BIER
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BGP extensions for BIER-TE
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Abstract

"Tree Engineering for Bit Index Explicit Replication" (BIER-TE) shares architecture and packet formats with BIER. BIER-TE forwards and replicates packets based on a BitString in the packet header, but every BitPosition of the BitString of a BIER-TE packet indicates one or more adjacencies.

This document describes BGP extensions for advertising the BIER-TE specific information.

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Table of Contents

1. Introduction

"Tree Engineering for Bit Index Explicit Replication" (BIER-TE) shares architecture and packet formats with BIER as described in [RFC8279]. BIER-TE forwards and replicates packets based on a BitString in the packet header, but every BitPosition of the BitString of a BIER-TE packet indicates one or more adjacencies as described in [RFC9262].

This document describes BGP extensions for advertising the BIER-TE specific information. More specifically, in this document, we define a new optional, non-transitive BGP attribute, referred to as the BIER-TE attribute, to convey the BIER-TE specific information.

These extensions are applicable to BGP based network scenarios.

1.1. 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.

2. BIER-TE TLV

[RFC9793] defines BIER Path attribute, and this document reuse the Bier Path attribute. The content of the BIER Path attribute is one or more BIER-TE TLV as shown in Figure 1. This TLV contains BIER-TE information associated with a Prefix.

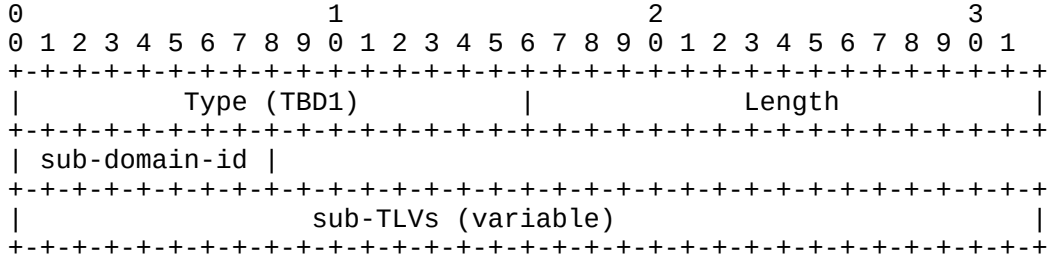

Figure 1: BIER-TE TLV

Type:A 2-octet field with value TBD1, see IANA Considerations section.

Length: 2 octets.

Subdomain-id: Unique value identifying the BIER-TE sub-domain, 1 octet.

Sub-TLVs: contains one or more sub-TLV. In this document, it defines three sub-TLV: the BIER-TE MPLS Encapsulation sub-TLV , the BIER-TE non-MPLS Encapsulation sub-TLV and the Bitposition sub-TLV.

2.1. The BIER-TE MPLS Encapsulation sub-TLV

This sub-TLV carries the information for the BIER MPLS encapsulation including the label range for a specific BitString length for a certain < MT,SD >. It is advertised within the BIER-TE TLV. This sub-TLV MAY appear multiple times within a single BIER-TE sub-TLV. If the same BitString length is repeated in multiple sub-TLVs inside the same BIER-TE TLV, the BIER-TE TLV MUST be ignored.

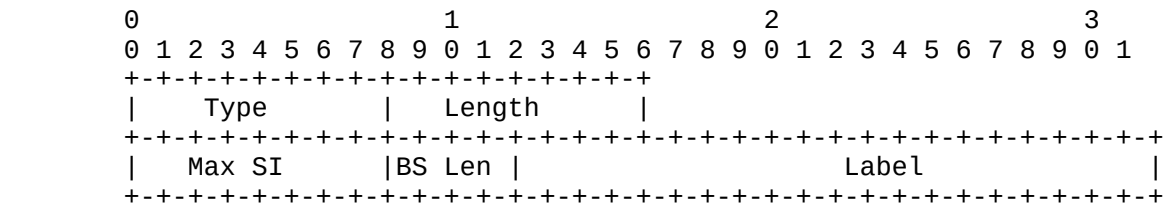

Figure 2: BIER-TE MPLS Encapsulation sub-TLV

Type:A 2-octet field with value TBD2.

Length:4

Max SI: Maximum Set Identifier (Section 1 of [RFC8279]) used in the encapsulation for this BIER subdomain for this BitString length, 1 octet. Each SI maps to a single label in the label range. The first label is for SI=0, the second label is for SI=1, etc. If the label associated with the Maximum Set Identifier exceeds the 20-bit range, the sub-sub-TLV MUST be ignored.

Local BitString Length (BS Len): Encoded BitString length as per [RFC8296]. 4 bits.

Label: First label of the range, 20 bits. The labels are as defined in [RFC8296].

2.2. The BIER-TE non-MPLS Encapsulation sub-TLV

The sub-TLV is advertised within the BIER-TE TLV.

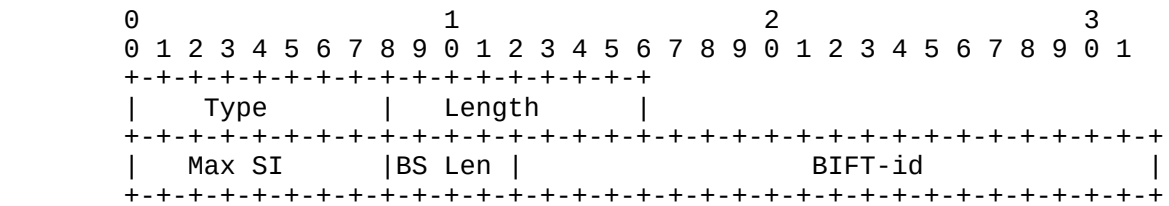

Figure 3: BIER-TE non-MPLS Encapsulation sub-TLV

Type:A 2-octet field with value TBD3.

