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BFD in Demand Mode over a Point-to-Point MPLS LSP
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Abstract

   This document describes procedures for using Bidirectional Forwarding
   Detection (BFD) in Demand mode to detect data plane failures in
   Multiprotocol Label Switching (MPLS) point-to-point Label Switched
   Paths.

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1. Introduction

   [RFC5884] defined use of the Asynchronous method of Bidirectional
   Detection (BFD) [RFC5880] to monitor and detect failures in the data
   path of a Multiprotocol Label Switching (MPLS) Label Switched Path
   (LSP). Use of the Demand mode, also specified in [RFC5880], has not
   been defined so far. This document describes procedures for using
   the Demand mode of BFD protocol to detect data plane failures in MPLS
   point-to-point (p2p) LSPs.

2. Acronyms

   MPLS: Multiprotocol Label Switching

   LSP: Label Switched Path

   LER: Label switching Edge Router

   BFD: Bidirectional Forwarding Detection

   p2p: Point-to-Point

3. Use of the BFD Demand Mode

   [RFC5880] defines that the Demand mode may be:

   * asymmetric, i.e. used in one direction of a BFD session;

   * switched to and from without bringing BFD session to Down state
      through using a Poll Sequence.

   For the case of BFD over MPLS LSP, ingress Label switching Edge
   Router (LER) usually acts as Active BFD peer and egress LER acts as
   Passive BFD peer. The Active peer bootstraps the BFD session by
   using LSP ping. If the BFD session is configured to use the Demand
   mode, once the BFD session is in Up state the ingress LER switches to

the Demand mode as defined in Section 6.6 [RFC5880]. The egress LER
also follows procedures defined in Section 6.6 [RFC5880] and ceases
further transmission of periodic BFD control packets to the ingress
LER.

In this state BFD peers remain as long as the egress LER is in Up
state. The ingress LER can periodically check continuity of a
bidirectional path between the ingress and egress LERs by using the
Poll Sequence, as described in Section 6.6 [RFC5880]. An
implementation that supports using the Poll Sequence as the mechanism
for bidirectional path continuity check must control the interval
between consecutive Poll Sequences. The default value could be
selected as 1 second.

If the Detection Time at the egress LER expires, the session state on
the egress LER transitions to the Down state according to Section 6.2
of [RFC5880]. As a result, the BFD system exits the Demand mode and
sends the BFD Control packet to the ingress LER with the Status (Sta)
field set to the Down (1) value and the Diagnostic (Diag) field set
to Control Detection Time Expired (1) value. The egress LER
periodically transmits these Control packets to the ingress LER until
either it receives the valid BFD control packet from the ingress LER.
The interval between BFD control packets is determined according to
Section 6.8.7 of [RFC5880].

The ingress LER transmits BFD Control packets over the MPLS LSP with
the Demand (D) flag set at the negotiated interval per [RFC5880]. If
it receives the valid BFD packet from the egress LER with the Status
(Sta) field set to Down and the Diagnostic (Diag) field value Control
Detection Time Expired, the ingress LER indicates that the monitored
LSP has a failure. Consequently, the BFD system on the ingress LER
advances the state of the BFD session to the Init state and sends a
BFD control packet with the Demand (D) flag cleared. That packet is
transmitted periodically. The BFD system continues performing in the
BFD Asynchronous mode until the BFD session reaches the Up state.
Then the ingress LER switches to the Demand mode.

3.1. The Applicability of BFD for Multipoint Networks

[RFC8562] and [RFC8563] define the use of BFD in multipoint networks.
This specification analyzes the case of p2p LSP. In that scenario,
the ingress of the LSP acts as the MultipointHead, and the egress -
as MultipointTail. The BFD state machines for MultipointHead,
MultipointClient, and MultipointTail don't use the three-way
handshakes for session establishment and teardown. As a result, the
Init state is absent, and the session transitions to the Up state
once the BFD session is administratively enabled. Hence, a BFD
session over a p2p LSP, using principles of [RFC8562] or [RFC8563],

can be established faster if the MultipointTail has been provisioned
with the value of My Discriminator used by the MultipointHead for
that BFD session. That value can be provided to the MultipointTail
using different mechanisms, e.g., an extension to IGP. Description
of mechanism to provide the value of My Discriminator used by the
MultipointHead for the particular BFD session is outside the scope of
this specification.

Unsolicited notification of the detected failure by the
MultipointTail to the MultipointClient performs as described in
Section 3 for the case after the ingress BFD system switches the
remote peer into the Demand mode.

4. IANA Considerations

   This document doesn't require any IANA action. This section can be
   removed before the publication of the document.

5. Security Considerations

   This document does not introduce new security aspects but inherits
   all security considerations from [RFC5880], [RFC5884], [RFC7726],
   [RFC8029], [RFC6425], [RFC8562], and [RFC8563]

6. Acknowledgements

   The author expresses his genuine appreciation of the extensive
   technical comments and the discussion with Jeffrey Haas that helped
   to clarify and properly position this document relative to the
   existing BFD specifications.

7. Normative References

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