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OSPFv3 Extensions for BIER-TE

Abstract

This document describes OSPFv3 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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This Internet-Draft is submitted in full conformance with the provisions of BCP 78 and BCP 79.

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Table of Contents

1. Introduction

[I-D.ietf-bier-te-arch] 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 OSPFv3 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.
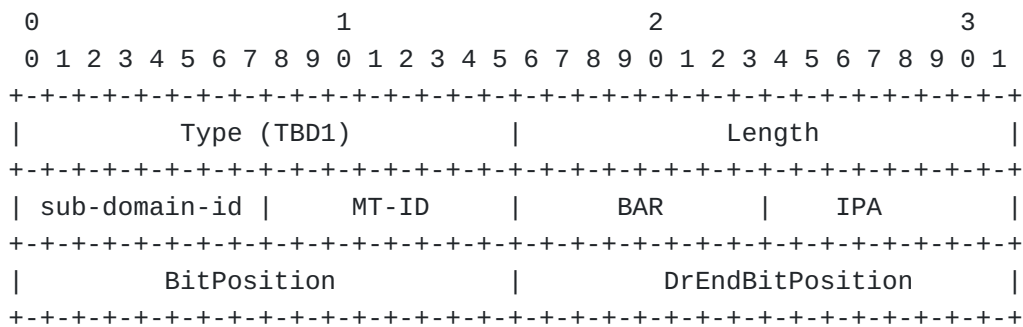
BFIR: Bit-Forwarding Ingress Router.

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 OSPFv3

This section describes protocol extensions to OSPFv3 for
distributing BIER-TE information such as the BitPositions configured
on the links in a BIER-TE domain.

[RFC8362] defines OSPFv3 Extended Router LSA, which may include
multiple Router-Link TLVs. A Router-Link TLV defines a single router
link. A Router-Link TLV may include a BIER-TE Sub-TLV below for
distributing BIER-TE information. This Sub-TLV has the following
format.

```
 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 (TBD1)           |            Length             |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
| sub-domain-id |    MT-ID      |     BAR       |     IPA       |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|        BitPosition            |        DrEndBitPosition       |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
```

           Figure 1: BIER-TE Sub-TLV in Router-Link TLV

Type: TBD1 is to be assigned by IANA.

Length: 8 (octets).

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 Router-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 Router-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).

Note that if each of BitPosition and DrEndBitPosition uses more than
2 octets, we use 4 or more octets for each of them.

3. Security Considerations

TBD.

4. IANA Considerations

Under "OSPFv3 Extended-LSA Sub-TLVs registry" as defined in
[RFC8362], IANA is requested to assign a new registry value for
BIER-TE Sub-TLV as follows:

```
+==============+===================+====================+
|  Value       | Description       |    reference       |
+==============+===================+====================+
|  TBD1 (30)   | 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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