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Unaffiliated BFD Echo Function
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Abstract

Bidirectional Forwarding Detection (BFD) is a fault detection protocol that can quickly determine a communication failure between devices and notify upper-layer applications [RFC5880]. BFD has asynchronous detecting mode and demand detection mode to satisfy different scenarios, also supports echo function as an adjunct to both modes to reduce the device requirement for BFD.

Unaffiliated BFD echo function described in this document reuses the BFD echo function as described in [RFC5880] and [RFC5881], but independent of BFD asynchronous mode or BFD demand mode, that means it doesn't need BFD protocol capability of state machine, but only BFD echo function to a deployed device supporting BFD detection. When using unaffiliated BFD echo function, just the local device works on BFD protocol and the BFD peer doesn't, which only loopback the received BFD echo packets as usual data packets without enabling BFD protocol.

Section 6.2.2 of [BBF-TR-146] describes one use case of the unaffiliated BFD echo function, and at least one more use case is known in the field BFD deployment.

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Table of Contents

1. Introduction 2
2. Unaffiliated BFD Echo Behavior 3
3. Discussion 4
4. Security Considerations 4
5. IANA Considerations 4
6. Acknowledgements 5
7. References 5
7.1. Normative References 5
7.2. Informative References 5
Authors' Addresses 5

1. Introduction

To minimize the impact of device faults on services and improve network availability, a network device must be able to quickly detect faults in communication with adjacent devices. Measures can then be taken to promptly rectify the faults to ensure service continuity.

BFD is a low-overhead, short-duration method to detect faults on the path between adjacent forwarding engines. The faults can be interface, data link, and even forwarding engine faults. It is a single, unified mechanism to monitor any media and protocol layers in real time.

BFD has asynchronous detecting mode and demand detection mode to satisfy different scenarios, also supports echo function to reduce

the device requirement for BFD. When the echo function is activated, the local system sends a BFD control packet and the remote system loops back the packet through the forwarding path. If several consecutive echo packets are not received, the session is declared to be Down.

When using BFD echo function, it is not clear whether the devices using echo function need to support the full BFD procotol, including maintaining the state machine of BFD session as described in [RFC5880] and [RFC5881]. According to different understanding, there are two typical scenarios as below:

1. Full BFD procotol capability with affiliated echo function: this scenario requires all the devices to support BFD protocol.

2. Only BFD echo function without full BFD procotol capability: this scenario requires only the local device to support sending BFD packets.

The two typical scenarios are both reasonable and useful, and the latter is referred to as unaffiliated BFD echo function in this document.

Unaffiliated BFD echo function described in this document reuses the BFD echo function as described in [RFC5880] and [RFC5881], but independent of BFD asynchronous mode or BFD demand mode, that means it doesn't need BFD protocol capability of state machine, but only BFD echo function to a deployed device supporting BFD detection. When using unaffiliated BFD echo function, just the local device works on BFD protocol and the BFD peer doesn't, which only loopback the received BFD echo packets as usual data packets without enabling BFD protocol.

Section 6.2.2 of [BBF-TR-146] describes one use case of the unaffiliated BFD echo function, and at least one more use case is known in the field BFD deployment.

2. Unaffiliated BFD Echo Behavior

With the more and more application of BFD detection, there are some scenarios the BFD echo function is deployed. And due to the different capabilities of the devices deploying BFD echo function, it's required to apply unaffiliated BFD echo to the devices that couldn't afford the overhead of the full BFD protocol capablity, such as the servers running virtual machines or some Internet of Things (IoT) devices. Unaffiliated BFD echo can be used when two devices are connected and only one of them supports BFD protocol capability. A BFD echo session can be established at the device that supports

BFD, and the device will send the BFD echo packets with the IP address destined for itself, whereas the other peer device just loopback the received BFD echo packets.

After receiving a BFD echo packet, the device that does not support BFD protocol immediately loops back the packet by normal IP forwarding, implementing quick link failure detection. As shown in Figure 1, device A supports BFD, whereas device B does not support BFD. To rapidly detect any faults with the IP link between device A and device B, a BFD echo session can be provisioned and created at device A, and device A starts sending BFD echo packets, which should include a BFD echo session demultiplexing field, such as BFD discriminator defined in [RFC5880]. After receiving the BFD echo packets sent from device A, device B immediately loops back them, implementing rapid link fault detection.

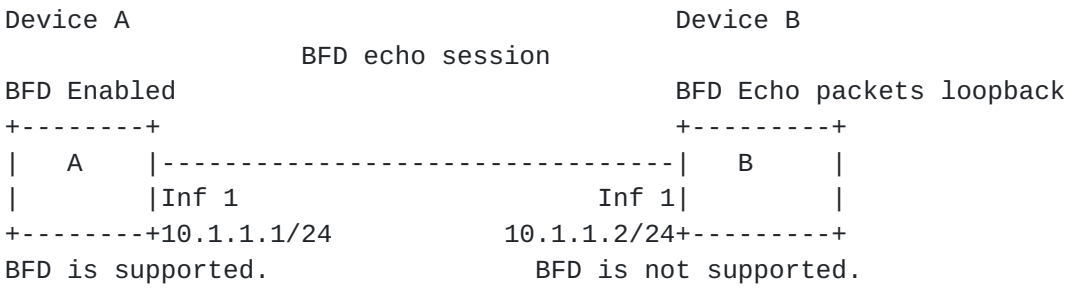

Figure 1: Unaffiliated BFD Echo deployment scenario

3. Discussion

Unaffiliated BFD echo function is reasonable and useful. Firstly, unaffiliated BFD echo can use BFD protocol capability in the local BFD-supported device, while using IP forwarding capability in the peer non-BFD-supported device, so unaffiliated BFD echo can support fast detecting and manage BFD sessions very effectively. Secondly, it is scalable when using unaffiliated BFD echo to adapt to different capabilities of devices.

4. Security Considerations

TBD.

5. IANA Considerations

This document has no IANA action requested.

6. Acknowledgements

TBD.

7. References

7.1. Normative References

[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>.

[RFC5881] Katz, D. and D. Ward, "Bidirectional Forwarding Detection (BFD) for IPv4 and IPv6 (Single Hop)", RFC 5881, DOI 10.17487/RFC5881, June 2010, <https://www.rfc-editor.org/info/rfc5881>.

7.2. Informative References

[BBF-TR-146] Broadband Forum, "BBF Technical Report - Subscriber Sessions Issue 1", 2013, <https://www.broadband-forum.org/technical/download/TR-146.pdf>.

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