IDR
Internet-Draft
Intended status: Standards Track
Expires: July 25, 2020

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January 22, 2020

BGP-LS Extensions for Transport Slice
draft-chen-idr-bgp-ls-transport-slice-00

Abstract

[I-D.peng-teas-network-slicing]defines a unified TN-slice identifier, AII(administrative instance identifier), to indicate the topology, computing, storage resources of the dedicated virtual network for both intra-domain and inter-domain network slicing scenarios. This draft defines extensions to BGP-LS protocol in order to advertise the information of the transport slice.

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 July 25, 2020.

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1. Introduction

For a packet network, network slicing requires the underlying network to support partitioning of the network resources to provide the client with dedicated (private) networking, computing, and storage resources drawn from a shared pool. [I-D.peng-teas-network-slicing]defines a unified TN-slice identifier, AII(administrative instance identifier), to indicate the topology, computing, storage resources of the dedicated virtual network for both intra-domain and inter-domain network slicing scenarios, and how to compute SR-BE or SR-TE path according to TN-slice Identifier combined with other criteria.

[I-D.zch-lsr-isis-network-slicing]defines the IS-IS extensions required to distribute TN-slice Identifier(that is AII) information in an AS.

In order to satisfy the need for applications that require topological visibility across one area or Autonomous System (AS). This document specifies extensions to the BGP Link-state address-family in order to advertise TN-slice specific. An external component (e.g., a controller) then can collect TN-slice information in the "northbound" direction.

2. Requirements Language

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "NOT RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in BCP 14 [RFC2119] [RFC8174] when, and only when, they appear in all capitals, as shown here.

3. BGP-LS Extensions for transport slice

The following transport slice information TLV is defined: BGP-LS[[RFC7752]]defines the link-state NLRI that can be a Node NLRI, a Link NLRI or a Prefix NLRI. BGP-LS[[RFC7752]]defines the TLVs that map link-state information to BGP link-state NLRI within the BGP-LS Attribute. This document adds additional BGP-LS Attribute TLVs in order to encode TN-slice information. It does not introduce any changes to the encoding of the BGP-LS NLRIs.

3.1. Node Attributes TLV

The TN-slice identifier Participation TLV is used in order to advertise which TN-slice a router wants to take part in. The TN-slice identifier Participation sub-TLV is a new TLV of the optional BGP-LS Attribute that is associated with the node NLRI. This information is derived from TN-slice identifier Participation sub-TLV of IS-IS (section 3 of [I-D.zch-lsr-isis-network-slicing].

The TN-slice identifier Participation TLV has the following format:

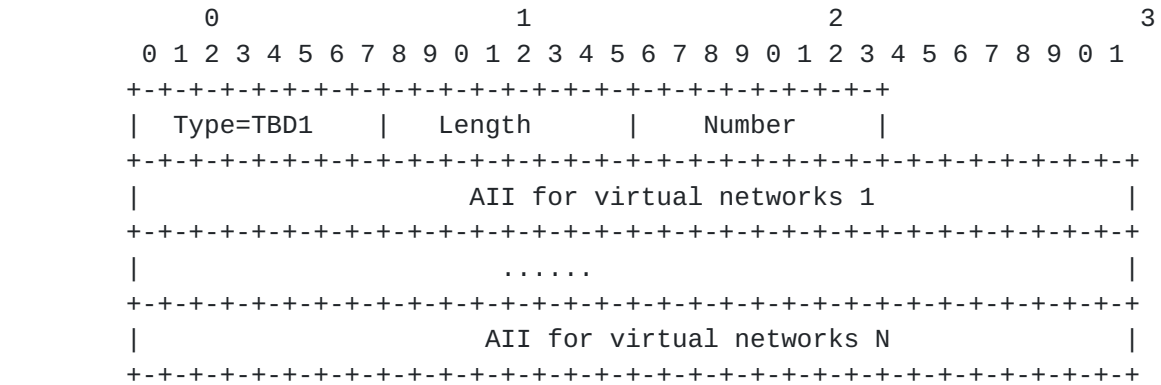

Figure 1: TN-slice identifier Participation TLV

where:

Type: TBD1 (Suggested value to be assigned by IANA)

Length: variable.

Number:Number of virtual networks.

AII for VN: allocate different TN-slice identifier (AII) for different virtual networks. AII is used to distinguish different virtual network resources.

3.2. Link Attribute TLVs

The following Link Attribute TLVs are are defined:

Type	Description
TBD2	The TN-slice Identifier list TLV
TBD3	L2 Bundle Member TN-Slice Identifier TLV
TBD4	Adjacency-SID for TN-slice Identifier TLV
TBD5	LAN-Adj-SID for TN-slice Identifier TLV

Table 1:The new Link Attribute TLVs

These TLVs should only be added to the BGP-LS Attribute associated with the Link NLRI.

3.2.1. TN-slice Identifier list sub-TLV

TN-slice Identifier can be used to color links to partition underlay resource. This section is derived from TN-slice Identifier list sub-TLV of IS-IS (section 4 of [I-D.zch-lsr-isis-network-slicing].)

