

Network Working Group
Internet-Draft
Intended status: Standards Track
Expires: January 2, 2020

J. Xie
Huawei Technologies
A. Wang
China Telecom
G. Yan
S. Dhanaraj
Huawei Technologies
July 1, 2019

BIER IPv6 Encapsulation (BIERv6) Support via IS-IS
draft-xie-bier-ipv6-isis-extension-00

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 January 2, 2020.

Copyright Notice

Copyright (c) 2019 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	2
2. Terminology	3
3. Specification	3
3.1. Function sub-TLV for BIERv6	3
3.2. Encapsulation sub-sub-TLV for BIERv6	4
4. Security Considerations	4
5. IANA Considerations	4
5.1. Function sub-TLV Type Code	4
5.2. Encapsulation sub-sub-TLV Type Code	5
6. Acknowledgements	5
7. References	5
7.1. Normative References	5
7.2. Informative References	6
Authors' Addresses	6

1. Introduction

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

Familiarity with the concept of "BIER specific" IPv6 address introduced in [I-D.xie-bier-ipv6-encapsulation] is necessary to understand the extensions specified in this document.

The [I-D.ietf-spring-srv6-network-programming] describes how a function can be bound to a special "IPv6 Address" within a special "IPv6 Address Block". The function bound to a special "IPv6 Address" can be used to indicate a special forwarding process in data-plane.

The BIER IPv6 encapsulation [I-D.xie-bier-ipv6-encapsulation] uses a "BIER specific" IPv6 unicast 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 is also required to use as the BFR prefix as defined in [RFC8279].

The indication of BFR prefix is a BIER Sub-TLV within the extended IP reachability TLV as specified by in [RFC8401].

The indication of BIER specific function is a "Function Sub-TLV" within the extended IP reachability as specified by in this document.

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 Function Sub-TLV:

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

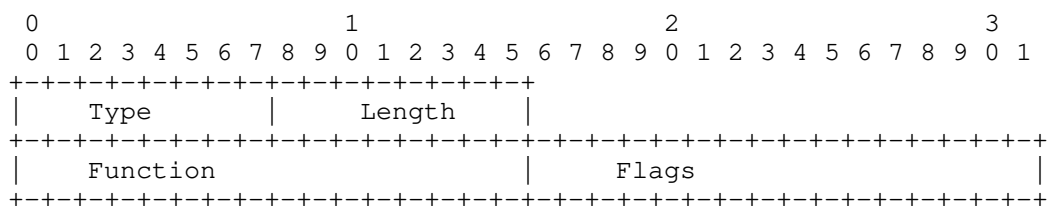
2. Terminology

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. Function sub-TLV for BIERv6

The Function sub-TLV is introduced to advertise a specified function bound to an IPv6 prefix with 128 bit prefix length. This new sub-TLV is advertised in the TLV 236 or TLV 237. The sub-TLV has the following format:



Type: 1 octet value indicating "Function Information" this IPv6 prefix bound to. To be assigned by IANA.

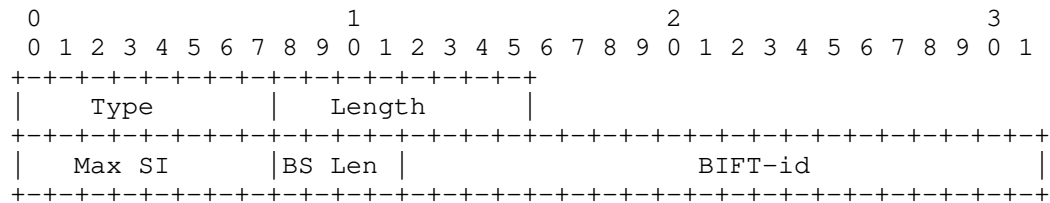
Length: 1 octet length in octets. Value 4 is set to this field.

Function: 2 octets value indicating function. A BIER function value called End.BIER defined in [I-D.xie-bier-ipv6-encapsulation] is expected to be the only function in the TLV.

Flags: 1 octet value indicating the Flags for the function preceding this field. No flags are currently defined and 0 should be set for this field.

3.2. Encapsulation sub-sub-TLV for BIERv6

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.



The Type field is a 1 octet value indicating BIER IPv6 encapsulation. To be assigned by IANA.

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

Other fields can be referred to [RFC8401] for MPLS encapsulation, or [I-D.ietf-bier-lsr-ethernet-extensions] for Ethernet encapsulation.

4. Security Considerations

The procedures of this document do not, in themselves, provide privacy, integrity, or authentication for the control plane or the data plane.

5. IANA Considerations

5.1. Function sub-TLV Type Code

Allocation is expected from IANA for a IS-IS Sub-TLV Type codepoint from the "Sub-TLVs for TLVs 135, 235, 236, and 237" sub-registry.

Type: To be assigned by IANA.

Description: Function Info.

Reference: This document.

Type	135	235	236	237	Reference
32	y	y	y	y	RFC8401
TBD	n	n	y	y	This document

5.2. Encapsulation sub-sub-TLV Type Code

Allocation is expected from IANA for a BIER IPv6 encapsulation sub-sub-TLV codepoint from the "sub-sub-TLVs for BIER Info sub-TLV" sub-registry.

Type: To be assigned by IANA.

Name: BIER IPv6 Encapsulation.

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-00 (work in progress), May 2019.
- [I-D.ietf-spring-srv6-network-programming]
Filsfils, C., Camarillo, P., Leddy, J., daniel.voyer@bell.ca, d., Matsushima, S., and Z. Li, "SRv6 Network Programming", draft-ietf-spring-srv6-network-programming-00 (work in progress), April 2019.
- [I-D.xie-bier-ipv6-encapsulation]
Xie, J., Geng, L., McBride, M., Dhanaraj, S., Yan, G., and Y. Xia, "Encapsulation for BIER in Non-MPLS IPv6 Networks", draft-xie-bier-ipv6-encapsulation-01 (work in progress), June 2019.

- [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>>.

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: wangaj.bri@chinatelecom.cn

Gang Yan
Huawei Technologies

Email: yangang@huawei.com

Senthil Dhanaraj
Huawei Technologies

Email: senthil.dhanaraj@huawei.com