        Seamless Bidirectional Forwarding Detection (S-BFD) for
                         IPv4, IPv6 and MPLS
                    draft-akiya-bfd-seamless-ip-05

Abstract

   This document defines procedures to use Seamless Bidirectional
   Forwarding Detection (S-BFD) for IPv4, IPv6 and MPLS environments.

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

Seamless Bidirectional Forwarding Detection (S-BFD),
[I-D.ietf-bfd-seamless-base], defines a generalized mechanism to
allow network nodes to seamlessly perform continuity checks to remote
entities. This document defines necessary procedures to use S-BFD on
IPv4, IPv6 and MPLS environments.

The reader is expected to be familiar with the IP, MPLS BFD and S-BFD
terminologies and protocol constructs.

2. S-BFD UDP Port

A new UDP port is defined for the use of the S-BFD on IPv4, IPv6 and
MPLS environments: TBD1. SBFDReflector session MUST listen for
incoming S-BFD control packets on the port TBD1. SBFDInitiator
sessions MUST transmit S-BFD control packets with destination port
TBD1. The source port of the S-BFD control packets transmitted by
SBFDInitiator sessions can be of any but MUST NOT be TBD1. The same
UDP source port number MUST be used for all S-BFD control packets
associated with a particular SBFDInitiator session. The source port
number MAY be unique among all SBFDInitiator sessions on the system.

3. S-BFD Echo UDP Port

   A new UDP port is defined for the use of the S-BFD Echo function on
   IPv4, IPv6 and MPLS environments: TBD2. SBFDInitiator sessions MUST
   transmit S-BFD echo packets with destination port TBD2. This
   document defines only the UDP port value for the S-BFD Echo function.
   The source port and the procedures for the S-BFD Echo function are
   outside the scope of this document.

4. S-BFD Control Packet Demultiplexing

   Received BFD control packet MUST be demultiplexed with the
   destination UDP port field. If the port is TBD1, then the packet
   MUST be looked up to locate a corresponding SBFDReflector session
   based on the value from the "your discriminator" field in the table
   describing S-BFD discriminators. If the port is not TBD1, then the
   packet MUST be looked up to locate a corresponding SBFDInitiator
   session or classical BFD session based on the value from the "your
   discriminator" field in the table describing BFD discriminators. If
   the located session is an SBFDInitiator, then the destination IP
   address of the packet SHOULD be validated to be for self.

5. Initiator Procedures

   S-BFD control packets are transmitted with IP header, UDP header and
   BFD control header ([RFC5880]). When S-BFD control packets are
   explicitly label switched (i.e. not IP routed which happen to go over
   an LSP, but explicitly sent on a specific LSP), the former is
   prepended with a label stack. Note that this document does not make
   a distinction between a single-hop S-BFD scenario and a multi-hop
   S-BFD scenario, both scenarios are supported.

   Necessary values in the BFD control headers are described in
   [I-D.ietf-bfd-seamless-base]. Section 5.1 describes necessary values
   in the MPLS header, IP header and UDP header when an SBFDInitiator on
   the initiator is sending S-BFD control packets.

5.1. Details of S-BFD Control Packet Sent by SBFDInitiator

   o Specifications common to both IP routed S-BFD control packets and
      explicitly label switched S-BFD control packets:

      * Source IP address field of the IP header MUST be set to a local
         IP address that is expected to be routable by the target (i.e.
         not IPv6 link-local address when the target is multiple hops
         away).

    * UDP destination port MUST be set to a well-known UDP
       destination port assigned for S-BFD: TBD1.

    * UDP source port MUST be set to a value that is not TBD1.

  o Specifications for IP routed S-BFD control packets:

    * Destination IP address field of the IP header MUST set to an IP
       address of the target.

    * TTL field of the IP header SHOULD be set to 255.

  o Specifications for explicitly label switched S-BFD control
     packets:

    * S-BFD control packets MUST have the label stack that is
       expected to reach the target.

    * TTL field of the top most label SHOULD be 255.

