

Workgroup: Network Working Group  
Internet-Draft: draft-chen-bier-te-ospfv3-01  
Published: 27 July 2021  
Intended Status: Standards Track  
Expires: 28 January 2022  
Authors: H. Chen      M. McBride      A. Wang  
         Futurewei      Futurewei      China Telecom  
         G. Mishra      Y. Fan      L. Liu      X. Liu  
         Verizon Inc.      Casa Systems      Fujitsu      Volta Networks  
**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.

## 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 28 January 2022.

## Copyright Notice

Copyright (c) 2021 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

- [1. Introduction](#)
  - [1.1. Terminology](#)
- [2. Extensions to OSPFv3](#)
- [3. Security Considerations](#)
- [4. IANA Considerations](#)
- [5. Acknowledgements](#)
- [6. References](#)
  - [6.1. Normative References](#)
  - [6.2. Informative References](#)
- [Authors' Addresses](#)

## 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 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.

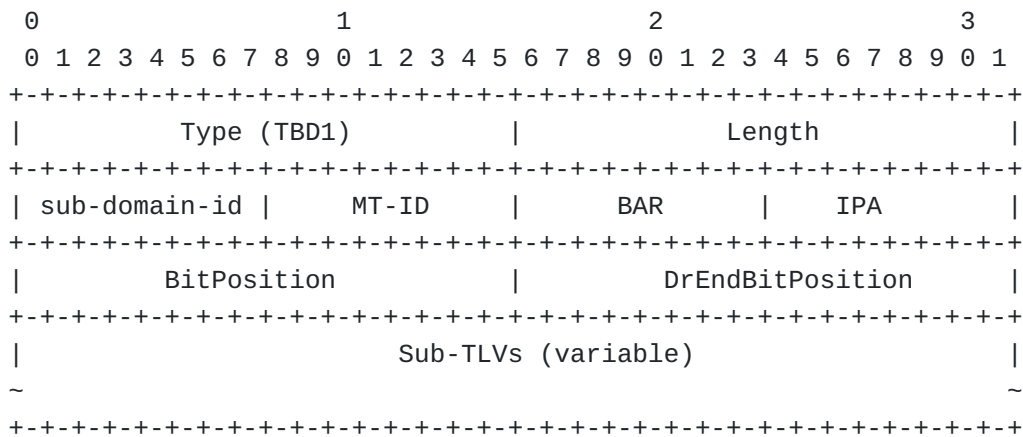


Figure 1: BIER-TE Sub-TLV in Router-Link TLV

**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.

**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).

No Sub-TLV is defined so far. 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.

6. References

6.1. Normative References

[I-D.ietf-bier-te-arch] Eckert, T., Cauchie, G., and M. Menth, "Tree Engineering for Bit Index Explicit Replication (BIER-TE)", Work in Progress, Internet-Draft, draft-ietf-bier-

te-arch-10, 9 July 2021, <<https://www.ietf.org/archive/id/draft-ietf-bier-te-arch-10.txt>>.

- [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>>.
- [RFC5226] Narten, T. and H. Alvestrand, "Guidelines for Writing an IANA Considerations Section in RFCs", RFC 5226, DOI 10.17487/RFC5226, May 2008, <<https://www.rfc-editor.org/info/rfc5226>>.
- [RFC8174] Leiba, B., "Ambiguity of Uppercase vs Lowercase in RFC 2119 Key Words", BCP 14, RFC 8174, DOI 10.17487/RFC8174, May 2017, <<https://www.rfc-editor.org/info/rfc8174>>.
- [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>>.
- [RFC8362] Lindem, A., Roy, A., Goethals, D., Reddy Vallem, V., and F. Baker, "OSPFv3 Link State Advertisement (LSA) Extensibility", RFC 8362, DOI 10.17487/RFC8362, April 2018, <<https://www.rfc-editor.org/info/rfc8362>>.

## 6.2. Informative References

- [RFC5250] Berger, L., Bryskin, I., Zinin, A., and R. Coltun, "The OSPF Opaque LSA Option", RFC 5250, DOI 10.17487/RFC5250, July 2008, <<https://www.rfc-editor.org/info/rfc5250>>.
- [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>>.
- [RFC8401] Ginsberg, L., Ed., Przygienda, T., Aldrin, S., and Z. Zhang, "Bit Index Explicit Replication (BIER) Support via IS-IS", RFC 8401, DOI 10.17487/RFC8401, June 2018, <<https://www.rfc-editor.org/info/rfc8401>>.

**[RFC8444]**

Psenak, P., Ed., Kumar, N., Wijnands, IJ., Dolganow, A., Przygienda, T., Zhang, J., and S. Aldrin, "OSPFv2 Extensions for Bit Index Explicit Replication (BIER)", RFC 8444, DOI 10.17487/RFC8444, November 2018, <<https://www.rfc-editor.org/info/rfc8444>>.

**[RFC8556]**

Rosen, E., Ed., Sivakumar, M., Przygienda, T., Aldrin, S., and A. Dolganow, "Multicast VPN Using Bit Index Explicit Replication (BIER)", RFC 8556, DOI 10.17487/RFC8556, April 2019, <<https://www.rfc-editor.org/info/rfc8556>>.

**Authors' Addresses**

Huaimo Chen  
Futurewei  
Boston, MA,  
United States of America

Email: [Huaimo.chen@futurewei.com](mailto:Huaimo.chen@futurewei.com)

Mike McBride  
Futurewei

Email: [michael.mcbride@futurewei.com](mailto:michael.mcbride@futurewei.com)

Aijun Wang  
China Telecom  
Beiqijia Town, Changping District  
Beijing  
102209  
China

Email: [wangaj3@chinatelecom.cn](mailto:wangaj3@chinatelecom.cn)

Gyan S. Mishra  
Verizon Inc.  
13101 Columbia Pike  
Silver Spring, MD 20904  
United States of America

Phone: [301 502-1347](tel:301-502-1347)  
Email: [gyan.s.mishra@verizon.com](mailto:gyan.s.mishra@verizon.com)

Yanhe Fan  
Casa Systems  
United States of America

Email: [yfan@casa-systems.com](mailto:yfan@casa-systems.com)

Lei Liu  
Fujitsu  
United States of America

Email: [liulei.kddi@gmail.com](mailto:liulei.kddi@gmail.com)

Xufeng Liu  
Volta Networks  
McLean, VA  
United States of America

Email: [xufeng.liu.ietf@gmail.com](mailto:xufeng.liu.ietf@gmail.com)