Length:4

Max SI: Maximum Set Identifier (Section 1 of [RFC8279]) used in the encapsulation for this BIER subdomain for this BitString length, 1 octet. The first BIFT-id is for SI=0, the second BIFT-id is for SI=1, etc. If the BIFT-id associated with the Maximum Set Identifier exceeds the 20-bit range, the sub-TLV MUST be ignored.

Local BitString Length (BS Len): Encoded BitString length as per [RFC8296]. 4 bits.

BIFT-id: A 20 bit field encoding the first BIFT-id of the BIFT-id range. BIFT-id as per [I-D.ietf-bier-lsr-non-mpls-extensions].

2.3. The Bitposition sub-TLV

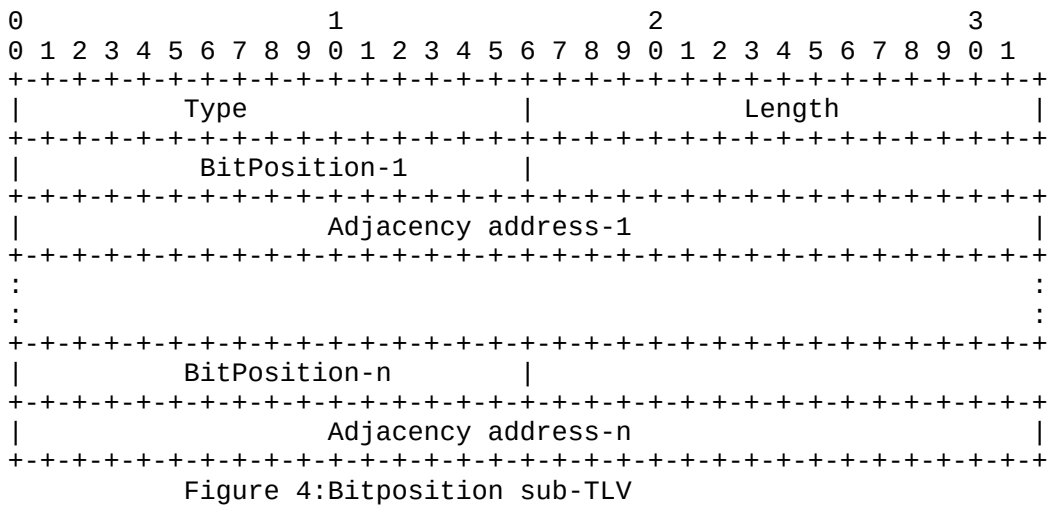

Figure 4:Bitposition sub-TLV

Type:A 2-octet field with value TBD4.

Length:4 if the Nexthop is IPv4 address and 16 if the Nexthop is IPv6 address

<BitPosition,Adjacency address>: A 2-octet field encoding the BitPosition associated with a adjacency address. Each adjacency address is a local or remote neighbor address.

The Bitposition sub-TLV is included in the BIER-TE TLV.

3. Acknowledgements

The authors would like to thank Zhaohui Zhang for his valuable suggestions.

4. IANA Considerations

The document requests new allocations from the IANA registries as follows:

4.1. The new BIER-TE TLVs

This document requests assigning code-points from the "BGP BIER Path Attribute Types" registry for the new BIER-TE TLV.

Value	Description	Reference
TBD1	BIER-TE	This document

4.2. The new BIER-TE Encapsulation sub-TLVs

This document requests assigning code-points from the "BGP BIER-TE TLV sub-TLV Types" for the new BIER-TE Encapsulation sub-TLVs.

Value	Description	Reference
TBD2	BIER-TE MPLS Encapsulation	This document
TBD3	BIER-TE non-MPLS Encapsulation	This document

4.3. The new Bitposition sub-TLV

This document requests assigning code-points from the "BGP BIER-TE TLV sub-TLV Types" for the new Bitposition sub-TLV.

Value	Description	Reference
TBD4	Bitposition sub-TLV	This document

5. Security Considerations

This document introduces no new security considerations beyond those already discussed in [RFC4271] and [RFC9262].

6. Normative References

[I-D.ietf-bier-lsr-non-mpls-extensions]
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[RFC8279] Wijnands, IJ., Ed., Rosen, E., Ed., Dolganow, A., Przygienda, T., and S. Aldrin, "Multicast Using Bit Index Explicit Replication (BIER)", RFC 8279, DOI 10.17487/RFC8279, November 2017, <https://www.rfc-editor.org/info/rfc8279>.

[RFC8296] Wijnands, IJ., Ed., Rosen, E., Ed., Dolganow, A., Tantsura, J., Aldrin, S., and I. Meilik, "Encapsulation for Bit Index Explicit Replication (BIER) in MPLS and Non-MPLS Networks", RFC 8296, DOI 10.17487/RFC8296, January 2018, <https://www.rfc-editor.org/info/rfc8296>.

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