BIER IPv6 Requirements
draft-ietf-bier-ipv6-requirements-06

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BIERv6 Revision Change Log History per WG, Chairs & AD requests

Rev 00 = Problem Statement, IPv6 Scenario's, Requirements, Solutions Evaluation

Rev 01 = Problem Statement, IPv6 Scenario's, Requirements, Solutions Evaluation

Rev 02 = Problem Statement, IPv6 Scenario's, Requirements, Solutions Evaluation

Rev 03 = Problem Statement, IPv6 Scenario's, Requirements, Solutions Evaluation

Rev 04 = Problem Statement, IPv6 Scenario's, Requirements, Appendix A – Solutions Evaluation

Rev 05 = Problem Statement, Conceptual Models, Mandatory & Optional Requirements, Appendix A – Solutions Evaluation

Rev 06 = Problem Statement, Conceptual Models, Mandatory & Optional Requirements, Appendix A – Solutions Evaluation

Rev 07 = Problem Statement, Conceptual Models, Mandatory & Optional Requirements, Appendix A –List of Solutions

Rev 08 = Problem Statement, Mandatory & Optional Requirements, Appendix A –Conceptual Models, Appendix B- List of Solutions

Rev 09 = Problem Statement, Mandatory & Optional Requirements

Some Clarity as far as Solutions Contentious Debate

The "BIER IPv6 Solutions" have always been present since Rev 00 May 2019.

Rev 09 was the first time the Solutions was omitted completely from the draft at the request of Chairs & AD. Each revision we have tailored the draft to accommodate all Ask?? By the WG, Chairs, AD. We are looking for consensus!

Draft Purpose

- Specify the requirements for transporting packets, with bier headers, in an IPv6 environment.
- Focus on Requirements Only
- Help the BIER WG come to a conclusion on what the requirements are that are on the table that are “Mandatory” and which are “Optional” so that we can move forward to next steps ⇔“Solutions”.

Requirements – Rev 0 - 4

L2 agnostic 0,1,2,3,4

HBH Destination Modification 0,1,2,3,4

L4 Inspection 0,1,2,3,4

Multicast Address in SA field 0,1,2,3,4

Incorrect Bits 0,1,2,3,4

Support BIER architecture 0,1,2,3,4

Conform to existing IPv6 Spec 3,4

Support Simple Encapsulation 2,3,4

SA filtering 0,1,2,3,4

Support IPSec 2,

Support Fragmentation 2,3,4

Hardware fastpath 0,1,2,3,4

Support IPv6 Security 2,3,4

Requirements – Rev 5 to 9

Mandatory

L2 agnostic 5,6

Various L2 Link types 7,8,9

Support BIER architecture 5,6,7,8,9

Conform to existing IPv6 Spec 6,

Support deployment with Non-BFR routers 5,6,7,8,9

Support inter-AS multicast deployment 5,6

Support Simple Encapsulation 5,6

Support Deployment Security 5,6

Support OAM 7,8,9

Optional

Support MVPN 5,6

Support OAM 5,6

Support IPSEC AH, ESP 5,6

Support IPSEC ESP 7,8,9

Support Fragmentation 5,6,7,8,9

Support hardware fastpath 5,6

Summary

Has the review of the evolution of the draft and where we are today from 1 ½ ago helped to see how far we have come?

- No? What is it lacking?
- Yes ? Let’s move on to solutions adoption


Q&A

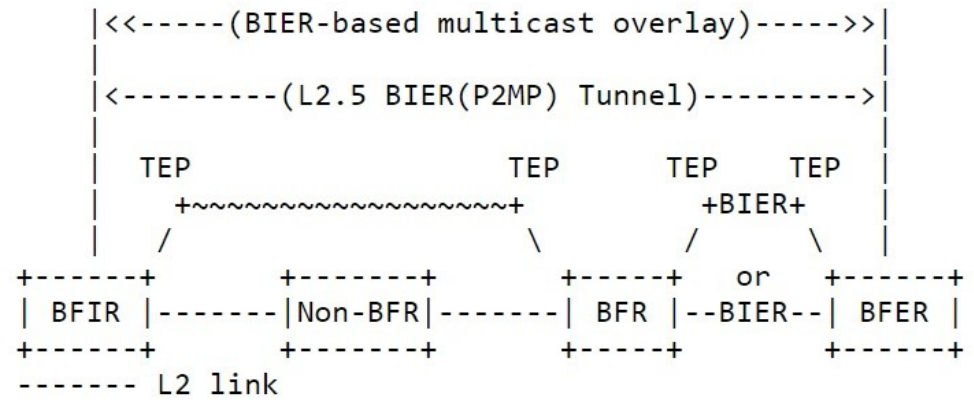
THANK YOU

Appendix A. Conceptual Models For BIER IPv6 Encapsulation and Forwarding

This analysis introduces two conceptual models for BIER in IPv6 networks based on the experience and solutions discussed in the IETF community.

A.1. Independent Model

The first conceptual model is an Independent Model, where IPv6 is nothing special to BIER but a transportation means that may be used just like other transportation means, and BIER is nothing special to IPv6 but a payload type just like other payload types.