The TN-slice Identifier list TLV has the following format:

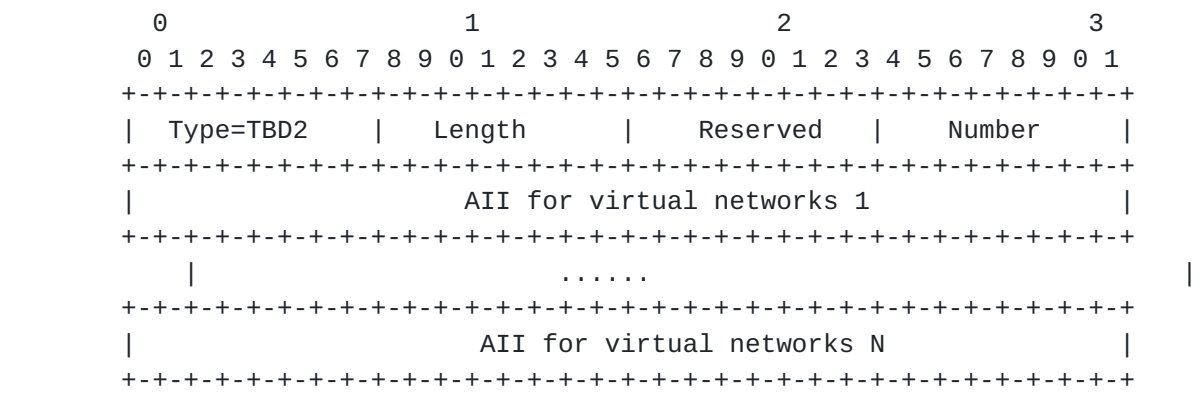

Figure 2

Type: TBD2 (Suggested value to be assigned by IANA)

Length: variable.

Number:Number of virtual networks.

AII for VN: allocate different TN-slice identifier (AII) for different virtual networks. AII is used to distinguish different virtual network resources.

3.2.2. L2 Bundle Member TN-Slice Identifier TLV

This TLV is used to advertise TN-slice Identifier for L2 Bundle Member associated with a parent L3 adjacency which is Point-to-Point. This information is derived from TN-slice Identifier for L2 Bundle Member sub-TLV of IS-IS (section 5 of [I-D.zch-lsr-isis-network-slicing].).The following format is defined for this sub-TLV:

Type: TBD3.

Length: variable

L2 Bundle Member TN-slice Identifier.There MUST be one TN-slice Identifier(AII) for each of the L2 Bundle Members advertised under the preceding L2 Bundle Member Attribute Descriptor.

3.2.3. Adjacency-SID for TN-slice Identifier TLV

This TLV is used to distinguish forwarding behavior of different virtual networks, Adjacency-SID need to be allocated per TN-slice Identifier. This information is derived from TN-slice Identifier for Adjacency-SID for TN-slice Identifier sub-TLV of IS-IS (section 7 of [I-D.zch-lsr-isis-network-slicing]).

The following format is defined for this sub-TLV:

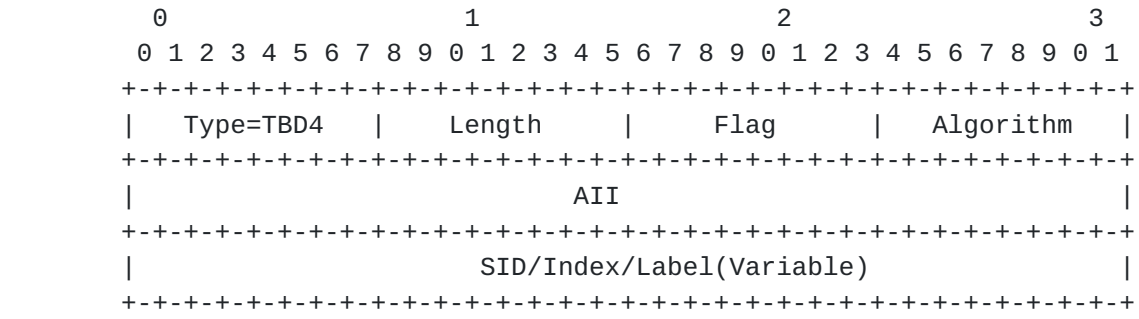

Figure 3

where:

Type:TBD4(Suggested value to be assigned by IANA)

Length: Variable. Depending on the size of the SID.

The "Flags" and "SID/Index/Label" fields are the same as the Adjacency-SID sub-TLV [I-D.ietf-isis-segment-routing-extensions].

AII: Identifies the TN-slice (AII) information corresponding to the Adjacency-SID.

3.2.4. LAN-Adj-SID for TN-slice Identifier TLV

In LAN subnetworks,[[I-D.ietf-isis-segment-routing-extensions]]defines the LAN-Adj-SID sub-TLV for a router to advertise the Adj-SID of each of its neighbors.

