr>
<tr>
<td>Local Interface address (4/6 octets)</td>
<td></td>
</tr>
<tr>
<td>Remote Interface address (4/6 octets)</td>
<td></td>
</tr>
</tbody>
</table>
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Figure 1: PeerAdjSID Sub-TLV

Type : TBD

Length : variable based on ipv4/ipv6 interface address

Local AS Number :

4 octet unsigned integer representing the Member ASN inside the Confederation.[RFC5065]. The AS number corresponds to the AS to which PeerAdjSID advertising node belongs to.

Remote AS Number :

4 octet unsigned integer representing the Member ASN inside the Confederation.[RFC5065]. The AS number corresponds to the AS of the remote node for which the PeerAdjSID is advertised.
Local BGP Router ID:

4 octet unsigned integer of the advertising node representing the BGP Identifier as defined in [RFC4271] and [RFC6286].

Remote BGP Router ID:

4 octet unsigned integer of the receiving node representing the BGP Identifier as defined in [RFC4271] and [RFC6286].

Local Interface Address:

In case of PeerAdjSID BGP session IPv4/IPv6 local address should be specified in this field. For IPv4, this field is 4 octets; for IPv6, this field is 16 octets.

Remote Interface Address:

In case of PeerAdjSID BGP session IPv4/IPv6 remote address should be specified in this field. For IPv4, this field is 4 octets; for IPv6, this field is 16 octets.

2.2. PeerNodeSID Sub-TLV
Type : TBD

Length : variable based on ipv4/ipv6 interface address

Local AS Number :

4 octet unsigned integer representing the Member ASN inside the Confederation. [RFC5065]. The AS number corresponds to the AS to which PeerNodeSID advertising node belongs to.

Remote AS Number :

4 octet unsigned integer representing the Member ASN inside the Confederation. [RFC5065]. The AS number corresponds to the AS of the remote node for which the PeerNodeSID is advertised.

Local BGP Router ID :

4 octet unsigned integer representing the BGP router ID of the PeerNodeSID advertising node.

Remote BGP Router ID :

4 octet unsigned integer representing the BGP router ID of the remote node for which the PeerNodeSID is advertised.

Local Interface address1 (4/6 octets) :

IPv4/IPv6 address of the local interface.

Remote Interface address1 (4/6 octets) :

IPv4/IPv6 address of the remote interface.

Local Interface address2 (4/6 octets) :

IPv4/IPv6 address of the local interface.

Remote Interface address2 (4/6 octets) :

IPv4/IPv6 address of the remote interface.

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Figure 2: PeerNodeSID Sub-TLV

Type : TBD

Length : variable based on ipv4/ipv6 interface address

Local AS Number :

4 octet unsigned integer representing the Member ASN inside the Confederation. [RFC5065]. The AS number corresponds to the AS to which PeerNodeSID advertising node belongs to.

Remote AS Number :

4 octet unsigned integer representing the Member ASN inside the Confederation. [RFC5065]. The AS number corresponds to the AS of the remote node for which the PeerNodeSID is advertised.

Local BGP Router ID :

4 octet unsigned integer representing the BGP router ID of the PeerNodeSID advertising node.

Remote BGP Router ID :

4 octet unsigned integer representing the BGP router ID of the remote node for which the PeerNodeSID is advertised.
4 octet unsigned integer of the advertising node representing the BGP Identifier as defined in [RFC4271] and [RFC6286].

Remote BGP Router ID:

4 octet unsigned integer of the receiving node representing the BGP Identifier as defined in [RFC4271] and [RFC6286].

Number of interface pairs:

There may be a number of parallel interfaces and few or all of them may be used for the PeerNodeSID. It is very useful to traverse all the links that the PeerNodeSID represents and ensure connectivity. This field carries number of interface pairs the PeerNodeSID corresponds to.

AF flag:

0 represents IPv4 address family.

1 represents IPv6 address family.

Local Interface Address:

In case of PeerNodeSID, the interface local address ipv4/ipv6 which corresponds to the PeerNodeSID MUST be specified. For IPv4, this field is 4 octets; for IPv6, this field is 16 octets.

Remote Interface Address:

In case of PeerNodeSID, the interface remote address ipv4/ipv6 which corresponds to the PeerNodeSID MUST be specified. For IPv4, this field is 4 octets; for IPv6, this field is 16 octets.

2.3. PeerSetSID Sub-TLV
Figure 3: PeerSetSID Sub-TLV

Type : TBD

Length : variable based on ipv4/ipv6 interface address

Local AS Number :

4 octet unsigned integer representing the Member ASN inside the Confederation. [RFC5065]. The AS number corresponds to the AS to which PeerSetSID advertising node belongs to.

Remote AS Number :

4 octet unsigned integer representing the Member ASN inside the Confederation. [RFC5065]. The AS number corresponds to the AS of the remote node for which the PeerSetSID is advertised.

Advertising BGP Router ID :
4 octet unsigned integer of the advertising node representing the BGP Identifier as defined in [RFC4271] and [RFC6286].

Receiving BGP Router ID:

4 octet unsigned integer of the receiving node representing the BGP Identifier as defined in [RFC4271] and [RFC6286].

Number of interface pairs:

There may be a number of parallel interfaces and few or all of them may be used for the PeerNodeSID. It is very useful to traverse all the links that the PeerNodeSID represents and ensure connectivity. This field carries number of interface pairs the PeerNode SID corresponds to.

AF flag:

0 represents IPv4 address family.

1 represents IPv6 address family.

Local Interface Address:

In case of PeerNodeSID/PeerAdjSID, the interface local address ipv4/ipv6 which corresponds to the PeerNodeSID/PeerAdjSID MUST be specified. For IPv4, this field is 4 octets; for IPv6, this field is 16 octets.

Remote Interface Address:

In case of PeerNodeSID/PeerAdjSID, the interface remote address ipv4/ipv6 which corresponds to the PeerNodeSID/PeerAdjSID MUST be specified. For IPv4, this field is 4 octets; for IPv6, this field is 16 octets.

3. Security Considerations

The EPE SIDs are advertised for egress links for Egress Peer Engineering purposes or for inter-As links between co-operating ASes. When co-operating domains are involved, they can allow the packets arriving on trusted interfaces to reach the control plane and get processed. When EPE SIDs which are created for egress TE links where the neighbor AS is an independent entity, it may not allow packets arriving from external world to reach the control plane. In such deployments mpls OAM packets will be dropped by the neighboring AS.
4. IANA Considerations

New Target FEC stack sub-TLV from the "sub-TLVs for TLV types 1, 16 and 21" subregistry of the "Multi-Protocol Label switching (MPLs) Label Switched Paths (LSPs) Ping parameters" registry

PeerAdjSID segment ID Sub-TLV : TBD
PeerNode segment ID Sub-TLV : TBD
PeerSetSID segment ID Sub-TLV : TBD

5. Acknowledgments

6. References

6.1. Normative References

[I-D.ietf-spring-segment-routing-central-epe]


6.2. Informative References


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