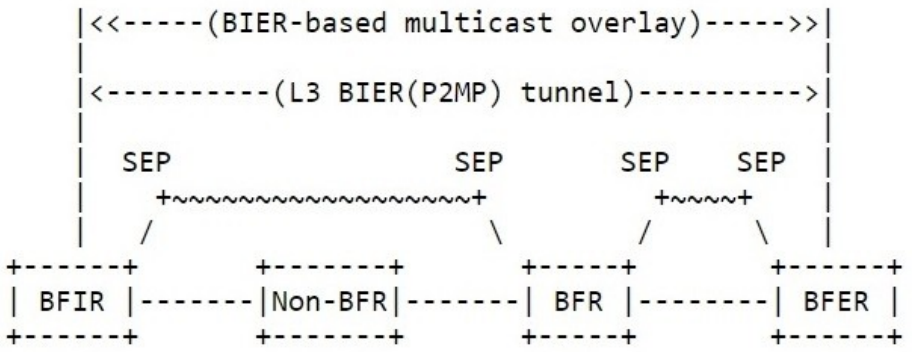
A.1 Independent Model – Continued

In this model, an IPv6 tunnel works as a link-layer of BIER, and BIER works as a layer-2.5 over tunnels or L2 links. Between two BFRs, either a L2 link can be used directly or any tunnel (IPv6 or not) can be used for BIER transport. In the tunnel case, the transmitting BFR adds tunnel encapsulation (e.g. IPv6 header) and the receiving BFR removes the tunnel encapsulation.

General consideration of this model is to keep BIER and IPv6 independent of each other. The BIER header is not part of the IPv6 header but comes after the transport header (L2 or tunnel header) and before BIER payload.

A.2. Integrated Model

The second conceptual model is an Integrated Model that integrates BIER as part of the IPv6 data plane, making it a "Layer-3 BIER" approach.



------- L2 link

~~~~~~~ IPv6(P2P) segment (SEP = Segment EndPoint)

<-----> BIER(P2MP) tunnel

In this model, BIER works as part of the IPv6 data plane. The BFIR and BFERs work as IPv6 (P2MP) tunnel endpoints, and BFRs work as IPv6 segment endpoints. The BIER header is processed on each segment endpoint and there is no decapsulation, or re-encapsulation, on the segment endpoints.
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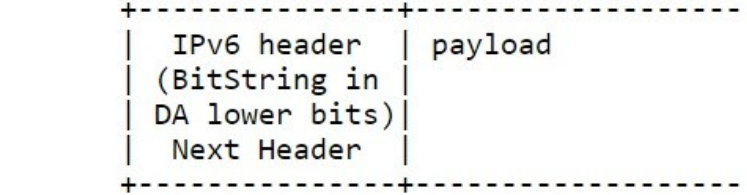
B.1. Integrated mode approach

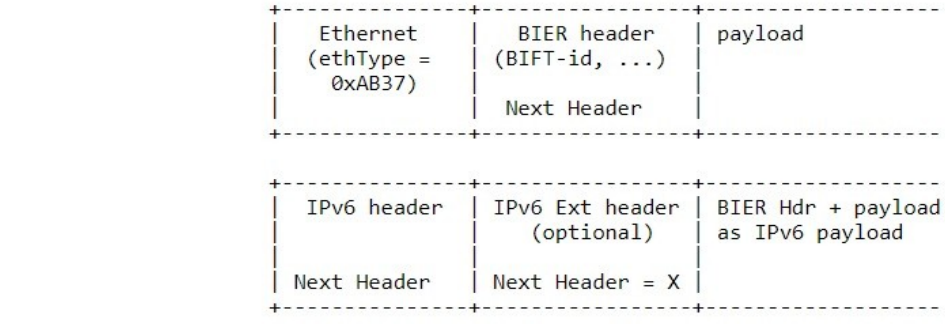
One example of this model is defined in [I-D.pfister-bier-over-ipv6], where the information required for BIER forwarding, e.g., the BitString, is encoded in the low-order bits of the IPv6 destination address of each packet. The high-order bits of the IPv6 destination address are used by intermediate routers for unicast forwarding, deciding whether a packet is a BIER packet, and if so, to identify the BIER Sub-Domain, Set Identifier and BitString length. The BIER function is integrated in the IPv6 header and its forwarding procedure, and the BIER payload is encapsulated as the IPv6 payload.



Another example of this model is defined in [I-D.xie-bier-ipv6-encapsulation], where information required for BIER forwarding, e.g., the BIER header, is encoded in an Option TLV (indicated by an Option Type to be allocated by IANA) of the IPv6 Destination Option Header. The third-highest-order bit of the Option Type is set to 1 to allow Option Data (e.g., the BitString) change en route. The BIER function is integrated in IPv6 extension header and its forwarding procedure, and the BIER payload is encapsulated as the IPv6 payload.

B.2. Independent model approach

One example of this model is defined in [I-D.zhang-bier-bierin6], where the BIER header and the payload following it are L2 payload when feasible (e.g. when two BFRs are directly connected) or IPv6 payload when IPv6 transport is needed/desired (e.g. when two BFRs are not directly connected). This is indicated by either a 0xAB37 Ethertype allocated to BIER or a new IPv6 Next-Header value to be allocated by IANA.



While not specified in [I-D.zhang-bier-bierin6], any other tunnel types supported by the IPv6 environment could be used, e.g. IPv6 GRE/UDP: