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Reverse Defect Indicator for MPLS FM OAM
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Abstract

This document describes extensions to the MPLS Fault Management Operations, Administration, and Management (MPLS FM OAM) in RFC 6427 [RFC6427] to support Remote Defect Indication (RDI) functionality. Specifically, it describes a mechanism for propagating MPLS FM OAM messages to the upstream Label Edge Router (LER) in MPLS-TP [RFC5921] bi-directional (associated and co-routed) Label Switched Paths (LSPs).

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

The MPLS Fault Management Operations, Administration, and Management (MPLS FM OAM) in RFC 6427 [RFC6427] describes a method to identify faults in MPLS transport networks, and a protocol to notify the upstream Label Edge Router (LER). However, in the case of MPLS-TP [RFC5921] bi-directional Label Switched Paths (LSPs), the fault must be coordinated on both, the upstream LER and the downstream LER (which is the upstream LER for the reverse path).

In typical scenario, the Bidirectional Forwarding Detection (BFD) protocol, as described in RFC 5880 [RFC5880], detects the fault signaled by MPLS FM OAM on the upstream LER and propagates the fault on the reverse LSP to the other MPLS-TP LSP LER. This allows the two MPLS-TP LERs to coordinate failover to backup LSPs.

This document proposes a mechanism to achieve MPLS FM OAM fault propagation on the MPLS-TP reverse LSP using a Reverse Defect Indicator (RDI) MPLS FM OAM message. This allows fast fault coordination between the bidirectional LSP end-points when the use of BFD is not feasible.

2. Reverse Defect Indicator (RDI)

The functionality proposed for MPLS FM OAM RDI is achieved by adding a RDI-flag in the MPLS Fault OAM message .

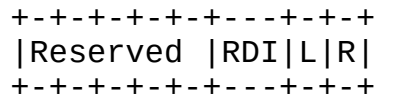

Figure 1: RDI-Flag in MPLS FM OAM Flags

where:

L-Flag and R-Flag are as defined in RFC 6427 [RFC6427].

RDI-Flag: Reverse Defect Indication Flag. The RDI-Flag is clear in the common MPLS FM OAM messages as defined in RFC 6427 [RFC6427]. The RDI-Flag is set to indicate that the message is MPLS FM OAM RDI.

3. Theory of Operations

3.1. RDI Operation in Associated Bidirectional LSPs

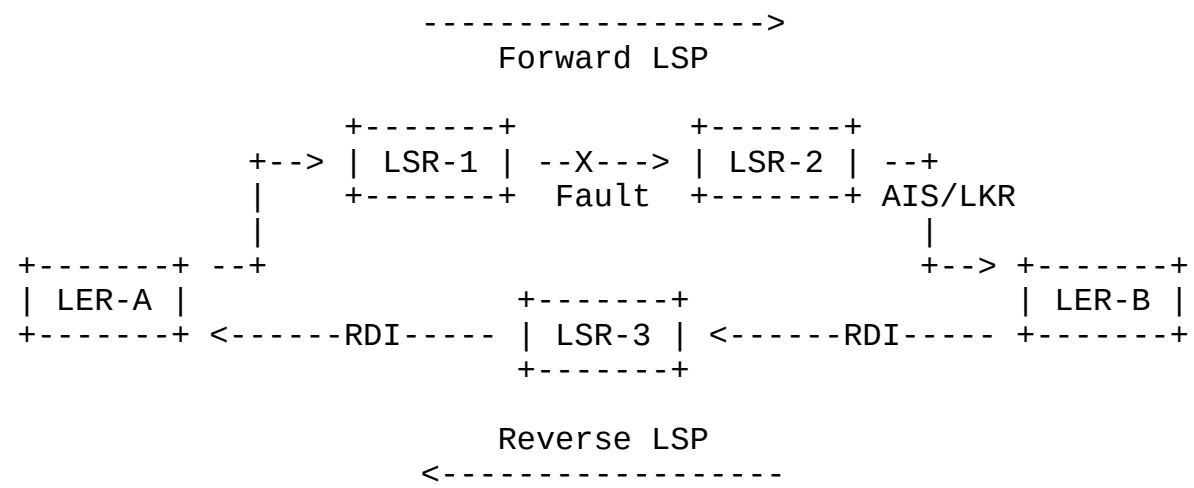

Figure 2: RDI Operation in Associated Bidirectional LSP

Figure 1 depicts an associated bidirectional LSP with:

Forward LSP (LER-A, LSR-1, LSR-2, LER-B)

Reverse LSP (LER-B, LSR-3, LER-A)

Scenario 1, Fault on LER-A: LSR-1 will detect a fault on the server sub-layer and generate AIS/LKR message on the upstream link for Forward LSP (towards LSR-2). LSR-2 will process the message and forward it, unaltered, upstream to LER-B. LER-B will process the message, set the RDI-Flag and forward it on the associated Reverse LSP. Because the RDI-Flag is set, LSR-3 does not need to process the message as the fault is not on the Reverse LSP and forwards it,

unaltered, towards LER-A. LER-A, if it receives the message (the fault may only be on the forward LSP on LER-A) processes the message and discard it (RDI-Flag set received on Reverse LSP indicates the fault is on the Forward LSP, and vice-versa). When the fault clears, LSR-1 will issue new set of AIS/LKR messages to clear the previous fault condition. This message is also propagated using the previous RDI logic to coordinate fault clear on the Reverse LSP.

Scenario 2, Link fault or LSR fault on Forward LSP: Same logic as fault on LER-A.

3.2. RDI Operation in Co-routed Bidirectional LSPs

RDI is not a required mechanism in co-routed bidirectional LSPs as MPLS LSx on either direction of the fault will generate MPLS FM OAM messages and the fault is propagated to both LERs.

4. IANA Requirements

None.

5. Security Consideration

No additional security impact because of addition of RDI-Flag in MPLS FM OAM messages.

6. Acknowledgements

7. References

7.1. Normative References

[RFC5921] Bocci, M., Ed., Bryant, S., Ed., Frost, D., Ed., Levrau, L., and L. Berger, "A Framework for MPLS in Transport Networks", RFC 5921, DOI 10.17487/RFC5921, July 2010, <https://www.rfc-editor.org/info/rfc5921>.

[RFC6427] Swallow, G., Ed., Fulignoli, A., Ed., Vigoureux, M., Ed., Boutros, S., and D. Ward, "MPLS Fault Management Operations, Administration, and Maintenance (OAM)", RFC 6427, DOI 10.17487/RFC6427, November 2011, <https://www.rfc-editor.org/info/rfc6427>.

7.2. Informative 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>.

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