

Workgroup: Network Working Group  
Internet-Draft: draft-ietf-bier-te-isis-05  
Published: 27 April 2023  
Intended Status: Standards Track  
Expires: 29 October 2023  
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## **IS-IS Extensions for BIER-TE**

### **Abstract**

This document describes IS-IS extensions for distributing the BitPositions configured on a Bit-Forwarding Router (BFR) in a "Bit Index Explicit Replication Traffic Engineering" (BIER-TE) domain.

### **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 [RFC2119] [RFC8174] when, and only when, they appear in all capitals, as shown here.

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## 1. Introduction

[RFC9262] introduces Bit Index Explicit Replication (BIER) Traffic/Tree Engineering (BIER-TE). It is an architecture for per-packet stateless explicit point to multipoint (P2MP) multicast path/tree. There are three types of BitPositions (BPs) in a BIER-TE domain: link BitPosition (BP), routed BP and localdecap BP. A link BP is a BP configured on a link from Bit-Forwarding Router (BFR) X to BFR Y for a forward connected adjacency from X to Y. A routed BP is a BP configured on BFR X for a forward routed adjacency from X to a remote BFR Z not directly connected to X. A localdecap BP is a BP configured on a BFR.

[RFC8401] describes IS-IS Extensions for distributing the BFR identifier (BFR-id) configured on a BFR. This document specifies IS-IS extensions for distributing the BitPositions configured a BFR in a BIER-TE domain. The BitPositions distributed may be used by a BFR as a Point of Local Repair (PLR) for Fast-ReRoute (FRR).

## 2. Extensions to IS-IS

This section describes protocol extensions to IS-IS for distributing the BitPositions configured on a BFR in a BIER-TE domain.

## 2.1. Link BitPosition

An Extended IS Reachability TLV (Type 22) defined in [\[RFC5305\]](#) may contain Sub-TLVs (such as those for TE) that apply to a link/interface to a neighbor. To encode multiple links or interfaces to neighbors, the structure inside TLV is repeated.

MT Intermediate Systems TLV (Type 222) defined in [\[RFC5120\]](#) may contain Sub-TLVs (such as those for TE) that apply to a link/interface. It is aligned with Extended IS Reachability TLV (Type 22) beside an additional two bytes in front at the beginning of the TLV for MT-ID.

Link-BP Sub-TLV of the following format is defined and used in Extended IS Reachability TLV (Type 22) and/or MT Intermediate Systems TLV (Type 222) to advertise a link BP.

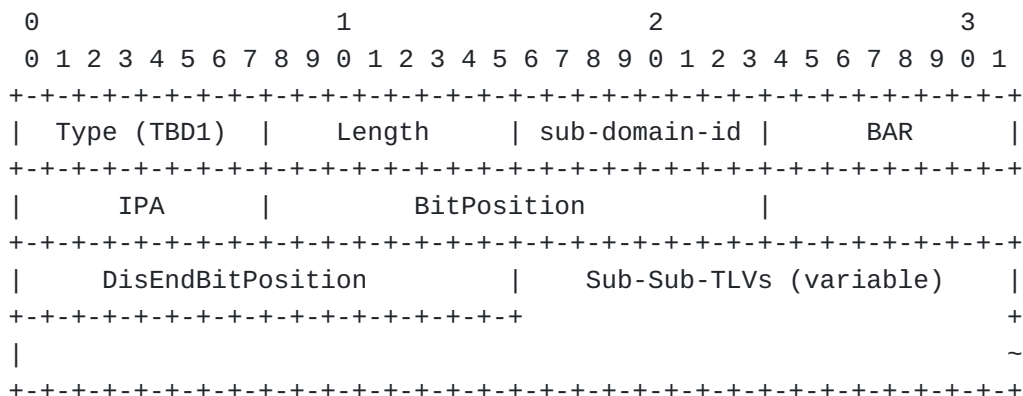


Figure 1: Link-BP Sub-TLV

**Type:** TBD1 is to be assigned by IANA.

**Length:** Variable, dependent on Sub-Sub-TLVs.

**sub-domain-id:** Unique value identifying a BIER-TE sub-domain.

**BAR:** Single-octet BIER Algorithm used to calculate underlay paths to reach other BFRs. Values are allocated from the "BIER Algorithm" registry defined in [\[RFC8401\]](#).

