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**MPLS Performance Measurement UDP Return Path  
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**Abstract**

This document specifies the procedure to be used by the Packet Loss and Delay Measurement for MPLS Networks protocol defined in [RFC6374](#) when sending and processing MPLS performance management out-of-band responses for delay and loss measurements over an IP/UDP return path.

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## **1. Introduction**

The Packet Loss and Delay Measurement for MPLS Networks protocol (MPLS-PLDM) defined in[RFC6374] does not define how an MPLS-PLDM out-of-band response delivered over IP will be transmitted to the Querier.

In a highly scaled system some MPLS-PLDM sessions may be off-loaded to a specific node within a the distributed system that comprises the LSR as a whole. In such systems the response may arrive via any interface in the LSR and need to internally forwarded to the processor tasked with handling the particular MPLS-PLDM measurement. Currently the MPLS-PLDM protocol does not have any mechanism to deliver the PLDM Response message to particular node within a multi-CPU LSR.

The procedure described in this specification describes how the queryer requests delivery of the MPLS-PLDM response over IP to a dynamic UDP port. It makes no other changes to the protocol and thus does not affect the case where the reponse is delivered over a MPLS Associated Channel [[RFC5586](#)].

## **2. 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 [[RFC2119](#)].

## **3. Solution Overview**

This document specifies that, unless configured otherwise, the Addressing Object defined in [[RFC6374](#)] SHALL be sent in MPLS-PLDM query messages to tell the responder the IP return address to be used. This document also defines Return UDP Port object which, unless configured otherwise SHALL be used to the return UDP port. The Addressing Object and the Return UDP PORT object carried in the MPLS-PLDM query message are used to specify to the Responder how to return the response message.

The procedures defined in this document may be applied to both unidirectional tunnels and Bidirectional LSPs. In this document, the term bidirectional LSP includes the co-routed Bidirectional LSP defined in [[RFC3945](#)] and the associated bidirectional LSP that is constructed from a pair of unidirectional LSPs (one for each direction) that are associated with one another at the LSP's ingress/egress points [[RFC5654](#)]. The mechanisms defined in this document can







#### **4.2. Sending an MPLS-PM Query**

When sending an MPLS-PLDM Query message, in addition to the rules and procedures defined in [\[RFC6374\]](#); the Control Code of the MPLS-PLDM Query MUST be set to "Out-of-band Response Requested", and a "Return UDP Port TLV" along with "Return Address TLV" MUST be carried in the MPLS-PLDM Query message.

Since the Querier uses the UDP port to de-multiplex response for different measurement type, there SHOULD be a different UDP port for each measurement type (Delay, loss and delay-loss combined).

An implementation MAY use multiple UDP ports for same measurement type to direct the response to the correct management process in the LSR.

#### **4.3. Receiving an MPLS PM Query Request**

The processing of MPLS-PLDM query messages as defined in [\[RFC6374\]](#) applies in this document. In addition, when an MPLS-PLDM Query request is received, with the Control Code of the MPLS-PLDM Query set to "Out-of-band Response Requested" with a Return address TLV and Return UDP TLV is present, then the Responder SHOULD use that IP address and UDP port to send MPLS-PLDM response back to Querier.

If an Out-of-band response is requested and either the Return Address TLV or the Return UDP port TLV is missing, the Query SHOULD be dropped in the case of unidirectional LSP. If either of these TLVs is missing on a bidirectional LSP, the control code of Response message should set to "Invalid Message" and the response SHOULD be sent over the reverse LSP. In either case the receipt of such a malformed request SHOULD be notified to the operator through the management system, taking the normal precautions with respect to the prevention of overload of the error reporting system.

#### **4.4. Sending an MPLS-PM Response**

As specified in [\[RFC6374\]](#) the MPLS-PLDM Response can be sent over either the reverse MPLS LSP for a bidirectional LSP or over an IP path. It MUST NOT be sent other than in response to an MPLS-PLDM Query message.

When the requested return path is an IP forwarding path and this method is in use, the destination IP address and UDP port SHOULD be copied from the Return Address TLV and the Return UDP TLV respectively. The source IP address and the source UDP port of Response packet is left to discretion of the Responder subject to the normal management and security considerations. The packet format for



the MPLS-PLDM response after the UDP header is as specified in [RFC6374]. As shown in Figure 1 the Associate Channel Header (ACH) [RFC5586] is not included. The information provided by the ACH is not needed since the correct binding between the Query and Response messages is achieved through the UDP Port and the Session Identifier contained in the [RFC6374] message.

As noted in

```

+-----+
| IP Header                                |
.   Source Address = Responders IP Address |
.   Destination Address = Return Address TLV.Address |
.   Protocol = UDP                          .
.                                           .
+-----+
| UDP Header                              |
.   Source Port = As chosen by Responder   .
.   Destination Port = Return UDP Port TLV.UDP Dest Port .
.                                           .
+-----+
| Message as specified in [RFC6374]       |
.                                           .
+-----+

```

Figure 1: Response packet Format

If the return path is IP path, only one-way delay or one-way loss measurement can be carried out. In this case timestamps 3 and 4 MUST be zero as specified in [RFC6374].

#### 4.5. Receiving an MPLS-PM Response

If the response was received over UDP/IP and an out-of-band response was expected, the Response message SHOULD be directed to the appropriate measurement process as determined by the destination UDP Port, and processed using the corresponding measurement type procedure specified in [RFC6374].

If the Response was received over UDP/IP and an out-of-band response was not requested, that response should be dropped and the event SHOULD be notified to the operator through the management system, taking the normal precautions with respect to the prevention of overload of the error reporting system.





## 5. Manageability Considerations

The manageability considerations described in [Section 7 of \[RFC6374\]](#) are applicable to this specification. Additional manageability considerations are noted within the elements of procedure of this document.

Nothing in this document precludes the use of a configured UDP/IP return path in a deployment in which configuration is preferred to signalling. In these circumstances the address and UDP port TLVs MAY be omitted from the MPLS-PLDM messages.

## 6. Security Considerations

The MPLS-PLDM system is not intended to be deployed on the public Internet. It is intended for deployment in well managed private and service provider networks. The security considerations described in [Section 8 of \[RFC6374\]](#) are applicable to this specification and the reader's attention is drawn to the last two paragraphs. Cryptographic measures may be enhanced by the correct configuration of access control lists and firewalls.

There is no additional exposure of information to pervasive monitoring systems observing LSPs that are being monitored.

## 7. IANA Considerations

IANA is requested to assign a new Optional TLV type from MPLS Loss/Delay Measurement TLV Object Registry contained within the g-ach-parameters registry set.

Code	Description	Reference
TBD	Return UDP Port	[This]

The TLV 131 is recommended.

IANA is requested to assign a new response code in the MPLS Loss/Delay Measurement Control Code Registry contained within the g-ach-parameters registry set.

Code	Description	Reference
TBD	Missing TLV	[This]

The response code 0x1E is recommended.



## **8. Acknowledgements**

We acknowledge the contribution of Joseph Chin and Rakesh Gandhi, both with Cisco Systems. We thank Loa Andersson for his review comments.

We thank all who have reviewed this text and provided feedback.

## **9. Normative References**

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