

Workgroup: BIER Working Group

Published: 11 February 2024

Intended Status: Informational

Expires: 14 August 2024

Authors: G. Mirsky, Ed. N. Kumar
 Ericsson Cisco Systems, Inc.
 M. Chen S. Pallagatti, Ed.
 Huawei Technologies VMware

Operations, Administration and Maintenance (OAM) Requirements for Bit Index Explicit Replication (BIER) Layer

Abstract

This document describes a list of functional requirements toward Operations, Administration and Maintenance (OAM) toolset in Bit Index Explicit Replication (BIER) layer of a network.

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 14 August 2024.

Copyright Notice

Copyright (c) 2024 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 Revised BSD License text as described in Section 4.e of the Trust Legal Provisions and are provided without warranty as described in the Revised BSD License.

Table of Contents

- [1. Introduction](#)
 - [1.1. Conventions used in this document](#)
 - [1.1.1. Terminology](#)
 - [1.1.2. Requirements Language](#)
- [2. Requirements](#)
- [3. IANA Considerations](#)
- [4. Security Considerations](#)
- [5. Normative References](#)
- [6. Informative References](#)
- [Contributors' Addresses](#)
- [Authors' Addresses](#)

1. Introduction

[[RFC8279](#)] introduces and explains Bit Index Explicit Replication (BIER) architecture and how it supports forwarding of multicast data packets.

This document lists the OAM requirements for the BIER layer of the multicast domain. The list can further be used for gap analysis of available OAM tools to identify possible enhancements of existing or whether new OAM tools are required to support proactive and on-demand path monitoring and service validation.

1.1. Conventions used in this document

1.1.1. Terminology

The term "BIER OAM" used in this document interchangeably with longer version "set of OAM protocols, methods, and tools for BIER layer".

BFR: Bit-Forwarding Router

BFER: Bit-Forwarding Egress Router

BIER: Bit Index Explicit Replication

OAM: Operations, Administration and Maintenance

1.1.2. Requirements Language

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "NOT RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in BCP 14 [[RFC2119](#)] [[RFC8174](#)] when, and only when, they appear in all capitals, as shown here.

2. Requirements

This section lists the requirements for OAM of the BIER layer:

1. The listed requirements MUST be supported with any transport layer over which the BIER layer can be realized.
2. It MUST be possible to initialize a BIER OAM session from any Bit-Forwarding Router (BFR) of the given BIER domain.
3. It SHOULD be possible to initialize a BIER OAM session from a centralized controller.
4. BIER OAM MUST support proactive and on-demand OAM monitoring and measurement methods.
5. BIER OAM MUST support unidirectional OAM methods, both continuity check and performance measurement.
6. BIER OAM packets MUST be in-band, i.e., follow exactly the same path as data plane traffic, in the forward direction, i.e., from ingress toward egress endpoint(s) of the OAM test session.
7. BIER OAM MUST support bi-directional OAM methods. Such OAM methods MAY combine in-band monitoring or measurement in the forward direction and out-of-band notification in the reverse direction, i.e., from egress to ingress end point of the OAM test session.
8. BIER OAM MUST support proactive monitoring of BFER availability by a BFR in the given BIER domain, e.g., p2mp BFD active tail support.
9. BIER OAM MUST support Path Maximum Transmission Unit discovery.
10. BIER OAM MUST support Reverse Defect Indication (RDI) notification of the source of continuity checking BFR by Bit-Forwarding Egress Routers (BFERs), e.g., by using Diag in p2mp BFD with active tail support.
11. BIER OAM MUST support active and passive performance measurement methods.
12. BIER OAM MUST support unidirectional performance measurement methods to calculate throughput, loss, delay, and delay variation metrics. [\[RFC6374\]](#) provides great details for performance measurement and performance metrics.
13. BIER OAM MUST support defect notification mechanism, like Alarm Indication Signal. Any BFR in the given BIER domain MAY

originate a defect notification addressed to any subset of BFRs within the domain.

14. BIER OAM MUST support methods to enable the survivability of a BIER layer. These recovery methods MAY use protection switching and restoration.

3. IANA Considerations

This document does not propose any IANA consideration. This section may be removed.

4. Security Considerations

This document lists the OAM requirement for a BIER-enabled domain and thus inherits security considerations discussed in [RFC8279] and [RFC8296]. Another general security aspect results from using active OAM protocols, according to the [RFC7799], in a multicast network. Active OAM protocols inject specially constructed test packets, and some active OAM protocols are based on the echo request/reply principle. In the multicast network, test packets are replicated as data packets, thus creating a possible amplification effect of multiple echo responses being transmitted to the sender of the echo request. Thus, an implementation of BIER OAM MUST protect the control plane from spoofed replies. Also, an implementation of BIER OAM MUST provide control of the number of BIER OAM messages sent to the control plane.

5. Normative 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>>.

6. Informative References

- [RFC6374] Frost, D. and S. Bryant, "Packet Loss and Delay Measurement for MPLS Networks", RFC 6374, DOI 10.17487/RFC6374, September 2011, <<https://www.rfc-editor.org/info/rfc6374>>.
- [RFC7799] Morton, A., "Active and Passive Metrics and Methods (with Hybrid Types In-Between)", RFC 7799, DOI 10.17487/RFC7799, May 2016, <<https://www.rfc-editor.org/info/rfc7799>>.

[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>>.

Contributors' Addresses

Erik Nordmark

Email: nordmark@acm.org

Sam Aldrin
Google

Email: aldrin.ietf@gmail.com

Lianshu Zheng

Email: veronique_cheng@hotmail.com

Nobo Akiya

Email: nobo.akiya.dev@gmail.com

Authors' Addresses

Greg Mirsky (editor)
Ericsson

Email: gregimirsky@gmail.com

Nagendra Kumar
Cisco Systems, Inc.

Email: naikumar@cisco.com

Mach Chen
Huawei Technologies

Email: mach.chen@huawei.com

Santosh Pallagatti (editor)

VMware

Email: santosh.pallagatti@gmail.com