Internet Engineering Task Force (IETF)
Request for Comments: 6375
Category: Informational
ISSN: 2070-1721

D. Frost, Ed.
S. Bryant, Ed.
Cisco Systems

September 2011

A Packet Loss and Delay Measurement Profile for MPLS-Based Transport Networks

Abstract

Procedures and protocol mechanisms to enable efficient and accurate measurement of packet loss, delay, and throughput in MPLS networks are defined in RFC 6374.

The MPLS Transport Profile (MPLS-TP) is the set of MPLS protocol functions applicable to the construction and operation of packet-switched transport networks.

This document describes a profile of the general MPLS loss, delay, and throughput measurement techniques that suffices to meet the specific requirements of MPLS-TP.

This document is a product of a joint Internet Engineering Task Force (IETF) / International Telecommunication Union Telecommunication Standardization Sector (ITU-T) effort to include an MPLS Transport Profile within the IETF MPLS and Pseudowire Emulation Edge-to-Edge (PWE3) architectures to support the capabilities and functionalities of a packet transport network as defined by the ITU-T.

Status of This Memo

This document is not an Internet Standards Track specification; it is published for informational purposes.

This document is a product of the Internet Engineering Task Force (IETF). It represents the consensus of the IETF community. It has received public review and has been approved for publication by the Internet Engineering Steering Group (IESG). Not all documents approved by the IESG are a candidate for any level of Internet Standard; see Section 2 of RFC 5741.

Information about the current status of this document, any errata, and how to provide feedback on it may be obtained at http://www.rfc-editor.org/info/rfc6375.

1. Introduction

Procedures for the measurement of packet loss, delay, and throughput in MPLS networks are defined in [RFC6374]. This document describes a profile, i.e., a simplified subset, of these procedures that suffices to meet the specific requirements of MPLS-based transport networks [RFC5921] as defined in [RFC5860]. This profile is presented for the convenience of implementors who are concerned exclusively with the transport network context.

The use of the profile specified in this document is purely optional. Implementors wishing to provide enhanced functionality that is within the scope of [RFC6374] but outside the scope of this profile may do so, whether or not the implementation is restricted to the transport network context.

The assumption of this profile is that the devices involved in a measurement operation are configured for measurement by a means external to the measurement protocols themselves, for example, via a Network Management System (NMS) or separate configuration protocol. The manageability considerations in [RFC6374] apply, and further information on MPLS-TP network management can be found in [RFC5950].

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2. MPLS-TP Measurement Considerations

The measurement considerations discussed in Section 2.9 of [RFC6374] apply also in the context of MPLS-TP, except for the following, which pertain to topologies excluded from MPLS-TP:

- Equal Cost Multipath considerations (Section 2.9.4 of [RFC6374])
- Considerations for direct Loss Measurement (LM) in the presence of Label Switched Paths constructed via the Label Distribution Protocol (LDP) or utilizing Penultimate Hop Popping (Section 2.9.8 of [RFC6374])

3. Packet Loss Measurement (LM) Profile

When an LM session is externally configured, the values of several protocol parameters can be fixed in advance at the endpoints involved in the session, so that negotiation of these parameters is not required. These parameters, and their default values as specified by this profile, are as follows:

Parameter	Default Value
Query control code	In-band Response Requested
Byte/packet Count (B) Flag	Packet count
Traffic-class-specific (T) Flag	Traffic-class-scoped
Origin Timestamp Format (OTF)	Truncated IEEE 1588v2

A simple implementation may assume that external configuration will ensure that both ends of the communication are using the default values for these parameters. However, implementations are strongly advised to validate the values of these parameters in received messages so that configuration inconsistencies can be detected and reported.

LM message rates (and test message rates, when inferred LM is used) should be configurable by the network operator on a per-channel basis. The following intervals should be supported:

Message Type	Supported Intervals
LM Message	100 milliseconds, 1 second, 10 seconds, 1 minute, 10 minutes
Test Message	10 milliseconds, 100 milliseconds, 1 second, 10 seconds, 1 minute

4. Packet Delay Measurement (DM) Profile

When a DM session is externally configured, the values of several protocol parameters can be fixed in advance at the endpoints involved in the session, so that negotiation of these parameters is not required. These parameters, and their default values as specified by this profile, are as follows:

Parameter	Default Value
Query control code	In-band Response Requested
Querier Timestamp Format (QTF)	Truncated IEEE 1588v2
Responder Timestamp Format (RTF)	Truncated IEEE 1588v2
Responder's Preferred Timestamp Format (RPTF)	Truncated IEEE 1588v2

A simple implementation may assume that external configuration will ensure that both ends of the communication are using the default values for these parameters. However, implementations are strongly advised to validate the values of these parameters in received messages so that configuration inconsistencies can be detected and reported.

DM message rates should be configurable by the network operator on a per-channel basis. The following message intervals should be supported: 1 second, 10 seconds, 1 minute, 10 minutes.

5. Security Considerations

This document delineates a subset of the procedures specified in [RFC6374], and as such introduces no new security considerations in itself. The security considerations discussed in [RFC6374] also apply to the profile presented in this document. General considerations for MPLS-TP network security can be found in [SECURITY-FRAMEWORK].

6. References

6.1. Normative References

[RFC5860] Vigoureux, M., Ward, D., and M. Betts, "Requirements for Operations, Administration, and Maintenance (OAM) in MPLS Transport Networks", RFC 5860, May 2010.

[RFC6374] Frost, D. and S. Bryant, "Packet Loss and Delay Measurement for MPLS Networks", RFC 6374, September 2011.

6.2. Informative References

[RFC5921] Bocci, M., Bryant, S., Frost, D., Levrau, L., and L. Berger, "A Framework for MPLS in Transport Networks", RFC 5921, July 2010.

[RFC5950] Mansfield, S., Gray, E., and K. Lam, "Network Management Framework for MPLS-based Transport Networks", RFC 5950, September 2010.

[SECURITY-FRAMEWORK] Fang, L., Niven-Jenkins, B., and S. Mansfield, "MPLS-TP Security Framework", Work in Progress, May 2011.

Authors' Addresses

Dan Frost (editor)
Cisco Systems

EMail: danfrost@cisco.com

Stewart Bryant (editor)
Cisco Systems

EMail: stbryant@cisco.com