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P. Psenak, Ed.
N. Kumar
IJ. Wijnands
Cisco
A. Dolganow
Nokia
T. Przygienda
J. Zhang
Juniper Networks, Inc.
S. Aldrin
Google, Inc.
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OSPF Extensions for BIER
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Abstract

Bit Index Explicit Replication (BIER) is an architecture that provides multicast forwarding through a "BIER domain" without requiring intermediate routers to maintain multicast related per-flow state. Neither does BIER require an explicit tree-building protocol for its operation. A multicast data packet enters a BIER domain at a "Bit-Forwarding Ingress Router" (BFIR), and leaves the BIER domain at one or more "Bit-Forwarding Egress Routers" (BFERs). The BFIR router adds a BIER header to the packet. Such header contains a bit-string in which each bit represents exactly one BFER to forward the packet to. The set of BFERs to which the multicast packet needs to be forwarded is expressed by the according set of bits set in BIER packet header.

This document describes the OSPF protocol extension required for BIER with MPLS encapsulation.

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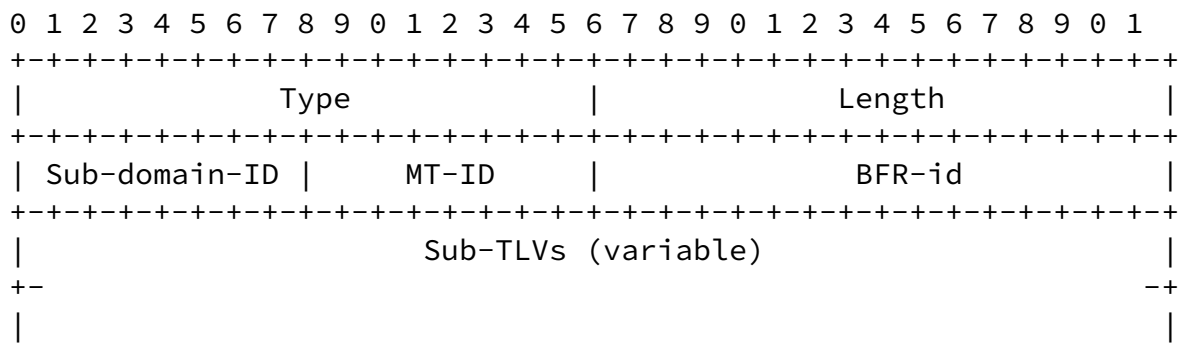
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[1.](#) Introduction

Bit Index Explicit Replication (BIER) is an architecture that provides optimal multicast forwarding through a "BIER domain" without requiring intermediate routers to maintain any multicast related per-flow state. Neither does BIER explicitly require a tree-building protocol for its operation. A multicast data packet enters a BIER domain at a "Bit-Forwarding Ingress Router" (BFIR), and leaves the



Type: TBD1

Length: variable

Sub-domain-ID: Unique value identifying the BIER sub-domain within the BIER domain, as described in section 1 of [\[I-D.ietf-bier-architecture\]](#).

MT-ID: Multi-Topology ID (as defined in [\[RFC4915\]](#)) that identifies the topology that is associated with the BIER sub-domain.

BFR-id: A 2 octet field encoding the BFR-id, as documented in section 2 of [\[I-D.ietf-bier-architecture\]](#). If the BFR is not locally configured with a valid BFR-id, the value of this field is set to invalid BFR-id per [\[I-D.ietf-bier-architecture\]](#).

Each BFR sub-domain MUST be associated with one and only one OSPF topology that is identified by the MT-ID. If the association between BIER sub-domain and OSPF topology advertised in the BIER sub-TLV by other BFRs is in conflict with the association locally configured on the receiving router, the BIER Sub-TLV MUST be ignored.

If a BFR advertises the same Sub-domain-ID in multiple BIER sub-TLVs, the BRF MUST be treated as if it did not advertise a BIER sub-TLV for such sub-domain.

All BFRs MUST detect advertisement of duplicate valid BFR-IDs for a given MT-ID and Sub-domain-ID. When such duplication is detected all BFRs advertising duplicates MUST be treated as if they did not advertise a valid BFR-id.

2.2. BIER MPLS Encapsulation Sub-TLV

The BIER MPLS Encapsulation Sub-TLV is a Sub-TLV of the BIER Sub-TLV. The BIER MPLS Encapsulation Sub-TLV is used in order to advertise MPLS specific information used for BIER. It MAY appear multiple times in the BIER Sub-TLV.

The BIER MPLS Encapsulation Sub-TLV has the following format:



Type: TBD2

Length: 4 octets

Label Range Size: A 1 octet field encoding the label range size of the label range. It MUST be greater than 0, otherwise the advertising router MUST be treated as if it did not advertise a BIER sub-TLV.

Label Range Base: A 3 octet field, where the 20 rightmost bits represent the first label in the label range.

Bit String Length: A 1 octet field encoding the supported BitString length associated with this BFR-prefix. The values allowed in this field are specified in section 2 of [\[I-D.ietf-bier-mpls-encapsulation\]](#).

The "label range" is the set of labels beginning with the label range base and ending with ((label range base)+(label range size)-1). A unique label range is allocated for each BitStream length and Sub-domain-ID. These labels are used for BIER forwarding as described in [\[I-D.ietf-bier-architecture\]](#) and


```

+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+
| Tree Type      |
+-----+-----+-----+-----+-----+

```

Type: TBD3.

Length: 1 octet.

Tree Type: 1 octet

[2.4.](#) Optional BIER sub-domain BSL conversion Sub-TLV

The BIER sub-domain BSL conversion Sub-TLV is a Sub-TLV of the BIER Sub-TLV. This sub-TLV indicates whether the BFR is capable of imposing a different Bit String Length (BSL) than the one it received in a BIER encapsulated packet. Such a capability may allow future, advanced tree types which ensure simple migration procedures from one BSL to another in a given MT-ID and Sub-domain-ID or prevent stable blackholes in scenarios where not all routers support the same set of BSLs in a given MT-ID and Sub-domain-ID.

The BIER sub-domain BSL conversion Sub-TLV is optional and its absence indicates that the router is NOT capable of imposing different BSLs but will always forward the packet with the BSL unchanged. This sub-TLV MAY occur at most once in a given BIER sub-TLV. If multiple occurrences of this sub-TLV are received in a given BIER sub-TLV, the BIER sub-TLV MUST be ignored.

The BIER sub-domain BSL conversion Sub-TLV has 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                                     Length                                     |
+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+

```

Type: TBD4.

Length: 0 octets.

[2.5.](#) Flooding scope of BIER Information

The flooding scope of the OSPF Extended Prefix Opaque LSA [[RFC7684](#)] that is used for advertising the BIER Sub-TLV is set to area-local. To allow BIER deployment in a multi-area environment, OSPF must propagate BIER information between areas. The following procedure is used in order to propagate BIER related information between areas:

When an OSPF Area Border Router (ABR) advertises a Type-3 Summary LSA from an intra-area or inter-area prefix to all its attached areas, it will also originate an Extended Prefix Opaque LSA, as described in [[RFC7684](#)]. The flooding scope of the Extended Prefix Opaque LSA type will be set to area-local. The route-type in the OSPF Extended Prefix TLV is set to inter-area. When determining whether a BIER Sub-TLV should be included in this LSA, an OSPF ABR will:

- Examine its best path to the prefix in the source area and find the advertising router associated with the best path to that prefix.

- Determine if such advertising router advertised a BIER Sub-TLV for the prefix. If yes, the ABR will copy the information from such BIER MPLS Sub-TLV when advertising BIER MPLS Sub-TLV to each attached area.

[3.](#) Security Considerations

Implementations must assure that malformed TLV and Sub-TLV permutations do not result in errors which cause hard OSPF failures.

[4.](#) IANA Considerations

The document requests three new allocations from the OSPF Extended Prefix sub-TLV registry as defined in [[RFC7684](#)].

BIER Sub-TLV: TBD1

BIER Tree Type Sub-TLV: TBD3

BIER sub-domain BSL conversion Sub-TLV

5. Acknowledgments

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6. Normative References

[I-D.ietf-bier-architecture]

Wijnands, I., Rosen, E., Dolganow, A., Przygienda, T., and S. Aldrin, "Multicast using Bit Index Explicit Replication", [draft-ietf-bier-architecture-06](#) (work in progress), April 2017.

[I-D.ietf-bier-mpls-encapsulation]

Wijnands, I., Rosen, E., Dolganow, A., Tantsura, J., Aldrin, S., and I. Meilik, "Encapsulation for Bit Index Explicit Replication in MPLS and non-MPLS Networks", [draft-ietf-bier-mpls-encapsulation-07](#) (work in progress), June 2017.

[RFC2119] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", [BCP 14](#), [RFC 2119](#), DOI 10.17487/RFC2119, March 1997, <<http://www.rfc-editor.org/info/rfc2119>>.

[RFC4915] Psenak, P., Mirtorabi, S., Roy, A., Nguyen, L., and P. Pillay-Esnault, "Multi-Topology (MT) Routing in OSPF", [RFC 4915](#), DOI 10.17487/RFC4915, June 2007, <<http://www.rfc-editor.org/info/rfc4915>>.

[RFC7684] Psenak, P., Gredler, H., Shakir, R., Henderickx, W., Tantsura, J., and A. Lindem, "OSPFv2 Prefix/Link Attribute Advertisement", [RFC 7684](#), DOI 10.17487/RFC7684, November 2015, <<http://www.rfc-editor.org/info/rfc7684>>.

Authors' Addresses

Peter Psenak (editor)
Cisco
Apollo Business Center
Mlynske nivy 43
Bratislava 821 09
Slovakia

Email: ppsenak@cisco.com

Nagendra Kumar
Cisco
7200 Kit Creek Road
Research Triangle Park, NC 27709
US

Email: naikumar@cisco.com

IJsbrand Wijnands
Cisco
De Kleetlaan 6a
Diegem 1831
Belgium

Email: ice@cisco.com

Andrew Dolganow
Nokia
750 Chai Chee Rd
06-06 Viva Business Park
Singapore 469004

Email: andrew.dolganow@alcatel-lucent.com

Tony Przygienda
Juniper Networks, Inc.
10 Technology Park Drive
Westford, MA 01886
USA

Email: prz@juniper.net

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Jeffrey Zhang
Juniper Networks, Inc.
10 Technology Park Drive
Westford, MA 01886
USA

Email: zzhang@juniper.net

Sam Aldrin
Google, Inc.
1600 Amphitheatre Parkway
Mountain View, CA
USA

Email: aldrin.ietf@gmail.com

