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Seamless Bidirectional Forwarding Detection (S-BFD) Alert Discriminator

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Abstract

This document defines the Alert Discriminator which operates on the Seamless Bidirectional Forwarding Detection (S-BFD), and Alert Discriminator Diagnostic Codes which operates on the Alert Discriminator.

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.

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1. Introduction

[I-D.ietf-bfd-seamless-base] defines the Seamless Bidirectional Forwarding Detection (S-BFD): a simplified mechanism which uses Bidirectional Forwarding Detection (BFD) with large portions of negotiation aspects eliminated.

This document defines the Alert Discriminator which operates on the S-BFD, and the Alert Discriminator Diagnostic Codes which operates on the Alert Discriminator, for extended S-BFD use cases described in Section 2.

2. Extended S-BFD Use Cases

This section describes extended S-BFD use cases.

2.1. Target S-BFD Discriminator Discovery

IS-IS ([I-D.ietf-isis-sbfd-discriminator]) and OSPF ([I-D.ietf-ospf-sbfd-discriminator]) protocols have been extended to advertise S-BFD discriminator values. These extensions will suffice for number of scenarios where S-BFD is used to verify the network reachability to other network devices. Other protocols may be extended to support S-BFD in further scenarios.

There are, however, some scenarios where it is desirable to have a mechanism within the S-BFD protocol to discover the target S-BFD discriminator value.

- In some scenarios, direct protocol communications are intentionally kept minimal for reasons such as administrative policy. One such example is the usage of S-BFD across Autonomous System (AS) boundaries (i.e. inter-AS).

- In some scenarios, there is no control plane which can easily advertise S-BFD discriminators. MPLS-TP and static routes are such examples.

- In some scenarios, defining and standardizing protocol extensions to advertise S-BFD discriminator values may be more work than the value it brings.

To accommodate the two scenarios described, it is desirable to have a mechanism within the S-BFD protocol to discover the target S-BFD discriminator value.

2.2. S-BFD Path Tracing

When a multihop S-BFD session, IP based or MPLS based, determines a loss of reachability to the target entity, the responsibility of identifying the problematic point in the paths is often left to operators. ICMP echo request/reply (IP Ping/Trace) [RFC0792] and MPLS echo request/reply (LSP Ping/Trace) [RFC4379] allow for tracing of hops to a specific target, and these are often used by operators, manually or automatically, to attempt to isolate faults. However, when it comes to identifying the problematic point that caused the S-BFD session to declare the failure, there are couple of issues.

- Usage of non-S-BFD packets can result in them being load balanced differently along the paths, causing those packets to traverse different paths than S-BFD packets did.

- Usage of non-S-BFD packets may not identify the problematic points which only affect specific flows (which affects S-BFD packets).

- In order to isolate short lived transient issues, it is desirable to immediately perform the task of fault isolation. IP/MPLS Ping/Trace implementations often require more processing overhead than S-BFD. Usage of heavier tool to attempt to isolate fault can result in missing more instances of identifying short lived transient issues.

Although the task of "fault isolation" does not belong in the BFD/S-BFD protocols, if the task of "fault isolation" can be done with simple extensions within the S-BFD protocol, the result does provide additional benefit to operators.

3. Alert Discriminator

This document reserves the value zero of the S-BFD discriminator pool as the Alert Discriminator. A reflector BFD session is to monitor incoming S-BFD packets with value zero in the "Your Discriminator" field. The reflector BFD session is to process the S-BFD packets according to the value specified in the received "Diagnostic" field. Procedures specific to each "Diagnostic" code are described in Section 4.

4. Alert Discriminator Diagnostic Codes

This section defines the Alert Discriminator Diagnostic Codes, and procedures for each defined code point. The Alert Discriminator Diagnostic Codes MUST operate on the Alert Discriminator. Specifically:

- In the direction from an SBFDInitiator to an SBFDReflector, the Alert Discriminator Diagnostic Codes MUST only be used with "Your Discriminator" field set to the Alert Discriminator.

- In the direction from an SBFDReflector to an SBFDInitiator, the Alert Discriminator Diagnostic Code MUST only be used in a reply S-BFD packet if received S-BFD packet contained "Your Discriminator" field set to the Alert Discriminator.

4.1. Diagnostic Code: Target S-BFD Discriminator Discovery

The Alert Discriminator Diagnostic Code 29 is defined for the purpose of discovering the target S-BFD discriminator.