    * The destination IP address MUST be chosen from the 127/8 range
       for IPv4 and from the 0:0:0:0:0:FFFF:7F00/104 range for IPv6.

    * TTL field of the IP header MUST be set to 1.

5.2. Target vs. Remote Entity (S-BFD Discriminator)

   Typically, an S-BFD control packet will have "your discriminator"
   field corresponding to an S-BFD discriminator of the remote entity
   located on the target network node defined by the destination IP
   address or the label stack. It is, however, possible for an
   SBFDInitiator to carefully set "your discriminator" and TTL fields to
   perform a continuity test towards a target but to a transit network
   node.

   Section 5.1 intentionally uses the word "target", instead of "remote
   entity", to accommodate this possible S-BFD usage through TTL expiry.
   This also requires S-BFD control packets not be dropped by the
   responder node due to TTL expiry. Thus implementations on the
   responder MUST allow received S-BFD control packets taking TTL expiry
   exception path to reach corresponding reflector BFD session.

6. Responder Procedures

   S-BFD control packets are IP routed back to the initiator, and will
   have IP header, UDP header and BFD control header. If an
   SBFDReflector receives an S-BFD control packet with UDP source port
   as TBD1, the packet MUST be discarded. Necessary values in the BFD

control header are described in [I-D.ietf-bfd-seamless-base].
Section 6.1 describes necessary values in the IP header and UDP
header when an SBFDReflector on the responder is sending S-BFD
control packets.

6.1. Details of S-BFD Control Packet Sent by SBFDReflector

o Destination IP address field of the IP header MUST be copied from
   source IP address field of received S-BFD control packet.

o Source IP address field of the IP header MUST be set to a local IP
   address that is expected to be visible by the initiator (i.e. not
   IPv6 link-local address when the initiator is multiple hops away).

o TTL field of the IP header SHOULD be set to 255.

o UDP destination port MUST be copied from received UDP source port.

o UDP source port MUST be copied from received UDP destination port.

7. Security Considerations

Security considerations for S-BFD are discussed in
[I-D.ietf-bfd-seamless-base]. Additionally, implementing the
following measures will strengthen security aspects of the mechanism
described by this document:

o Implementations MUST provide filtering capability based on source
   IP addresses of received S-BFD control packets: [RFC2827].

o Implementations MUST NOT act on received S-BFD control packets
   containing Martian addresses as source IP addresses.

o Implementations MUST ensure that response S-BFD control packets
   generated to the initiator by the SBFDReflector have a reachable
   target (ex: destination IP address).

8. IANA Considerations

A new value TBD1 is requested from the "Service Name and Transport
Protocol Port Number Registry". The requested registry entry is:

```
   Service Name (REQUIRED)
     s-bfd
   Transport Protocol(s) (REQUIRED)
     udp
   Assignee (REQUIRED)
     IESG <iesg@ietf.org>
   Contact (REQUIRED)
     BFD Chairs <bfd-chairs@tools.ietf.org>
   Description (REQUIRED)
     Seamless Bidirectional Forwarding Detection (S-BFD)
   Reference (REQUIRED)
     draft-akiya-bfd-seamless-ip
   Port Number (OPTIONAL)
     TBD1 (Requesting 7784)
```

A new value TBD2 is requested from the "Service Name and Transport
Protocol Port Number Registry". The requested registry entry is:

```
   Service Name (REQUIRED)
     s-bfd-echo
   Transport Protocol(s) (REQUIRED)
     udp
   Assignee (REQUIRED)
     IESG <iesg@ietf.org>
   Contact (REQUIRED)
     BFD Chairs <bfd-chairs@tools.ietf.org>
   Description (REQUIRED)
     Seamless Bidirectional Forwarding Detection (S-BFD) Echo Function
   Reference (REQUIRED)
     draft-akiya-bfd-seamless-ip
   Port Number (OPTIONAL)
     TBD2 (Requesting 7785)
```

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11.2. Informative References

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