LAN-Adj-SID for TN-slice Identifier TLV is used to distinguish forwarding behavior of different virtual networks, Adjacency-SID need to be allocated per TN-slice Identifier. This information is derived from the LAN-Adj-SID for TN-slice Identifier sub-TLV of IS-IS (section 8 of I-D. [I-D.zch-lsr-isis-network-slicing]).

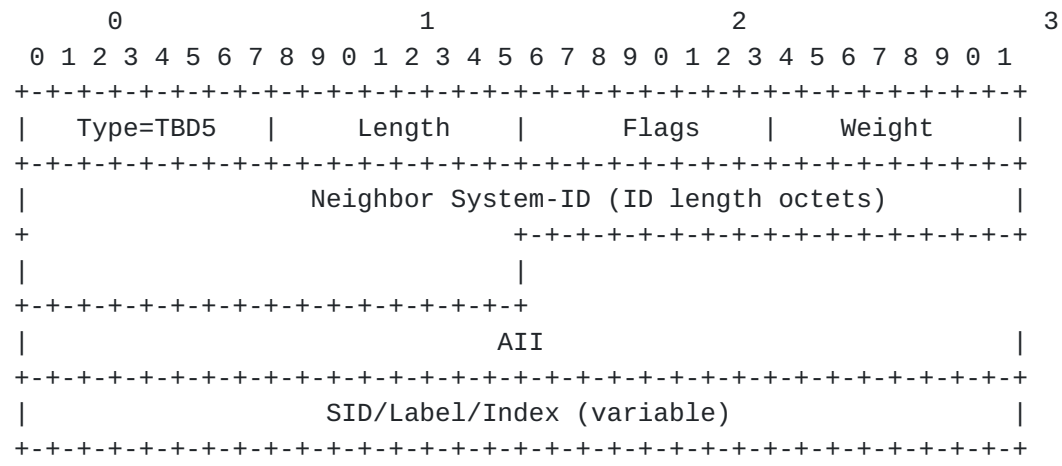

Figure 4

where:

Type:TBD5 (Suggested value to be assigned by IANA)

Length: Variable. Depending on the size of the SID.

The "Flags" and "SID/Index/Label" fields are the same as the Adjacency-SID sub-TLV [I-D.ietf-isis-segment-routing-extensions].

AII: Identifies the TN-slice (AII) information corresponding to the Adjacency-SID.

3.3. Prefix Attribute TLVs

Prefix-SID for TN-slice Identifier TLV should only be added to the BGP-LS Attribute associated with the Prefix NLRI describing the prefix of the IGP node. This TLV is used to distinguish forwarding behavior of different virtual networks.This information is derived from TN-slice identifier Participation sub-TLV of IS-IS (section 6 of [I-D.zch-lsr-isis-network-slicing]).

The Prefix-SID for TN-slice Identifier TLV has the following format:

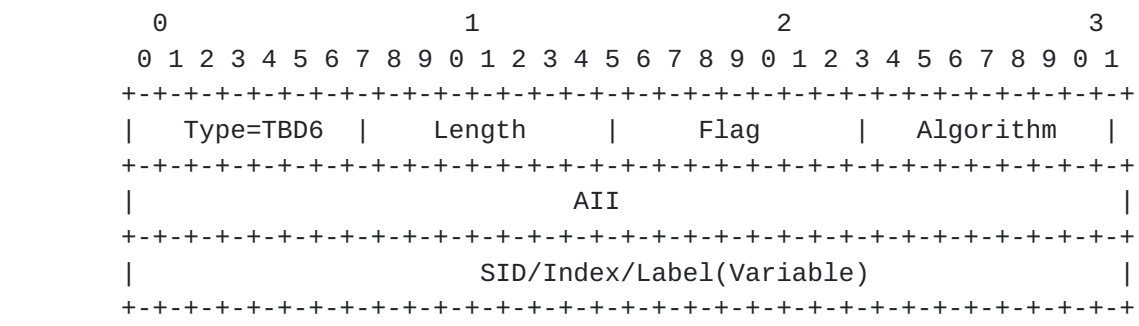

Figure 5

where:

Type:TBD6 (Suggested value to be assigned by IANA)

Length: Variable. Depending on the size of the SID.

The "Flags" and "SID/Index/Label" fields are the same as the Prefix-SID sub-TLV [I-D.ietf-isis-segment-routing-extensions].

Algorithm: Accoridng to section "3.2. SR-Algorithm Sub-TLV" of >[I-D.ietf-isis-segment-routing-extensions], two values can be set in this field.

o 0: Shortest Path First (SPF) algorithm based on link metric.

o 1: Strict Shortest Path First (SPF) algorithm based on link metric.

Note that[I-D.ietf-lsr-flex-algo]also allows user to define other algorithm values, i.e., FA-id within [128, 255], for the purpose of constraint based path computation.However, an FA-id algorithm value MUST not be set in this field, the reason is that FA-id has not semantic local within AII.

AII: Identifies the TN-slice (AII) information corresponding to the Prefix-SID.

4. IANA Considerations

This document does not define any new protocol or any extension to an existing protocol.

5. Acknowledgements

TBD

6. Normative References

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