BIER IPv6 Requirements
draft-ietf-bier-ipv6-requirements-01

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Since last ietf

- Transitioned from problem statement to requirements
- Move requirements section up
- Added co-author
- WG Adoption
- New rev mainly developing requirements section

Draft Purpose

- Specify the requirements for transporting packets, with bier headers, in an IPv6 environment.
- Describe proposed solutions. List the pros/cons of each.
- Help the BIER WG come to a conclusion on which solution(s) to rally behind and further specify.

Requirements

- Should be L2 Agnostic
- **Shouldn't require hop-by-hop modification of the IP DA field. SA field?**
- Shouldn't require the BFRs to inspect, or require changes to, L4
- Shouldn't allow a multicast address to be put in the IP SA field
- **Shouldn't assume that bits never get set incorrectly**
- Shouldn't require changes in SA filtering procedures
- **Should be possible to use it to support the entire BIER architecture**
- **Should avoid having different encapsulation types or complex tunneling**
- **Should support hardware fast path**

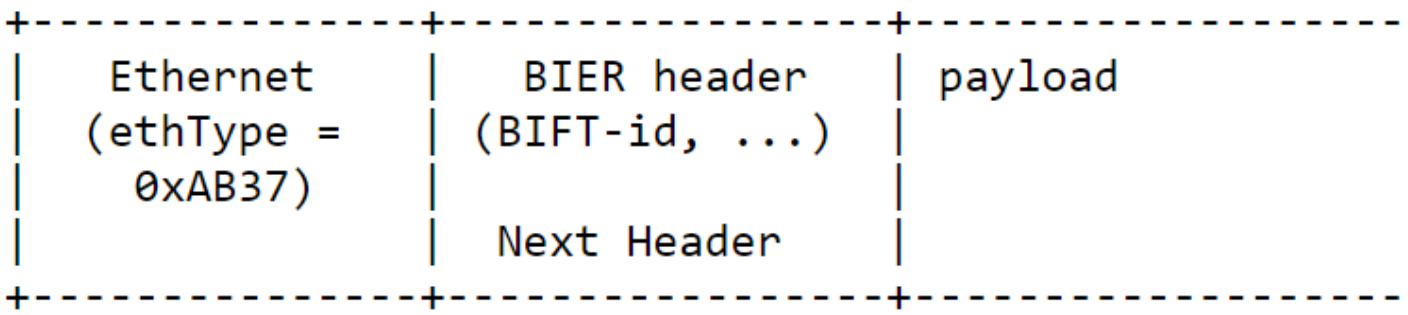
Requirements

- Proposed encapsulation must confirm to the IPv6 specification and guidelines as described in RFC8200. Should not require any new modifications to the IPv6 specification.
- Proposed encapsulation must support fragmentation. Shouldn't require fragmentation and re-assembly at each hops.
- Support IPv6 security - AH/ESP extension headers. Shouldn't require hop-by-hop encryption/decryption.

Request to the WG

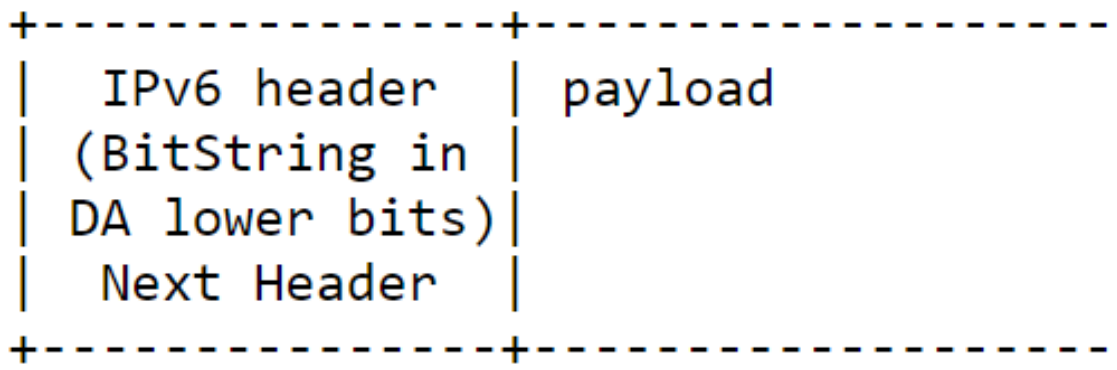
- If your solution is in the document, please provide pros/cons. Else authors will.
- Be nice ☺. And impartial.

BIER-ETH encapsulation in IPv6



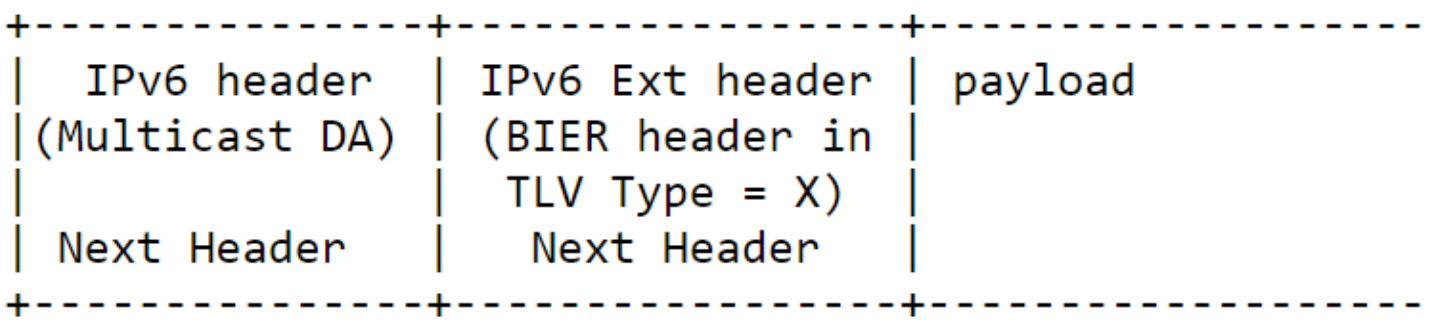
BIER-ETH encap (BIER header for Non-MPLS networks as defined in [RFC8296]) can be used to transport the multicast data in the IPv6 network by encapsulating the multicast user data payload within the BIER-ETH header. However, using BIER-ETH in IPv6 networks is not considered to be a native IPv6 solution which utilizes the IPv6 header to forward the packet.

