

Network Working Group  
Internet-Draft  
Intended status: Standards Track  
Expires: February 26, 2016

X. Xu  
M. Chen  
Huawei  
K. Patel  
I. Wijnands  
Cisco  
A. Przygienda  
Ericsson  
August 25, 2015

BGP Extensions for BIER  
draft-xu-bier-idr-extensions-00

## Abstract

Bit Index Explicit Replication (BIER) is a new multicast forwarding architecture which doesn't require an explicit tree-building protocol and doesn't require intermediate routers to maintain any multicast state. BIER is applicable in a multi-tenant data center network environment for efficient delivery of Broadcast, Unknown-unicast and Multicast (BUM) traffic while eliminating the need for maintaining a huge amount of multicast state in the underlay. This document describes BGP extensions for advertising the BIER-specific information. These extensions are applicable in those multi-tenant data centers where BGP instead of IGP is deployed as an underlay for network reachability advertisement. These extensions may also be applicable in other scenarios.

## 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 <http://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 February 26, 2016.

Internet-Draft

BGP Extensions for BIER

August 2015

## Copyright Notice

Copyright (c) 2015 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 (<http://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

<a href="#">1.</a>	Introduction . . . . .	<a href="#">2</a>
<a href="#">1.1.</a>	Requirements Language . . . . .	<a href="#">3</a>
<a href="#">2.</a>	Terminology . . . . .	<a href="#">3</a>
<a href="#">3.</a>	BIER Path Attribute . . . . .	<a href="#">3</a>
<a href="#">4.</a>	Originating BIER Attribute . . . . .	<a href="#">4</a>
<a href="#">5.</a>	Restrictions on Sending/Receiving . . . . .	<a href="#">5</a>
<a href="#">6.</a>	Deployment Considerations . . . . .	<a href="#">5</a>
<a href="#">7.</a>	Acknowledgements . . . . .	<a href="#">5</a>
<a href="#">8.</a>	IANA Considerations . . . . .	<a href="#">5</a>
<a href="#">9.</a>	Security Considerations . . . . .	<a href="#">6</a>
<a href="#">10.</a>	References . . . . .	<a href="#">6</a>
<a href="#">10.1.</a>	Normative References . . . . .	<a href="#">6</a>
<a href="#">10.2.</a>	Informative References . . . . .	<a href="#">6</a>
	Authors' Addresses . . . . .	<a href="#">7</a>

[1.](#) Introduction

Bit Index Explicit Replication (BIER) [[I-D.ietf-bier-architecture](#)] is a new multicast forwarding architecture which doesn't require an explicit tree-building protocol and doesn't require intermediate routers to maintain any multicast state. BIER is applicable in a multi-tenant data center network environment for efficient delivery of Broadcast, Unknown-unicast and Multicast (BUM) traffic while eliminating the need for maintaining a huge amount of multicast state in the underlay [[I-D.ietf-bier-use-cases](#)]. This document describes BGP extensions for advertising the BIER-specific information. More

specifically, in this document, we define a new optional, non-transitive BGP attribute, referred to as the BIER attribute, to convey the BIER-specific information such as BFR-ID, BitString Length (BSL) and so on. In addition, this document specifies procedures to prevent the BIER attribute from "leaking out" of a BIER domain .

These extensions are applicable in those multi-tenant data centers where BGP instead of IGP is used as an underlay [[I-D.ietf-rtgwg-bgp-routing-large-dc](#)]. These extensions may also be applicable to other BGP based network scenarios.

### [1.1](#). 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 [RFC 2119](#) [[RFC2119](#)].

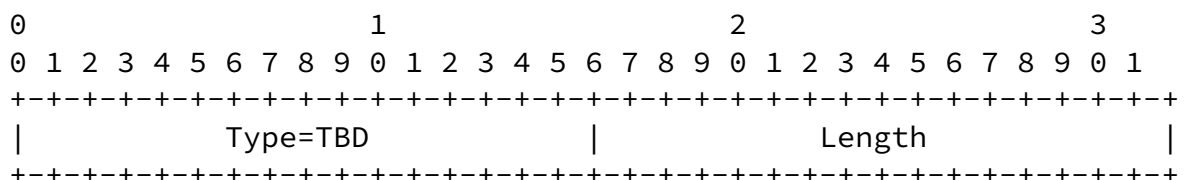
## [2](#). Terminology

This memo makes use of the terms defined in [[RFC4271](#)] and [[I-D.ietf-bier-architecture](#)].