Value	Alert Discriminator Diagnostic Code Name
29	Target S-BFD Discriminator Discovery

When a reflector BFD session receives an S-BFD packet containing the Alert Discriminator and the Alert Discriminator Diagnostic Code of 29, then the reflector BFD session SHOULD send a reply S-BFD packet. The format and the contents of the generated reply S-BFD packet MUST follow the definition in the S-BFD protocol documents, except for following fields:

- "My Discriminator" field MUST be set to one of local S-BFD discriminators.

- "Diagnostic" field MUST be set to value 29.

4.2. Diagnostic Code: S-BFD Path Tracing

The Alert Discriminator Diagnostic Code 30 is defined for the purpose of S-BFD path tracing.

Value	Alert Discriminator Diagnostic Code Name
30	S-BFD Path Trace

When a reflector BFD session receives an S-BFD packet containing the Alert Discriminator and the Alert Discriminator Diagnostic Code of 30, then the reflector BFD session SHOULD send a reply S-BFD packet. The format and the contents of the generated reply S-BFD packet MUST follow the definition in the S-BFD protocol documents, except for following fields:

- "My Discriminator" field MUST be set to zero.

- "Diagnostic" field MUST be set to value 30.

4.3. Diagnostic Code: Not Supported

The Alert Discriminator Diagnostic Code 31 is defined for a reflector BFD session to communicate, in reply S-BFD packet, that specified Alert Discriminator Diagnostic Code in received S-BFD packet is not understood or is not supported.

Value	Alert Discriminator Diagnostic Code Name
31	Not Supported

When a reflector BFD session receives an S-BFD packet containing the Alert Discriminator and an Alert Discriminator Diagnostic Code which is not understood or supported by the reflector BFD session, then the reflector BFD session SHOULD send a reply S-BFD packet. The format and the contents of the generated reply S-BFD packet MUST follow the

definition in the S-BFD protocol documents, except for following fields:

- "My Discriminator" field MUST be set to zero.

- "Diagnostic" field MUST be set to value 31.

Note that in the direction from an SBFDInitiator to an SBFDReflector, the Alert Discriminator Diagnostic Code 31 MUST NOT be used. If a reflector BFD session receives an S-BFD packet with the Alert Discriminator and the Alert Discriminator Diagnostic Code 31, then the reflector BFD session MUST drop the packet.

5. Security Considerations

Conceptually the Alert Discriminator is similar to an IP Router Alert Option or an MPLS Router Alert Label. The Alert Discriminator introduces a way which remote network devices can instruct a reflector BFD sessions to perform specific tasks corresponding to specified Alert Discriminator Diagnostic Codes, and without remote network devices knowing a valid S-BFD discriminator on the target device. Hence, it is very critical that reflector BFD session services the Alert Discriminator only from trusted sources and for allowed Alert Diagnostic Codes for those sources. Therefore, this document RECOMMENDS following security procedures to be implemented:

- S-BFD packets with Alert Discriminator is accepted only from trusted sources. An implementation SHOULD provide a mechanism for operators to specify an access-list to describe the trusted sources.

- An implementation SHOULD provide a mechanism for operators to specify the Alert Discriminator Diagnostic Codes which are supported on the device. If required, such configuration should be set per a trusted source.

Additionally, it is RECOMMENDED that implementations supporting the Alert Discriminator considers the security considerations described in [I-D.ietf-bfd-seamless-base], [I-D.ietf-bfd-seamless-ip] and [I-D.akiya-bfd-seamless-sr] documents.

6. IANA Considerations

This document requests IANA to create a new registry within [IANA-BFD] protocol to maintain "Alert Discriminator Diagnostic Codes" field. Initial values are described in immediate sub-section to follow.

6.1. Alert Discriminator Diagnostic Codes Registry

The IANA is requested to create and maintain a registry entitled "Alert Discriminator Diagnostic Codes" with the following registration procedures:

Registry Name: Alert Discriminator Diagnostic Codes

Value	Alert Discriminator Diagnostic Code Name	Reference
0-7	Experimental	This document
8-28	Reserved	This document
29	Target S-BFD Discriminator Discovery	This document
30	S-BFD Path Trace	This document
31	Not Supported	This document

Assignments of Alert Discriminator Diagnostic Codes are via Standards Action [RFC5226].

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