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Seamless Bidirectional Forwarding Detection (BFD) for
Segment Routing (SR)
draft-akiya-bfd-seamless-sr-02

Abstract

Note: this document needs to be updated to align with changes in the S-BFD base document.

This specification defines procedures to use Seamless Bidirectional Forwarding Detection (S-BFD) in a Segment Routing (SR) based environment.

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].

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1. Introduction

One application for Seamless Bidirectional Forwarding Detection (S-BFD) [I-D.akiya-bfd-seamless-base] is to perform full reachability validations, partial reachability validations and adjacency segment ID verifications on a Segment Routing (SR) based environment.

This specification defines procedures to use Seamless BFD in a SR based environment.

2. BFD Target Identifier Types

BFD target identifier type of value 2 is used for SR. Note that BFD target identifier type of value 2, which specifies segment routing node segment ID, is not tied to a specific routing protocol. If definitions and procedures need routing protocol specifics, then IGP specific SR types will be defined.

3. Reserved BFD Discriminators

With SR technology, BFD target identifier type 2 is used. Node segment IDs are used as BFD discriminators. BFD discriminator values corresponding to all or subset of local node segment IDs are to be allocated from the discriminator pool for Seamless BFD.

Example:

- o BFD Target Identifier Type 2: Node segment ID 0x03E9A0FF maps to BFD discriminator 0x03E9A0FF.

4. BFD Target Identifier Table

With SR BFD target identifier type, only locally reserved BFD discriminators and corresponding information are to be in this table. No inter-node communications are needed to exchange BFD discriminator and BFD target identifier mappings.

5. Full Reachability Validations

5.1. Initiator Behavior

Any SR network node can attempt to perform a full reachability validation to any BFD target identifier of type 2 (node segment ID) on other network nodes, as long as destination BFD target identifier is provisioned to use this mechanism. Transmitted BFD control packet by the initiator is to have "your discriminator" corresponding to destination BFD target identifier of type 2.

Initiator is to use following procedures to construct BFD control packets to perform SR full reachability validations:

- o MUST set "your discriminator" to target node segment ID.
- o MUST use explicit label switching packet format described in [I-D.akiya-bfd-seamless-base].

5.2. Responder Behavior

To respond to received BFD control packet which was targeted to local BFD target identifier of type 2 (Segment Routing Node Segment ID), response BFD control packet is targeted to IP address taken from received "source IP address". Responder MUST validate obtained IP address is in valid format (ex: not Martian address). Responder MUST consult local routing table to ensure obtained IP address is reachable. Responder MAY impose node segment ID, corresponding to obtained IP address, on the response BFD control packet.

node, with stack of segment IDs, absence of hop-by-hop signaling results in less confidence in reachability to egress as well as traversal of strictly routed segments. S-BFD can perform rapid verification of both prior to allowing service over instantiated traffic engineered segment routing paths. In addition, S-BFD can provide continuity check on both aspects, as detection time and coverage of S-BFD is much superior than IGP failure detection and convergence time.

Single node segment ID data forwarding

- o In order to protect all data passing through local network using single node segment ID, active BFD sessions can be instantiated on each network node to verify full reachability to all node segment IDs.

Centralized controller initiated S-BFD

- o Centralized controller based segment routing network monitoring techniques, such as the one described in [I-D.geib-spring-oam-usecase], are powerful. One aspect that is lacking from such techniques is the guarantee that monitor packet did indeed reach certain network node (i.e. u-turned at expected network node). Related aspect is the lack of guarantee that monitor packet over adjacency segment ID did indeed result in traversal of expected adjacency. Since S-BFD can fill in the missing holes, also running S-BFD in parallel from the central controller device will even strengthen the technique.

9. Security Considerations

Security considerations for BFD are discussed in [RFC5880] and security considerations for S-BFD are discussed in [I-D.akiya-bfd-seamless-base].

10. IANA Considerations

None

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