Network Working Group
Internet-Draft
Intended status: Standards Track
Expires: April 30, 2021

J. Xie
Huawei Technologies
A. Wang
China Telecom
G. Yan
S. Dhanaraj
X. Geng
Huawei Technologies

October 27, 2020

BIER IPv6 Encapsulation (BIERv6) Support via IS-IS draft-xie-bier-ipv6-isis-extension-02

Abstract

This document defines IS-IS extensions to support multicast forwarding using the Bit Index Explicit Replication (BIER) with IPv6 encapsulation (BIERv6).

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] and [RFC8174].

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 April 30, 2021.

Table of Contents

1. Introduction

This document defines IS-IS extensions to support multicast forwarding using the Bit Index Explicit Replication (BIER) with IPv6 encapsulation (BIERv6).

The BIER IPv6 encapsulation [I-D.xie-bier-ipv6-encapsulation] uses a "BIER specific" IPv6 unicast address, the "End.BIER" address, configured locally on a BIER Forwarding Router (BFR) to indicate a "BIER specific handling" in Forwarding Information Base (FIB). This BIER specific IPv6 address, used as part of BIER IPv6 encapsulation, is advertised as a type of Encapsulation sub-sub-TLV within the BIER Info sub-TLV defined [RFC8401].

The BIFT-id field for each BSL of each Sub-domain is another part of BIER IPv6 encapsulation, and is advertised as a type of Encapsulation sub-sub-TLV within the BIER Info sub-TLV defined [RFC8401].

The BIER Sub-TLV is advertised within the extended IP reachability TLV as specified by in [RFC8401].

Note the extended IP reachability only includes the TLV 236 (IPv6 IP Reach TLV) [RFC5308] and TLV 237 (MT IPv6 IP Reach TLVs) [RFC5120] in this document.

The following restrictions defined for BIER Sub-TLV in section 4.2 of [RFC8401] apply equally to this document:

- Prefix length MUST be 128 for an IPv6 prefix.
- When the Prefix Attributes Flags sub-TLV [RFC7794] is present, the N flag MUST be set and the R flag MUST NOT be set.
- BIER sub-TLVs and Function Sub-TLVs MUST be included when a prefix reachability advertisement is leaked between levels.

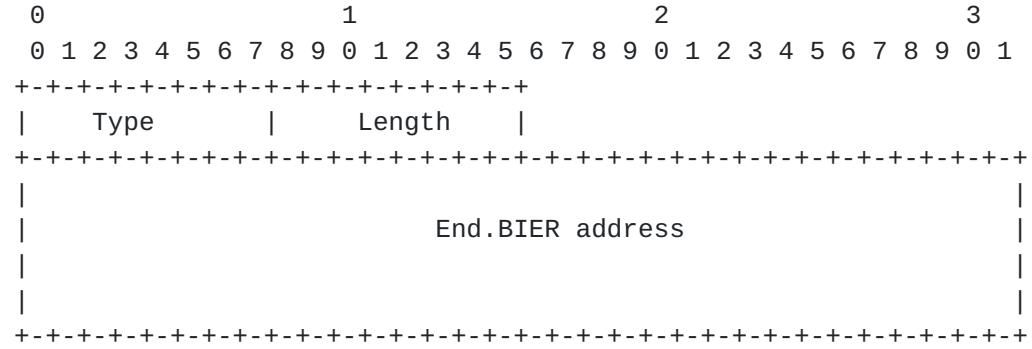
2. Terminology

Readers of this document are assumed to be familiar with the terminology and concepts of the documents listed as Normative References.

3. Specification

3.1. Encapsulation sub-sub-TLV of End.BIER address

The Encapsulation sub-sub-TLV carries the information for the End.BIER address of a sub-domain for BIER IPv6 encapsulation. It is advertised within the BIER Info sub-TLV defined in [RFC8401] which in-turn is carried within the TLVs 236 or 237. This sub-sub-TLV MUST appear no more than one time within a single BIER Info sub-TLV. If the sub-sub-TLV appears more than one time, the BIER Info sub-TLV MUST be ignored.



Type: 1 octet value indicating "Encapsulation of End.BIER" this IPv6 prefix bound to. TBD1 to be assigned by IANA.

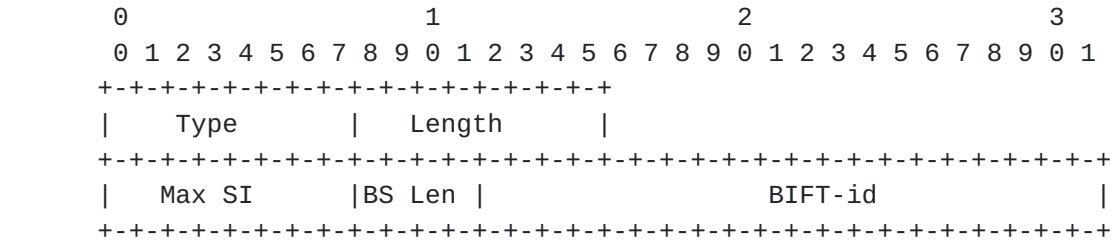
Length: 1 octet length in octets. Value 16 is set to this field.

