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OSPF Extensions for BIER-TE

Abstract

This document describes OSPF extensions for distributing BitPositions configured on the links in "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. A link in a BIER-TE domain has its BitPositions. For a link between two nodes X and Y, there are two BitPositions for two forward connected adjacencies. These two adjacency BitPositions could be configured on nodes X and Y respectively. The BitPosition configured on X is the forward connected adjacency of Y. The BitPosition configured on Y is the forward connected adjacency of X.

This document proposes OSPF extensions for distributing BitPositions configured on the links in "Bit Index Explicit Replication Traffic Engineering" (BIER-TE) domain.

1.1. Terminology

BIER: Bit Index Explicit Replication.

BIER-TE: BIER Traffic Engineering.

BFR: Bit-Forwarding Router.

BFIR: Bit-Forwarding Ingress Router.

BFER: Bit-Forwarding Egress Router.

BFR-id:

BFR Identifier. It is a number in the range [1,65535].

BFR-NBR: BFR Neighbor.

LSA: Link State Advertisement.

OSPF: Open Shortest Path First.

2. Extensions to OSPFv2

This section describes protocol extensions to OSPFv2 for distributing BIER-TE information such as the BitPositions configured on the links in a BIER-TE domain.

[RFC7684] defines the OSPFv2 Extended Link TLV to advertise the information about a link. Multiple Link TLVs for the links of a router are included in the OSPFv2 Extended Link Opaque LSA of the router. The OSPFv2 Extended Link TLV has the following format:

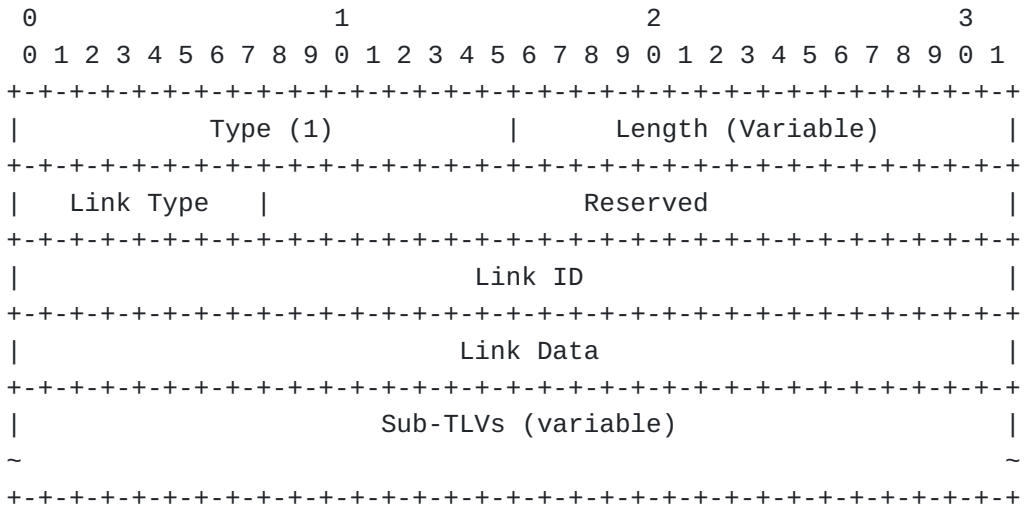


Figure 1: OSPFv2 Extended Link TLV

Type: 1.

Length: Variable, dependent on Sub-TLVs.

Link Type, Link ID and Link Data: They are defined in Section A.4.2 of [RFC2328].

Reserved: MUST be set to 0 on transmission and MUST be ignored on reception.

Under the OSPFv2 Extended Link TLV for a link, a Sub-TLV, called BIER-TE Sub-TLV, is defined for distributing BIER-TE information

about the link. A BIER-TE Sub-TLV is included in the Link TLV for a link of Link Type Point-to-Point or Broadcast (or say LAN or Transit Network). The BIER-TE Sub-TLV has the following format:

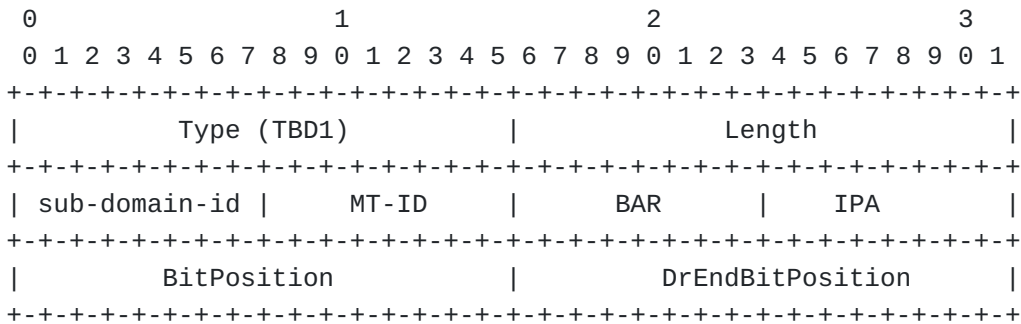


Figure 2: BIER-TE Sub-TLV

Type: TBD1 is to be assigned by IANA.

Length: Variable.

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

MT-ID: Multi-Topology ID identifying the topology that is associated with the 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 when the Link Type of the link in the OSPFv2 Extended Link TLV containing this Sub-TLV is 1 (i.e., Point-to-Point connection to another router) or 2 (i.e., connection to Transit Network or say LAN).

DrEndBitPosition: A 2-octet field encoding the BitPosition of the connection on the designated router (DR) end. This field is valid when the Link Type in the OSPFv2 Extended Link TLV containing this Sub-TLV is 2 (i.e., Transit Network or LAN). For the other value of the Link Type, this field MUST be ignored. The DrEndBitPosition may be configured on the link/interface to a transit network (i.e., broadcast link or say LAN).

3. Security Considerations

Protocol extensions defined in this document do not affect the OSPF security other than those as discussed in the Security Considerations section of [RFC7684].

4. IANA Considerations

Under "OSPFv2 Extended Link TLV Sub-TLVs registry" as defined in [RFC7684], IANA is requested to assign a new registry value for BIER-TE Sub-TLV as follows:

Value	Description	reference
TBD1 (25)	BIER-TE	This document

5. Acknowledgements

The authors would like to thank Acee Lindem and Tony Przygienda for their comments on this work.

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