

Network Working Group
Internet Draft
Intended Status: Informational
Expires: August 03,2017

Sudhin Jacob
Juniper Networks
Praveen Ananthasankaran
Nokia
Februrary 06, 2017

Benchmarking of Y1731 Performance Monitoring draft-jacpra-bmwg-pmtest-03

Abstract

The draft defines the methodologies for benchmarking of the Y1731 performance monitoring on DUT in various methods like Calculation of near-end and far-end data. Measurement is done in scenarios by using pre-defined COS and without COS in the network. The test includes Impairment test, High Availability test and soak tests.

Status of This Memo

This Internet-Draft is submitted in full conformance with the provisions of BCP 78 and BCP 79.

Internet-Drafts are working documents of the Internet Engineering Task Force (IETF). Note that other groups may also distribute working documents as Internet-Drafts. The list of current Internet-Drafts is at <http://datatracker.ietf.org/drafts/current/>.

Internet-Drafts are draft documents valid for a maximum of six months and may be updated, replaced, or obsoleted by other documents at any time. It is inappropriate to use Internet-Drafts as reference material or to cite them other than as "work in progress."

This Internet-Draft will expire on August 03, 2017.

Copyright Notice

Copyright (c) 2016 IETF Trust and the persons identified as the document authors. All rights reserved.

This document is subject to BCP 78 and the IETF Trust's Legal Provisions Relating to IETF Documents (<http://trustee.ietf.org/license-info>) in effect on the date of publication of this document. Please review these documents carefully, as they describe your rights and restrictions with respect to this document. Code Components extracted from this document must include Simplified BSD License text as described in Section 4.e of the Trust Legal Provisions and are provided without warranty as described in the Simplified BSD License.

Praveen & Sudhin Expires August 03,2017
Table of Contents

[Page 1]

1. Introduction	3
1.1. Requirements Language	3
1.2. Terminologies.	3
2. Test Topology	3
3. Network	4
4. Test Procedure	5
5. Test cases	

5.1 Y.1731 Two-way Delay Measurement Test procedure.	5
5.2 Y.1731 One-way Delay Measurement Test procedure.	7
5.3 Loss measurement without COS Test Procedure.	9
5.4 Loss measurement with COS Test Procedure.	12
5.5. Synthetic Loss Measurement Test Procedure.	15
6.Acknowledgements.	18
7. Security Considerations.	18
8.IANA Considerations.	18

1. Introduction

Performance monitoring is explained in ITU Y1731.This document defines the methodologies for benchmarking performance of Y1731 over a point to point service. Performance Monitoring has been implemented with many varying designs in order to achieve their intended network functionality. The scope of this document is to define methodologies for benchmarking Y1731 performance measurement. The following protocols under Y.1731 will be benchmarked.

1. Two-way delay measurement
2. One-way delay measurement
3. Loss measurement
4. Synthetic loss measurement

1.1. 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 RFC 2119 [RFC2119].

1.2. Terminologies

PM Performance monitoring

COS Class of Service

In-profile CIR termed as green packets.

Out-profile EIR Yellow/Amber packet.

LMM Loss Measurement Message

LMR Loss Measurement Reply

DMM Delay Measurement Message

DMR Delay MEasurement Reply

P Router Provider Router.

PE Router Provider Edge Router

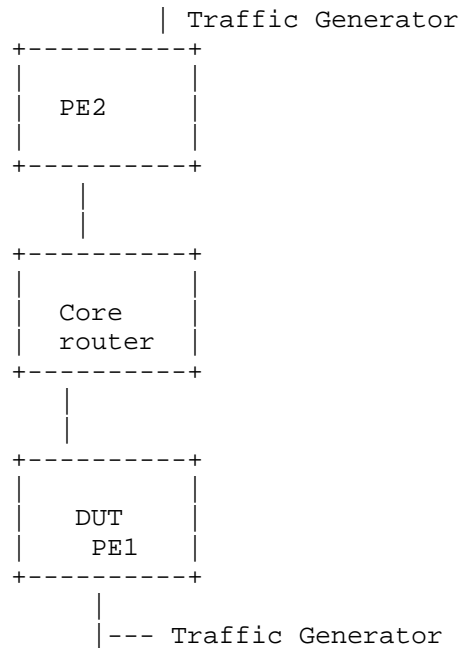
CE Router customer Edge Router

DUT Device under Test.

CCM Continuity check messages

Praveen & Sudhin Expires August 03,2017
2.1 Test Topology

[Page 3]



Praveen & Sudhin Expires August 03,2017
3. Network

[Page 4]

The benchmarking topology consists of 3 routers and 2 traffic generators. DUT is PE1 connected to CE. The core router is the P router mentioned in the topology. There is layer two(point-to-point) services running from PE1 to PE2. On the top of that performance monitoring such as loss,delay and synthetic measurements are running.PE1 is acting as DUT.The traffic will be layer 2 with vlan tag.The frame size will be 64,128,512,1024 and 1400.The tests are carried out using these various frame size.The traffic will be uni directional or bi directional.

