

Network Working Group  
Internet-Draft  
Intended status: Standards Track  
Expires: May 25, 2018

A. Mishra  
O3b Networks  
M. Jethanandani  
Cisco Systems  
A. Saxena  
Ciena Corporation  
S. Pallagatti  
Juniper Networks  
M. Chen  
Huawei  
P. Fan  
China Mobile  
November 21, 2017

BFD Stability  
draft-ietf-bfd-stability-01

Abstract

This document describes extensions to the Bidirectional Forwarding Detection (BFD) protocol to measure BFD stability. Specifically, it describes a mechanism for detection of BFD frame loss.

Requirements Language

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in RFC 2119 [RFC2119].

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 May 25, 2018.

## Copyright Notice

Copyright (c) 2017 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 Simplified BSD License text as described in Section 4.e of the Trust Legal Provisions and are provided without warranty as described in the Simplified BSD License.

## Table of Contents

1. Introduction . . . . .	2
2. Use Cases . . . . .	3
3. BFD Null-Authentication TLV . . . . .	3
4. Theory of Operations . . . . .	3
4.1. Loss Measurement . . . . .	3
5. IANA Requirements . . . . .	4
6. Security Consideration . . . . .	4
7. Contributors . . . . .	4
8. Acknowledgements . . . . .	4
9. Normative References . . . . .	4
Authors' Addresses . . . . .	4

## 1. Introduction

The Bidirectional Forwarding Detection (BFD) [RFC5880] protocol operates by transmitting and receiving control frames, generally at high frequency, over the datapath being monitored. In order to prevent significant data loss due to a datapath failure, the tolerance for lost or delayed frames in the Detection Time, as defined in BFD [RFC5880] is set to the smallest feasible value.

This document proposes a mechanism to detect lost frames in a BFD session in addition to the datapath fault detection mechanisms of BFD. Such a mechanism presents significant value to measure the stability of BFD sessions and provides data to the operators for the cause of a BFD failure.

This document does not propose BFD extension to measure data traffic loss or delay on a link or tunnel and the scope is limited to BFD frames.

## 2. Use Cases

Legacy BFD cannot detect any BFD frame loss if loss does not last for dead interval. This draft proposes a method to detect a dropped frame on the receiver. For example, if the receiver receives BFD CC frame  $k$  at time  $t$  but receives frame  $k+3$  at time  $t+10ms$ , and never receives frame  $k+1$  and/or  $k+2$ , then it has experienced a drop.

This proposal enables BFD engine to generate diagnostic information on the health of each BFD session that could be used to preempt a failure on a link that BFD was monitoring by allowing time for a corrective action to be taken.

In a faulty datapath scenario, operator can use BFD health information to trigger delay and loss measurement OAM protocol (Connectivity Fault Management (CFM) or Loss Measurement (LM)-Delay Measurement (DM)) to further isolate the issue.

## 3. BFD Null-Authentication TLV

The functionality proposed for BFD stability measurement is achieved by appending the Null-Authentication TLV (as defined in Optimizing BFD Authentication [I-D.ietf-bfd-optimizing-authentication] ) to the BFD control frame that do not have authentication enabled.

## 4. Theory of Operations

This mechanism allows operator to measure the loss of BFD CC frames.

When using MD5 or SHA authentication, BFD uses authentication TLV that carries the Sequence Number. However, if non-meticulous authentication is being used, or no authentication is in use, then the non-authenticated BFD frames MUST include NULL-Auth TLV.

### 4.1. Loss Measurement

Loss measurement counts the number of BFD control frames missed at the receiver during any Detection Time period. The loss is detected by comparing the Sequence Number field in the Auth TLV (NULL or otherwise) in successive BFD CC frames. The Sequence Number in each successive control frame generated on a BFD session by the transmitter is incremented by one.

The first BFD NULL-Auth TLV processed by the receiver that has a non-zero sequence number is used for bootstrapping the logic. When using secure sequence numbers, if the expected values are pre-calculated, the matched value must be appropriately recorded to detect lost frames.

## 5. IANA Requirements

N/A

## 6. Security Consideration

Other than concerns raised in BFD [RFC5880] there are no new concerns with this proposal.

## 7. Contributors

Manav Bhatia

## 8. Acknowledgements

Authors would like to thank Nobo Akiya, Jeffery Haas, Peng Fan, Dileep Singh, Basil Saji, Sagar Soni and Mallik Mudigonda who also contributed to this document.

## 9. Normative References

[I-D.ietf-bfd-optimizing-authentication]

Jethanandani, M., Mishra, A., Saxena, A., and M. Bhatia, "Optimizing BFD Authentication", draft-ietf-bfd-optimizing-authentication-03 (work in progress), June 2017.

[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>>.

[RFC5880] Katz, D. and D. Ward, "Bidirectional Forwarding Detection (BFD)", RFC 5880, DOI 10.17487/RFC5880, June 2010, <<https://www.rfc-editor.org/info/rfc5880>>.

## Authors' Addresses

Ashesh Mishra  
O3b Networks

Email: [mishra.ashesh@gmail.com](mailto:mishra.ashesh@gmail.com)

Mahesh Jethanandani  
Cisco Systems  
170 W. Tasman Drive  
San Jose, CA 95134  
USA

Email: [mjethanandani@gmail.com](mailto:mjethanandani@gmail.com)  
URI: [www.cisco.com](http://www.cisco.com)

Ankur Saxena  
Ciena Corporation  
3939 North 1st Street  
San Jose, CA 95134  
USA

Email: [ankurpsaxena@gmail.com](mailto:ankurpsaxena@gmail.com)  
URI: [www.ciena.com](http://www.ciena.com)

Santosh Pallagatti  
Juniper Networks  
Juniper Networks, Exora Business Park  
Bangalore, Karnataka 560103  
India

Email: [santoshpk@juniper.net](mailto:santoshpk@juniper.net)

Mach Chen  
Huawei

Email: [mach.chen@huawei.com](mailto:mach.chen@huawei.com)

Peng Fan  
China Mobile  
32 Xuanwumen West Street  
Beijing, Beijing  
China

Email: [fanp08@gmail.com](mailto:fanp08@gmail.com)