End.BIER address: 16 octets IPv6 address.

3.2. Encapsulation sub-sub-TLV of BIFT-id for each BSL

The Encapsulation sub-sub-TLV carries the information for the BIER IPv6 encapsulation of a specific BitString length. It is advertised within the BIER Info sub-TLV defined in [RFC8401] which in-turn is carried within the TLVs 236 or 237. This sub-sub-TLV MAY appear multiple times within a single BIER Info sub-TLV. If the same BitString length is repeated in multiple sub-sub-TLVs inside the same BIER Info sub- TLV, the BIER Info sub-TLV MUST be ignored.

When a BIER IPv6 encapsulation sub-sub-TLV of BIFT-id for any BSL appears in a BIER Info sub-TLV, one End.BIER Encapsulation sub-sub-TLV MUST appears in the BIER info sub-TLV, otherwise the BIER Info sub-TLV MUST be ignored.



Type: 1 octet value indicating BIER IPv6 encapsulation. TBD2 to be assigned by IANA.

Length: 1 octet length in octets. Value 4 is set to this field.

Max SI: 1 octet value. Maximum Set Identifier (Section 1 of [RFC8279]) used in the encapsulation for this BIER sub-domain for this BitString length. Each SI maps to a single BIFT-id in the BIFT-id range. The first BIFT-id is for SI=0, the second BIFT-id is for SI=1, etc. If the BIFT-id associated with the Maximum Set Identifier exceeds the 20-bit range, the sub-sub-TLV MUST be ignored.

BS Len: 4 bits value of Local BitString Length. Encoded BitString length as per [RFC8296].

BIFT-id: 20 bits value. First BIFT-id of the range. The BIFT-id(s) are as defined in [RFC8296], or refer to [I-D.ietf-bier-lsr-ethernet-extensions] for Non-MPLS encapsulation.

4. Security Considerations

The security considerations defined in [RFC8401] and [I-D.xie-bier-ipv6-encapsulation] apply equally to this document.

5. IANA Considerations

5.1. Encapsulation sub-sub-TLV Type Code

Allocation is expected from IANA for two sub-sub-TLV codepoints from the "sub-sub-TLVs for BIER Info sub-TLV" sub-registry.

Type: TBD1 to be assigned by IANA.

Name: BIER IPv6 encapsulation of End.BIER address.

Reference: This document.

Type: TBD2 to be assigned by IANA.

Name: BIER IPv6 Encapsulation of BIFT-id for each BSL.

Reference: This document

6. Acknowledgements

TBD.

7. References

7.1. Normative References

[I-D.ietf-bier-lsr-ethernet-extensions]
Dhanaraj, S., Wijnands, I., Psenak, P., Zhang, Z., Yan, G., and J. Xie, "LSR Extensions for BIER over Ethernet", draft-ietf-bier-lsr-ethernet-extensions-01 (work in progress), July 2019.

[I-D.xie-bier-ipv6-encapsulation]
Xie, J., Geng, L., McBride, M., Asati, R., Dhanaraj, S., Zhu, Y., Qin, Z., Shin, M., Mishra, G., and X. Geng, "Encapsulation for BIER in Non-MPLS IPv6 Networks", draft-xie-bier-ipv6-encapsulation-08 (work in progress), July 2020.

[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>.

[RFC5308] Hopps, C., "Routing IPv6 with IS-IS", RFC 5308, DOI 10.17487/RFC5308, October 2008, <https://www.rfc-editor.org/info/rfc5308>.

[RFC7794] Ginsberg, L., Ed., Decraene, B., Previdi, S., Xu, X., and U. Chunduri, "IS-IS Prefix Attributes for Extended IPv4 and IPv6 Reachability", RFC 7794, DOI 10.17487/RFC7794, March 2016, <https://www.rfc-editor.org/info/rfc7794>.

[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>.

[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>.

7.2. Informative References

[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>.

[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>.

Authors' Addresses

Jingrong Xie
Huawei Technologies

Email: xiejingrong@huawei.com

Aijun Wang
China Telecom

Email: wangaj3@chinatelecom.cn

Gang Yan
Huawei Technologies

Email: yangang@huawei.com

Senthil Dhanaraj
Huawei Technologies

Email: senthil.dhanaraj@huawei.com

Xuesong Geng
Huawei Technologies

Email: gengxuesong@huawei.com