4. Test Procedure

The tests are defined to benchmark the Y1731 performance monitoring in High Availability,Impairment,SOAK,Scale,with traffic of various line rate and frame sizes.

4.1 Performance Monitoring with traffic

Traffic is send with different .lp priorities,line rate and frame size of 64, 128,512,1024,1400.The PM values are measured with each frame size with various line rates.

4.2 High Availability

The traffic is flowing bi-direction. Then traffic is flowing at "P" packets per sec. The traffic generator is measuring the Tx and Rx packets, while the routing engine failover there should not any packet loss the router tester must show both "P" packet per seconds. The PM historical data should not reset.

4.3 Scale

This is to measure the performance of DUT in scaling to "X" CFM sessions with Performance monitoring running over it. There should not be any crashes, memory leaks.

4.4 SOAK

This test is used to measure the performance of DUT over a period of time, with scaled configuration and traffic over a period of time "T' ". In each interval "t1" the parameters measured are CPU usage, memory usage and crashes.

4.5 Measurement Statistics

The test is repeated for "N" times and the value is taken by averaging the values.

Praveen & Sudhin Expires August 03, 2017
5 Test Cases

[Page 5]

5.1 Y.1731 Two-way Delay Measurement Test procedure

Basic Testing Objective

Check the round trip delay of the network in different conditions of traffic load in the network.

Test Procedure

Configure a layer 2 point-to-point service between PE1 and PE2.
Configure Y.1731 Two way delay measurement over the service. Observe the delay measurement in the following conditions of traffic in the network

- a. Send 80% of Line-rate traffic with different priorities and frame size.
- b. Send 40% of Line-rate traffic with different priorities and frame size.
- c. Without any line traffic

The result of all the 3 conditions above are noted and correlated.

Test Measurement

The following factors need to be measured to benchmark the result

1. The average two-way delay
2. The average two-way delay variation

In the above 3 conditions the results obtained must be similar

1. Ideal case

In this case the hardware aspects of processing capacity and the link level anomalies are not considered. The benchmark is just on the protocol

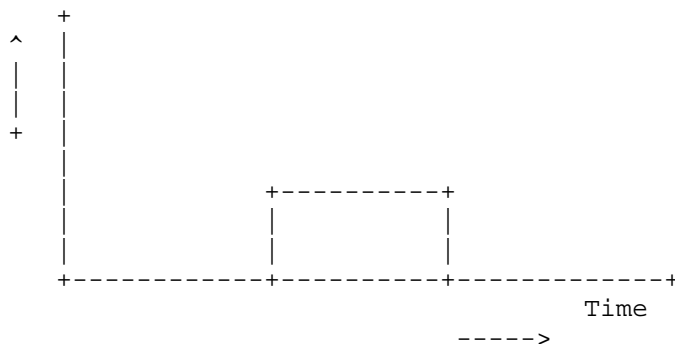
functioning. In such environment where for an ideal case the system should expect delay variation to be zero.

Praveen & Sudhin Expires August 03, 2017
2. Practical case

[Page 6]

This case is used to benchmark results when delay measurement is done on physical hardware (like a router). The factors of packet process jitter and link level delays need to be considered here. The delay variation in such cases will defer based on the above parameters on different hardware systems. Result will very base on the exact hardware.

Delay Variation



Traffic (0 to 100 percent line rate)

Impairment

This is to benchmark two-way delay measurement even when both data and PDUs are dropped in the network using the impairment tool.

Measurement

The results must show similar results before and after this test.

High Availability

During routing engine failover the historical data must not reset.

Scale

This is to measure the performance of DUT in scaling to "X" CFM sessions with Performance monitoring running over it. There should not be any crashes, memory leaks.

Soak

The bi directional traffic is send over service over 24 to 48 hours and measure after the stipulated time there must not be any change in behavior in the network for performance monitoring

Measurement

There should not be any core or crashes, memory leaks.

Praveen & Sudhin Expires August 03, 2017
5.2 One-Way delay measurement Test Procedure

[Page 7]

The test defined to measure the one-way delay measurement. One-way delay measurement as defined in Y.1731 is the delay of the packet to originate from a specific end-point till it reached the other end of the network. The measurement of this mandates the clock to be accurately synchronized as the delay is computed based on the time of two different end-points.

Configure a layer2 point-to-point service between PE1 and PE2.
Configure Y.1731 one-way delay measurement over the service.
Observe the delay measurement delay measurement in the following
conditions of traffic in the network

- The result of all the 3 conditions above are noted and correlated.

The following factors needs to be measured to benchmark the result

In the above 3 cases results obtained must be similar.

