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OAM for Packet-Optical Integration in Segment Routing
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Abstract

This document describes a list of functional requirements for transport segment OAM in Segment Routing (SR) based networks.

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1 Introduction

[I-D.filsfils-rtgwg-segment-routing] introduces and explains Segment Routing architecture that leverages source routing and tunneling standards which can be applied directly to MPLS dataplane with no changes on forwarding plane and on IPv6 dataplane with new Routing Extension Header. In addition [I-D. [draft-anand-spring-poi-sr](#)] introduces the concept of a Transport Segment at the edge of the packet and optical network that represents the optical path taken for a given flow.

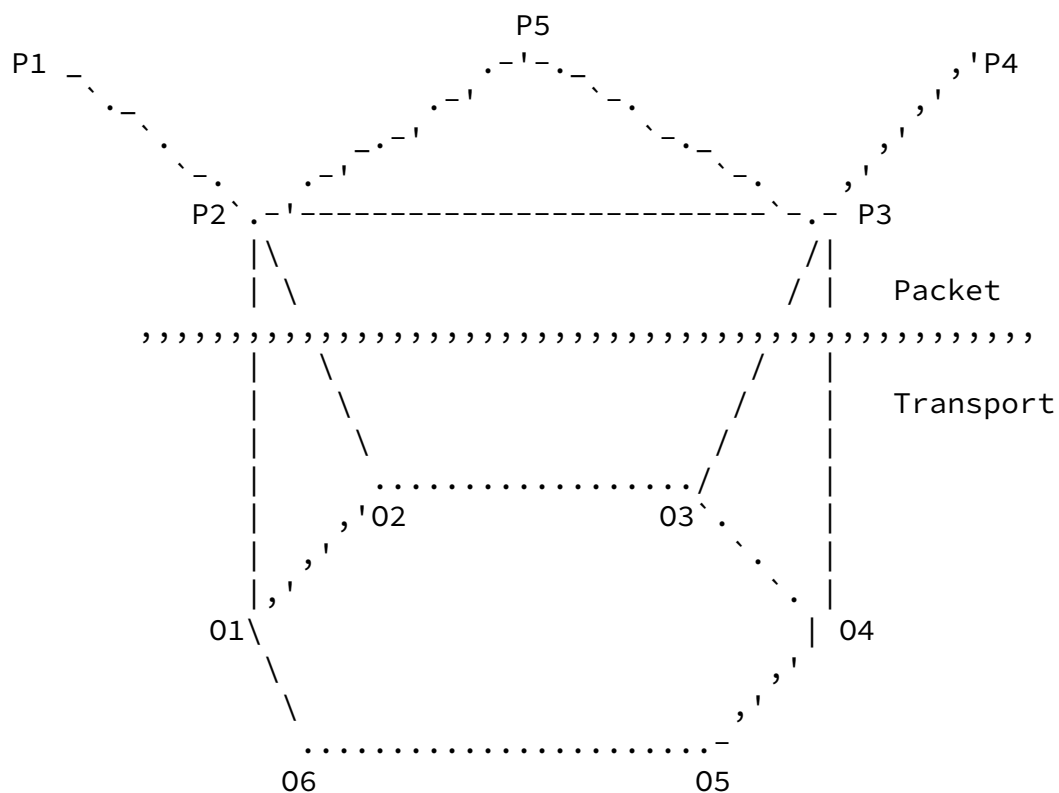


Figure 1: Representation of a packet-optical path

In Figure 1 above, the nodes represent a packet optical network. P1,...,P5 are packet devices. Nodes P2 and P3 are connected via optical network comprising of nodes 01,...,06. Nodes P2 and P3 are POGs that communicate with other packet devices and also with the devices in the optical transport domain.

This document is a place holder to identify and list the OAM requirements for Segment Routing based network which can further be extended to produce OAM tools for path liveliness and service validation across the optical domain using Transport Segments. In the above figure, these requirements would pertain to nodes P2 and P3.

[1.1](#) Terminology

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](#)].

SR: Segment Routing

Initiator: Centralized OAM initiator

POG: Packet Optical Gateway that interworks between a packet and optical network

[2.](#) Detailed Requirement List

This section list the OAM requirement for Transport Segments in a Segment Routing based network. The below listed requirements MUST be supported within an optical dataplane.

REQ#1: Transport Segment OAM SHOULD support Continuity Check

(liveliness of a path - BFD), Connectivity Verification (BFD, Ping), Fault Verification - exercised on demand to validate the reported fault (Ping).

REQ#2: Transport Segment OAM MUST support both On-demand and Continuous OAM functionality.

REQ#3: Transport Segment OAM packet MUST follow exactly the same path as the dataplane traffic.

REQ#4: The Transport Segment OAM packet MUST have the ability to exercise any available paths as defined by the transport segment label.

REQ#5: Transport Segment OAM SHOULD have the ability to allow the Initiator to add the Remote Transport Label and control the return path from egress responder. [draft-ietf-mpls-bfd-directed](#) has provided the semantics of a return path which would suit this need.

REQ#6: Transport Segment OAM MUST have the ability to be initialized from an ingress POG node to perform connectivity verification and continuity check to any remote POG within the same optical domain ID based on the declared Transport Segment Label.

REQ#7: In case of any failure with continuity check, Transport Segment OAM Layer SHOULD support rapid Connectivity Fault notification to the Packet Control plane of the POG to withdraw the Transport Segment Label associated with the affected path and/or take a local protection action.

REQ#8: Transport Segment OAM SHOULD also have the ability to be initialized from a centralized controller.

REQ#9: When Transport Segment OAM is initialized from centralized controller, the node on receiving the alert MAY take a local protection action and/or pop an informational message.

REQ#10: When Transport Segment OAM is initialized, it SHOULD support node redundancy based on network configuration. If primary Initiator fails, secondary one MUST take over the responsibility without having any impact on customer traffic.

REQ#11: Transport Segment OAM MUST have the ability to measure bidirectional packet loss, throughput measurement, delay variation, as well as unidirectional and dyadic measurements.

REQ#12: When a new path is instantiated, Transport Segment OAM SHOULD allow path verification without noticeable delay. It may be desired to check for liveness of the optical path using Transport Segment OAM before announcing the Transport Segment.

REQ#13: The above listed requirements SHOULD be supported without any scalability limitation imposed and SHOULD be extensible to accommodate any new SR functionality.

REQ#14: Transport Segment OAM SHOULD maintain per Transport label state entry at the originating POG.

REQ#15: When traffic engineering is initiated by centralized controller device, and when Transport Segment OAM is performed by POGs, there MUST be a mechanism to communicate the failure to a centralized controller device.

REQ#16: When a local repair in the optical network takes place, the characteristics of the path between the POGs may have changed. If there is significant change in the path characteristics based on thresholds, the ingress POG SHALL trigger a re-advertisement of the transport segment label at the global level.

REQ#17: The format of the Transport Segment OAM Ping packet SHALL follow [RFC 4379](#).

REQ#18: The format of the Transport Segment OAM BFD packet SHALL follow [RFC 5884](#).

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[3](#) Security Considerations

This document does not introduce any new security considerations.

[4](#) IANA Considerations

TBD.

[5](#) References

[5.1](#) Normative References

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