Encode Bitstring in IPv6 DA address



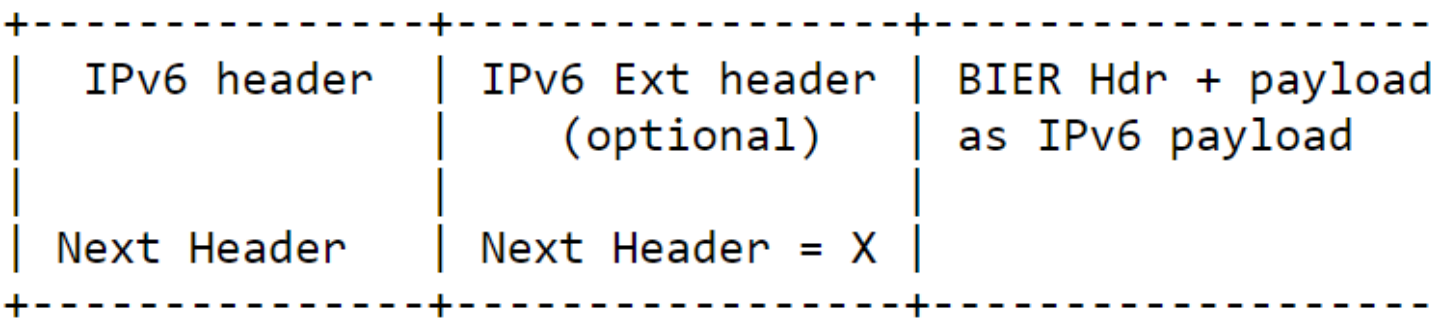
As described in [I-D.**pfister-bier-over-ipv6**], the information required by BIER is stored in the destination IPv6 address. The BIER BitString is encoded in the low-order bits of the IPv6 destination address of each packet. The high-order bits of the IPv6 destination address are used by intermediate 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. No additional extension or encapsulation header is required. Instead of encapsulating the packet in IPv6, the payload is attached to the BIER IPv6 header and the IPv6 protocol number is set to the type of the payload. If the payload is UDP, the UDP checksum needs to change when the BitString in the IPv6 destination address changes.

Add BIER header into IPv6 Extension Header



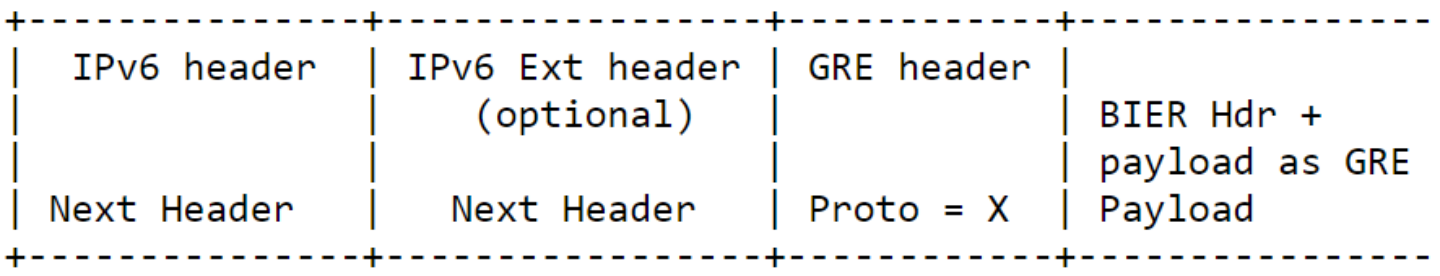
In [I-D.**xie-bier-ipv6-encapsulation**] an IPv6 BIER Destination Option is carried by the IPv6 Destination Option Header (indicated by a Next Header value 60). It is initialized in a packet sent by an IPv6 BFIR router to inform the following BFR routers in an IPv6 BIER domain to replicate to destination BFER routers hop-by-hop. BIER is generally a hop-by-hop and one-to-many architecture and it is required for a BIER IPv6 encapsulation to include the BIER Header ([RFC8296]) as an IPv6 Extension Header, to pilot the hop-by-hop BIER replication.

Transport BIER as IPv6 payload



There is a proposal for a transport-independent BIER encapsulation header which is applicable regardless of the underlying transport technology. As described in [I-D.xu-bier-encapsulation] and [I-D.**zhang-bier-bierin6**], the BIER header, and the payload following it, can be combined as an IPv6 payload, and be indicated by a new Upper-layer IPv6 Next-Header value. A unicast IPv6 destination address is used for the replication and changes when replicating a packet out to a neighbor.

Tunneling BIER in a IPv6 tunnel



A generic IPv6 Tunnel could be used to encapsulate the bier packet within an IPv6 domain. GRE is a mechanism by which any ethernet payload can be carried by an IP GRE tunnel due to the 16-bits 'Protocol Type' field. Both IPv4 and IPv6 can be used to carry GRE. The Ethernet type codepoint 0xAB37, defined for BIER, can be used in a GRE header to indicate the subsequent BIER header and payload in an IPv6 network.