## [3](#). BIER Path Attribute

This draft defines a new optional, transitive BGP path attribute, referred to as the BIER attribute. This attribute can be attached to a BGP UPDATE message by the originator so as to indicate the BIER-specific information of a particular BFR which is identified by the /32 or /128 address prefix contained in the NLRI. In other words, if the BIER path attribute is present, the NLRI is treated by BIER as a "BFR-prefix". When creating a BIER attribute, a BFR needs to include one BIER TLV for every <Sub-domain, BFR-ID> pair that it supports.

The attribute type code for the BIER Attribute is TBD. The value field of the BIER Attribute contains one or more BIER TLV as shown in Figure 1.



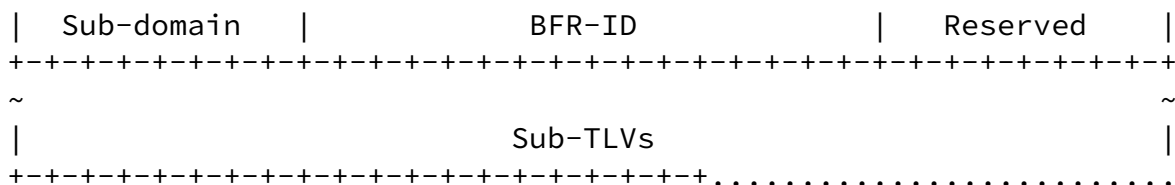


Figure 1:BIER TLV

Type: Two octets encoding the BIER TLV Type: TBD.

Length: Two octets encoding the length in octets of the TLV, including the type and length fields. The length is encoded as an

unsigned binary integer. (Note that the minimum length is 8, indicating that no sub-TLV is present.)

Sub-domain: a one-octet field encoding the sub-domain ID corresponding to the BFR-ID.

BFR-ID: a two-octet field encoding the BFR-ID.

Sub-TLVs: contains one or more sub-TLV. The BIER MPLS Encapsulation sub-TLV is one of such sub-TLVs.

The BIER MPLS Encapsulation sub-TLV is encoded as follows:

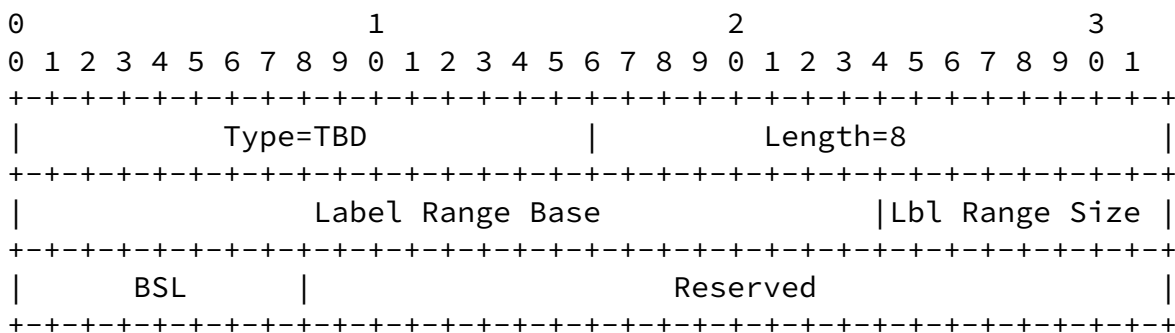


Figure 2:BIER MPLS Encapsulation sub-TLV

Type:TBD

Length:12

Label Range Size: a one-octet field indicating the size of the

label range.

Label Range Base: a 3-octet field where the 20 rightmost bits represent the first label in the label range while the other bits MUST be set to 0 when transmitting, and MUST be ignored upon receipt.

BSL: a one-octet field indicating the length of the Bitstring in 4-octets. The field MUST be filled with one of the valid BSL values as specified in [[I-D.ietf-bier-architecture](#)]. Upon receiving a BSL-TLV containing an invalid BSL value, it MUST be ignored.

#### [4.](#) Originating BIER Attribute

An implementation that supports the BIER attribute MUST support a policy to enable or disable the creation of the BIER attribute and its attachment to specific BGP routes. An implementation MAY disable the creation of the BIER attribute unless explicitly configured to do

so otherwise. A BGP speaker MUST only attach the locally created BIER attribute to a BGP UPDATE message in which at least one of its BFR-prefixes is contained in the NLRI.

#### [5.](#) Restrictions on Sending/Receiving

An implementation that supports the BIER attribute MUST support a per-EBGP-session policy, that indicates whether the attribute is enabled or disabled for use on that session. The BIER attribute MUST NOT be sent on any EBGP peers for which the session policy is not configured. If an BIER attribute is received on a BGP session for which session policy is not configured, then the received attribute MUST be treated exactly as if it were an unrecognised non-transitive attribute. That is, "it MUST be quietly ignored and not passed along to other BGP peers".

To prevent the BIER attribute from "leaking out" of an BIER domain, each BGP router on the BIER domain MUST support an outbound route announcement policy. Such a policy MUST be disabled on each EBGP session by default unless explicitly configured.

#### [6.](#) Deployment Considerations

It's assumed by this document that the BIER domain is aligned with the Administrative Domain (AD) which are composed of multiple ASes (either private or public ASes). Use of the BIER attribute in other scenarios is outside the scope of this document.

Since the BIER attribute is an optional, transitive BGP path attribute, a non-BFR BGP speakers could still advertise the received route with a BIER attribute. This is desirable in the incremental deployment scenario where a BGP speaker could tunnel a BIER packet or the payload of a BIER packet to a BFER directly if the BGP next-hop of the route for that BFER is a non-BFR. Furthermore, a BGP speaker is allowed to tunnel a BIER packet to the BGP next-hop if these two BFR-capable BGP neighbors are not directly connected (e.g., multi-hop EBGP) .

## 7. Acknowledgements

Thanks a lot for Eric Rosen and Peter Psenak for their valuable comments on this document.

## 8. IANA Considerations

IANA is requested to assign a codepoint in the "BGP Path Attributes" registry to the BIER attribute. IANA shall create a registry for "BGP BIER Attribute Types". The type field consists of two octets,

with possible values from 1 to 65535 (The value 0 is "reserved".) The allocation policy for this field is to be "First Come First Serve". Type codes should be allocated for BIER TLV and BIER MPLS Encapsulation sub-TLV respectively.

## 9. Security Considerations

This document introduces no new security considerations beyond those already specified in [[RFC4271](#)].

## 10. References

### 10.1. 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-02](#) (work in progress), July 2015.

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

Wijnands, I., Rosen, E., Dolganow, A., Tantsura, J., and S. Aldrin, "Encapsulation for Bit Index Explicit Replication in MPLS Networks", [draft-ietf-bier-mpls-encapsulation-01](#) (work in progress), June 2015.

[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>>.

[RFC4271] Rekhter, Y., Ed., Li, T., Ed., and S. Hares, Ed., "A Border Gateway Protocol 4 (BGP-4)", [RFC 4271](#), DOI 10.17487/RFC4271, January 2006, <<http://www.rfc-editor.org/info/rfc4271>>.

## [10.2](#). Informative References

[I-D.ietf-bier-use-cases]

Kumar, N., Asati, R., Chen, M., Xu, X., Dolganow, A., Przygienda, T., [arkadiy.gulko@thomsonreuters.com](mailto:arkadiy.gulko@thomsonreuters.com), a., Robinson, D., and V. Arya, "BIER Use Cases", [draft-ietf-bier-use-cases-01](#) (work in progress), August 2015.

[I-D.ietf-rtgwg-bgp-routing-large-dc]

Lapukhov, P., Premji, A., and J. Mitchell, "Use of BGP for routing in large-scale data centers", [draft-ietf-rtgwg-bgp-routing-large-dc-06](#) (work in progress), August 2015.

Xu, et al.

Expires February 26, 2016

[Page 6]

---

Internet-Draft

BGP Extensions for BIER

August 2015

Authors' Addresses

Xiaohu Xu  
Huawei

Email: [xuxiaohu@huawei.com](mailto:xuxiaohu@huawei.com)

Mach Chen  
Huawei

Email: mach.chen@huawei.com

Keyur Patel  
Cisco

Email: keyupate@cisco.com

IJsbrand Wijnands  
Cisco

Email: ice@cisco.com

Antoni Przygienda  
Ericsson

Email: antoni.przygienda@ericsson.com