**IPA:** Single-octet IGP Algorithm used to either modify, enhance, or replace the calculation of underlay paths to reach other BFRs as defined by the BAR value. Values are defined in the "IGP Algorithm Types" registry.

**BitPosition:** A 2-octet field encoding the BitPosition locally configured on the link/interface to an Intermediate System neighbor.

A 2-octet field encoding the BitPosition of the connection on the designated Intermediate Systems (Dis) end. This field exists when the neighbor is a pseudonode. If the neighbor is not a pseudonode, this field MUST NOT exist. The DisEndBitPosition may be configured on the link/interface to a transit network (i.e., broadcast link or say LAN) as described in [[I-D.chen-bier-te-lan](#)].

## 2. Routed and Localdecap BitPositions

```

0                                     1                                     2                                     3
0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1
+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+
| Type (TBD2)      |      Length      |
+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+
|                                     Sub-TLVs                                     ~
+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+

```

**Type:** TBD2 is to be assigned by IANA.

**Sub-TLVs:** Sub-TLVs containing the Routed BitPositions and Localdecap BitPosition configured on a BFR.

[illegible]

Figure 3: Routed-BP Sub-TLV

**Type:**

1 is the type for routed BP.

**Length:** It is 8.

**BitPosition:** A 2-octet field encoding the BitPosition configured on a BFR for a forward routed adjacency to a remote BFR.

**BFR-id:** A 2-octet field encoding the BFR-id of the remote BFR.

**sub-domain-id, MT-ID, BAR and IPA:** They are the same as those described in [Section 2.1](#).

The Localdecap-BP Sub-TLV has the following format:

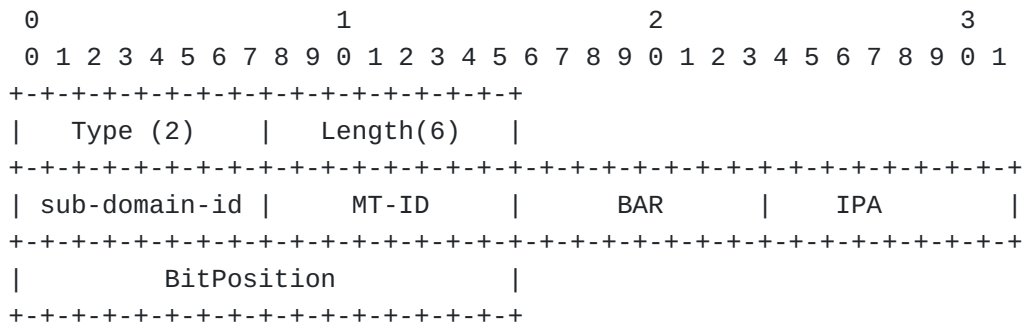


Figure 4: Localdecap-BP Sub-TLV

**Type:** 2 is the type for localdecap BP.

**Length:** It is 6.

**BitPosition:** A 2-octet field encoding the localdecap BitPosition configured on a BFR.

**sub-domain-id, MT-ID, BAR and IPA:** They are the same as those described in [Section 2.1](#).

### 3. Security Considerations

Protocol extensions defined in this document do not affect the IS-IS security.

### 4. IANA Considerations

Under "IS-IS Sub-TLVs for TLVs Advertising Neighbor Information" registry, IANA is requested to assign a new Sub-TLV Type for Link BP as follows:

Type	Description	22	23	25	141	222	223	reference
TBD1	Link BP	y	y	n	n	y	y	This document

IANA is requested to make a new allocation in the "IS-IS TLV Codepoint Registry" under the registry name "IS-IS TLV Codepoints" as follows:

TLV Type	TLV Name	reference
TBD2	Node BPs ID	This document

Note that TBD2 is less than 255.

IANA is requested to create a new sub-registry "Sub-TLVs for TLV type TBD2 (Node BPs TLV)" under the IANA IS-IS TLV Codepoints as follows:

Type	Name	reference
0	Reserved	
1	Link BP	This document
2	Localdecap BP	This document
3 - 255	Unassigned	

## 5. References

### 5.1. Normative References

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## Acknowledgments

The authors would like to thank Acee Lindem, Les Ginsberg, Tony Przygienda, Jeffrey Zhang and Toerless Eckert for their comments on this work.

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