BIER WG
Internet-Draft
Intended status: Informational
Expires: January 8, 2020

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July 7, 2019

# BIER Source Protection
draft-zhang-bier-source-protection-00

## Abstract

This document describes the multicast source protection functions in Bit Index Explicit Replication BIER domain.

## Status of This Memo

## Copyright Notice

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## 1. Introduction

Bit Index Explicit Replication (BIER) [RFC8279] is an architecture that provides multicast forwarding through a "BIER domain" without requiring intermediate routers to maintain any multicast related per-flow state. BIER also does not require any explicit tree-building protocol for its operation. A multicast data packet enters a BIER domain at a "Bit-Forwarding Ingress Router" (BFIR), and leaves the BIER domain at one or more "Bit-Forwarding Egress Routers" (BFERs).

To protect the source node it may be transmitting to two or more BFIRs. Based on local policies, BFERs may elect to use the same BFIR or different BFIRs as the source of the multicast flow. The BFIR and the path in use are referred to as working while all alternative available BFIRs and paths that can be used to receive the same multicast flow are referred to as protection. For a BFER, when either the working BFIR or the working path fail, the BFER can select one of protection BFIRs to get the multicast flow. The shorter the detection time is, the faster the flow recovers.

This document discusses the functions that can be used in failure detection for multicast source protection.

## 2. Multicast Source Protection

Two BFIRs independently advertise the source of the multicast flow to BFERs. The precise type of advertisement depends on the overlay protocol being used, e.g., MLD, MVPN, EVPN. BFER selects one BFIR as the UMH (Upstream Multicast Hop). Different BFERs may select the same BFIR or different BFIRs according to the local policy.

```
                            +--------+S1+-------+
                            |                   |
                         +--v----+          +---v---+
                  +------+ BFIR1 |          | BFIR2 +-------+
                  |      +-------+          +-------+       |
                  |                                         |
                  |                                         |
                  |                                         |
                  | +-------+      +-------+      +-------+ |
                  +--|BFER1|--------|BFER2|---- ---|BFER3|--+
                    +--+----+      +---+---+      +--+----+
                       |               |             |
                       v               v             v
                       R1              R2            R3
                                  Figure 1
```

For example, a multicast source S1 is connected to BFIR1 and BFIR2. BFIR1 and BFIR2 advertise the source information to BFERs. It is assumed that BFER1, BFER2, and BFER3 all choose BFIR1 as the UMH. BFERs signal to BFIR1 to get the multicast flow from S1.

In case BFIR1 fails, or the path from BFIR1 to BFER1 is broken, BFER1 should select BFIR2 as the UMH. But if the timeout period is too long, the multicast flow will be significantly affected.

### 2.1. BIER Ping

[I-D.ietf-bier-ping] describes the mechanism and basic BIER OAM packet format that can be used to perform failure detection and isolation on BIER data plane without any dependency on other layers like the IP layer.

In the example of Figure 1, BFER can monitor the status of BFIR and the path status between BFER and BFIR. BFER1 sends the BIER Ping packet to BFIR1. If BFER1 does not receive responses from BFIR1 in a period of time, BFER1 will treat BFIR1 as a failed UMH, and BFER1 will select BFIR2 as the UMH and signal to BFIR2 to get multicast flow.

In this example, BFER1, BFER2, and BFER3 send BIER ping packet to BFIR1 separately. The timeout period MAY be set to a different values depending on the local performance requirement on each BFER.

In general case of more complex BIER topology, it cannot be guaranteed that the path used from BFIR1 to BFER1 is the same as in the reverse direction, i.e., from BFER1 to BFIR1. If that is not guaranteed and the paths are not co-routed, then this method may produce false results, both false negative and false positive. The former is when ping fails while the multicast path and flow are OK. The latter is when the multicast path has defect but ping works. Thus, to improve consistency of this method of detecting a failure in multicast flow transport, the path that the echo request from BFER1 traverses to BFIR1 must be co-routed with the path that the monitored multicast flow traverses through the BIER domain from BFIR1 to BFER1.

### 2.2. BIER BFD

[I-D.hu-bier-bfd] describes the application of P2MP BFD in BIER network. And it describes the procedures for using such mode of BFD protocol to verify multipoint or multicast connectivity between a sender (BFIR) and one or more receivers (BFERs).

In the same example, BFIR1 sends the BIER Echo request packet to BFERs to bootstrap a p2mp BFD session. After BFER1, BFER2 and BFER3 receive the Echo request packet with BFD Discriminator and the Target SI-Bitstring TLVs, BFERs creates the BFD session of type MultipointTail [RFC8562] to monitor the status of BFIR1 and the working path. If BFERs have not received BFD packet from BFER1 for the Detection Time [RFC8562], BFER1 will treat BFIR1 as a failed UMH, and signal to BFIR2 to get the multicast flow.

The timeout period on each BFER MAY be set to different value depending on the local performance requirement on each BFER. BFER monitors BFIR separately and selects its UMH independently from selections reached by other BFERs.

## 3. Security Considerations

Security considerations discussed in [RFC8279], [RFC8562], [I-D.ietf-bier-ping] and [I-D.hu-bier-bfd] apply to this document.

## 4. Normative References

[I-D.hu-bier-bfd]
Xiong, Q., Mirsky, G., hu, f., and C. Liu, "BIER BFD", draft-hu-bier-bfd-04 (work in progress), July 2019.

[I-D.ietf-bier-ping]
Kumar, N., Pignataro, C., Akiya, N., Zheng, L., Chen, M., and G. Mirsky, "BIER Ping and Trace", draft-ietf-bier-ping-05 (work in progress), April 2019.

[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>.

[RFC8562] Katz, D., Ward, D., Pallagatti, S., Ed., and G. Mirsky, Ed., "Bidirectional Forwarding Detection (BFD) for Multipoint Networks", RFC 8562, DOI 10.17487/RFC8562, April 2019, <https://www.rfc-editor.org/info/rfc8562>.

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