

Networking Working Group  
Internet-Draft  
Intended status: Standards Track  
Expires: May 7, 2020

Yongqing. Zhu  
China Telecom  
Ran. Chen  
Shaofu. Peng  
ZTE Corporation  
Fengwei. Qin  
China Mobile  
November 4, 2019

## IS-IS Extensions to Support Packet Network Slicing using Segment Routing [draft-zch-lsr-isis-network-slicing-02](#)

### Abstract

[I-D.peng-teas-network-slicing] defines a unified administrative instance identifier to distinguish different virtual network resources for both intra-domain and inter-domain network slicing scenarios. This draft describes the IS-IS extensions required to support Packet Network Slicing using Segment Routing.

### 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 May 7, 2020.

### Copyright Notice

Copyright (c) 2019 IETF Trust and the persons identified as the document authors. All rights reserved.

This document is subject to [BCP 78](#) and the IETF Trust's Legal Provisions Relating to IETF Documents (<https://trustee.ietf.org/license-info>) in effect on the date of publication of this document. Please review these documents carefully, as they describe your rights and restrictions with respect

to this document. Code Components extracted from this document must include Simplified BSD License text as described in Section 4.e of the Trust Legal Provisions and are provided without warranty as described in the Simplified BSD License.

## Table of Contents

|                      |                                                               |                   |
|----------------------|---------------------------------------------------------------|-------------------|
| <a href="#">1.</a>   | Introduction . . . . .                                        | <a href="#">2</a> |
| <a href="#">2.</a>   | Conventions used in this document . . . . .                   | <a href="#">2</a> |
| <a href="#">3.</a>   | Advertising AII information as a new TE parameter of a link . | <a href="#">2</a> |
| <a href="#">4.</a>   | Advertising prefix-SID per AII information . . . . .          | <a href="#">4</a> |
| <a href="#">5.</a>   | Advertising Adjacency-SID per AII information . . . . .       | <a href="#">5</a> |
| <a href="#">6.</a>   | IANA Considerations . . . . .                                 | <a href="#">6</a> |
| <a href="#">6.1.</a> | AII list sub-TLV . . . . .                                    | <a href="#">6</a> |
| <a href="#">6.2.</a> | Prefix-SID for AII sub-TLV . . . . .                          | <a href="#">6</a> |
| <a href="#">6.3.</a> | Adjacency -SID for AII sub-TLV . . . . .                      | <a href="#">6</a> |
| <a href="#">7.</a>   | Security Considerations . . . . .                             | <a href="#">6</a> |
| <a href="#">8.</a>   | Acknowledgements . . . . .                                    | <a href="#">6</a> |
| <a href="#">9.</a>   | References . . . . .                                          | <a href="#">6</a> |
| <a href="#">9.1.</a> | Normative references . . . . .                                | <a href="#">6</a> |
| <a href="#">9.2.</a> | Informative references . . . . .                              | <a href="#">7</a> |
|                      | Authors' Addresses . . . . .                                  | <a href="#">8</a> |

## [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. The slices may be seen as virtual networks. [[I-D.peng-teas-network-slicing](#)] specifies a detailed mechanism to signal association of shared resources required to create and manage an NSI called "Administrative Instance Identifier" (AII).

This draft describes the IS-IS extensions required to distribute AII information in an AS.

## [2.](#) Conventions used in this document

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](#).

## [3.](#) Advertising AII information as a new TE parameter of a link

[RFC5305] describes extensions to the Intermediate System to Intermediate System (IS-IS) protocol to support Traffic Engineering (TE).



AII can be used to color links to partition underlay resource. This document defines a new extension of the existing IGP-TE mechanisms[RFC5305] to distribute AII information in an AS as a new TE parameter of a link.

The AII list sub-TLV has the following format:

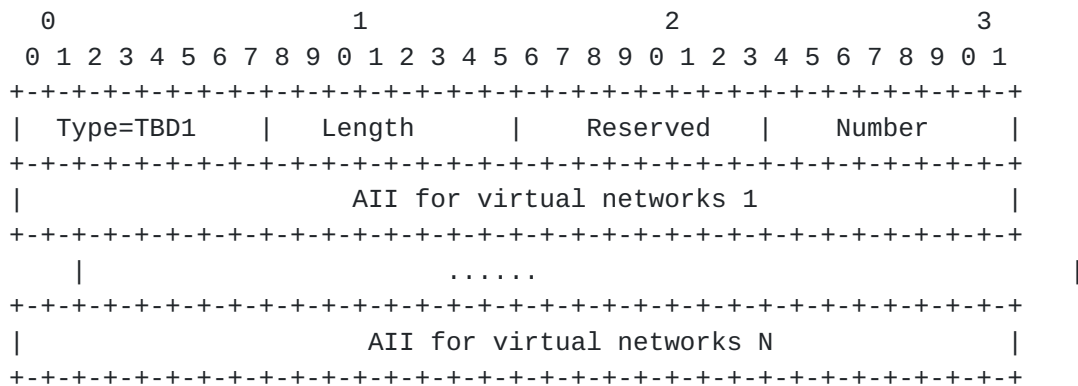


Figure 1

Type: 43 (Suggested value to be assigned by IANA)

Length: variable.

Number: Number of virtual networks.

AII for VN: allocate different AII for different virtual networks.  
AII is used to distinguish different virtual network resources.

This sub-TLV MAY be present in any of the following TLVs:

TLV-22 (Extended IS reachability) [[RFC5305](#)].

TLV-222 (Multitopology IS)[[RFC5120](#)].

TLV-23 (IS Neighbor Attribute)[[RFC5311](#)].

TLV-223 (Multitopology IS Neighbor Attribute)[[RFC5311](#)].

TLV-141 (inter-AS reachability information)[[RFC5316](#)].

This sub-TLV SHOULD appear once at most in each TLV. Indicates that a link MAY belong to multiple virtual networks.

Note that AII 0 does not require notification, and all links are always in AII 0 at the same time.



#### 4. Advertising prefix-SID per AII information

[I-D.ietf-isis-segment-routing-extensions] defines a new IS-IS sub-TLV: the Prefix Segment Identifier sub-TLV (Prefix-SID sub-TLV). The Prefix-SID sub-TLV carries the Segment Routing IGP-Prefix-SID as defined in [RFC8402], and is associated to a prefix advertised by a node.

To distinguish forwarding behavior of different virtual networks, Prefix-SID need to be allocated per AII and advertised in the IGP domain. This document defines a new extension of the existing Prefix-SID sub-TLV.

The Prefix-SID for AII sub-TLV has the following format:

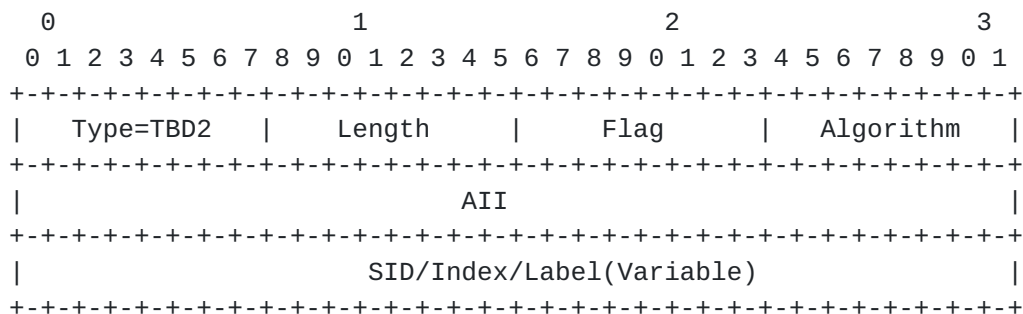


Figure 2

where:

Type:33 (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].

AII: Identifies the AII information corresponding to the Prefix-SID.

This sub-TLV MAY be present in any of the following TLVs:

TLV-135 (Extended IPv4 reachability) defined in [RFC5305].

TLV-235 (Multitopology IPv4 Reachability) defined in [RFC5120].

TLV-236 (IPv6 IP Reachability) defined in [RFC5308].

TLV-237 (Multitopology IPv6 IP Reachability) defined in [RFC5120].



This sub-TLV MAY appear multiple times in each TLV.

## 5. Advertising Adjacency-SID per AII information

[[I-D.ietf-isis-segment-routing-extensions](#)] defines a new IS-IS sub-TLV: the Adjacency Segment Identifier sub-TLV (Adj-SID sub-TLV). The Adj-SID sub-TLV is an optional sub-TLV carrying the Segment Routing IGP-Adjacency-SID as defined in [[RFC8402](#)].

To distinguish forwarding behavior of different virtual networks, Adjacency -SID need to be allocated per AII and advertised in the IGP domain. This document defines a new extension of the existing Adjacency-SID sub-TLV.

The Adjacency-SID for AII sub-TLV has the following format:

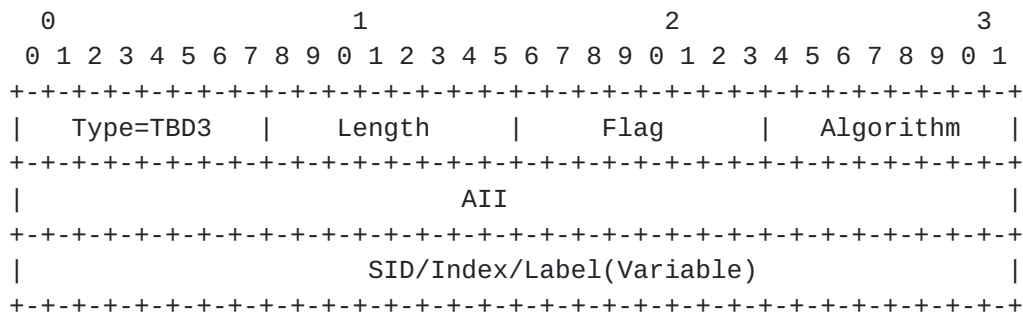


Figure 3

where:

Type:44 (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 AII information corresponding to the Adjacency-SID.

This sub-TLV MAY be present in any of the following TLVs:

TLV-22 (Extended IS reachability) [[RFC5305](#)].

TLV-222 (Multitopology IS)[[RFC5120](#)].

TLV-23 (IS Neighbor Attribute)[[RFC5311](#)].



TLV-223 (Multitopology IS Neighbor Attribute)[[RFC5311](#)].

TLV-141 (inter-AS reachability information)[[RFC5316](#)].

Multiple Adj-SID sub-TLVs MAY be associated with a single IS-neighbor. This sub-TLV MAY appear multiple times in each TLV.

## **6. IANA Considerations**

This document requests allocation for the following Sub-TLVs.

### **6.1. AII list sub-TLV**

This TLV shares sub-TLV space with existing "Sub-TLVs for TLVs 22, 222, 23, 223 and 141 registry".

Type:43(suggested - to be assigned by IANA).

### **6.2. Prefix-SID for AII sub-TLV**

This TLV shares sub-TLV space with existing "Sub-TLVs for TLVs 135, 235, 226 and 237 registry".

Type:33(suggested - to be assigned by IANA).

### **6.3. Adjacency -SID for AII sub-TLV**

This TLV shares sub-TLV space with existing "Sub-TLVs for TLVs 22, 222, 23, 223 and 141 registry".

Type:44(suggested - to be assigned by IANA).

## **7. Security Considerations**

TBD.

## **8. Acknowledgements**

TBD.

## **9. References**

### **9.1. Normative references**



[I-D.ietf-isis-segment-routing-extensions]

Previdi, S., Ginsberg, L., Filsfils, C., Bashandy, A., Gredler, H., and B. Decraene, "IS-IS Extensions for Segment Routing", [draft-ietf-isis-segment-routing-extensions-25](#) (work in progress), May 2019.

[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>>.

[RFC5120] Przygienda, T., Shen, N., and N. Sheth, "M-ISIS: Multi Topology (MT) Routing in Intermediate System to Intermediate Systems (IS-ISs)", [RFC 5120](#), DOI 10.17487/RFC5120, February 2008, <<https://www.rfc-editor.org/info/rfc5120>>.

[RFC5305] Li, T. and H. Smit, "IS-IS Extensions for Traffic Engineering", [RFC 5305](#), DOI 10.17487/RFC5305, October 2008, <<https://www.rfc-editor.org/info/rfc5305>>.

[RFC5308] Hopps, C., "Routing IPv6 with IS-IS", [RFC 5308](#), DOI 10.17487/RFC5308, October 2008, <<https://www.rfc-editor.org/info/rfc5308>>.

[RFC5311] McPherson, D., Ed., Ginsberg, L., Previdi, S., and M. Shand, "Simplified Extension of Link State PDU (LSP) Space for IS-IS", [RFC 5311](#), DOI 10.17487/RFC5311, February 2009, <<https://www.rfc-editor.org/info/rfc5311>>.

[RFC5316] Chen, M., Zhang, R., and X. Duan, "ISIS Extensions in Support of Inter-Autonomous System (AS) MPLS and GMPLS Traffic Engineering", [RFC 5316](#), DOI 10.17487/RFC5316, December 2008, <<https://www.rfc-editor.org/info/rfc5316>>.

[RFC8402] Filsfils, C., Ed., Previdi, S., Ed., Ginsberg, L., Decraene, B., Litkowski, S., and R. Shakir, "Segment Routing Architecture", [RFC 8402](#), DOI 10.17487/RFC8402, July 2018, <<https://www.rfc-editor.org/info/rfc8402>>.

## **9.2. Informative references**

[I-D.peng-teas-network-slicing]

Peng, S., Chen, R., and G. Mirsky, "Packet Network Slicing using Segment Routing", [draft-peng-teas-network-slicing-00](#) (work in progress), August 2019.



Authors' Addresses

Yongqing Zhu  
China Telecom

Email: zhuyq.gd@chinatelecom.cn

Ran Chen  
ZTE Corporation

Email: chen.ran@zte.com.cn

Shaofu Peng  
ZTE Corporation

Email: peng.shaofu@zte.com.cn

Fengwei Qin  
China Mobile

Email: qinfengwei@chinamobile.com

