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

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## 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".

- \* In-band OAM is an active OAM or hybrid OAM method ([RFC7799]) that traverses the same set of links and interfaces receiving the same QoS treatment as the monitored BIER flow.
- \* Out-of-band OAM is an active OAM method whose path through the BIER domain is not topologically identical to the path of the monitored BIER flow, or its test packets receive different QoS, or both.

### 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.

### 1.1.3. Acronyms

BFR: Bit-Forwarding Router

BFER: Bit-Forwarding Egress Router

BIER: Bit Index Explicit Replication

OAM: Operations, Administration and Maintenance

## 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 (Section 1.1.1) 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 (Section 1.1.1) 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 [RFC7799].
12. BIER OAM MUST support unidirectional performance measurement methods to calculate throughput, loss, delay, and delay variation metrics. Simple Two-way Active Measurement Protocol ([RFC8762] and [RFC8972]) is an example of an active performance measurement method and performance metrics that may be applied in a BIER domain. The Alternate Marking Method, described in [RFC9341] and [RFC9342], is an example of a hybrid measurement method ([RFC7799]) that may be applied in a BIER domain.
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

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