In this case the hardware aspects of processing capacity and the link level anomalies are not considered. The benchmark is just on the protocol functioning. In such environment where for an ideal case the system should expect delay variation to be zero.

This case is used to benchmark results when delay measurement is done on physical hardware (like a router). The factors of packet process jitter and link level delays needs to be considered here. The delay variation in such cases will defer based on the above parameters on different hardware systems. Result will very base on the exact hardware.

A graph showing a step function over time. The vertical axis is labeled with a caret (^) and the horizontal axis is labeled 'Time'. The function is zero for most of the time, then jumps to a positive value for a short duration, and then returns to zero.

Traffic (0 to 100 percent line rate)

Impairment

This is to benchmark one-way delay measurement even when both data and PDUs are dropped in the network using the impairment tool.

Measurement

The results must show similar results before and after this test.

High Availability

During routing engine failover the historical data must not reset.

Praveen & Sudhin Expires August 03,2017
Scale

[Page 9]

This is to measure the performance of DUT in scaling to "X" CFM sessions with Performance monitoring running over it. There should not be any crashes, memory leaks.

Soak

The bi directional traffic is send over service over 24 to 48 hours and measure after the stipulated time there must not be any change in behavior in the network for performance monitoring

Measurement

There should not be any core or crashes, memory leaks.

5.3 Loss measurement without COS Test Procedure

Basic Testing Objective

The test defined methodology for benchmarking data loss in the network on real customer traffic. The Y.1731 indicates to consider only in-profile (green) packet for loss measurement. For this, the testing needs to be done in multiple environment where

a. All data packets from traffic generator are sent with single 802.1p priority and the network do not have a COS profile defined.

b. All data packets from traffic generator are sent with 0 to 7 values for 802.1p priority and the network do not have a COS profile defined.

The objective is to benchmark the protocol behavior under different networking conditions and correlate the data. The objective is not to test the actual functioning of Y.1731 Loss measurement. The loss measurement must count only in profile packet, since there is no COS defined. All the packets must be recorded as green.

Praveen & Sudhin Expires August 03,2017
Test Procedure

[Page 10]

Configure a layer2 point-to-point service between PE1 and PE2.
Configure Y.1731 loss measurement over the service.
Observe the loss measurement in the following conditions of traffic in the network

- a.Send 80% of Line-rate traffic with different priorities with different frame size.
- b.Send 40% of Line-rate traffic with different priorities with different frame size.
- c.Without any line traffic

The result of all the 3 conditions above are noted and correlated.

Test Measurement

The factors which need to be considered is the acceptable absolute loss for the given network.

Impairment

This is to benchmark loss measurement even when both data and PDUs are dropped in the network using the impairment tool.

Measurement

When the data is dropped it must show the loss correctly and PM PDUs are dropped the counting should not be affected,ther should not be any abnormal output.

High Availability

During routing engine failover the historical data must not reset.
Ideal case there must be 0 packet loss.

Praveen & Sudhin Expires August 03,2017

[Page 11]

Scale

This is to measure the performance of DUT in scaling to "X" CFM sessions with Performance monitoring running over it.There should not be any crashes,memory leaks.Each session must record loss measurement correctly.

Soak

The bi directional traffic is send over service over 24 to 48 hours and measure after the stipulated time there must not be any change in behavior in the network for performance monitoring

Measurement

There should not be any core or crashes,memory leaks.

Result

+-----+	
Traffic sent over the service for bi direction	Loss measurement (without cos)
+-----+	
7 Streams at 100% line rate with priority	Near End = 100% Far End = 100%

from 0 to 7	
Dropping 50% of line rate at near end.	Near End 50% Far end 100% Near End loss observed 50%
Dropping 50% of line rate at far end.	Near End 100% Far end 50% Far End Loss observed 50%

Praveen & Sudhin Expires August 03,2017
5.4. Loss measurement with COS Test Procedure

[Page 12]

Basic Testing Objective

The test defined methodology for benchmarking data loss in the network on real customer traffic. The Y.1731 indicates to consider only in-profile(green) packet for loss measurement. For this, the testing needs to be done in multiple environment where

- a. All data packets from traffic generator are sent with single 802.1p priority and the network have pre-defined COS profile defined.
- b. All data packets from traffic generator are sent with 0 to 7 values for 802.1p priority and the network have pre-defined COS profile defined.

The COS profile defined needs to have 2 factors

- a.COS needs to treat different 802.1p as separate class of packets.
- b.Each Class of packets needs to be an defined CIR for the specific network.

The objective is to benchmark the protocol behavior under different networking conditions and correlate the data. The objective is not to test the actual functioning of Y.1731 Loss measurement. The loss measurement must show in profile packet for each COS levels. Each COS level must count only its own defined in profile packets. The Packets, which are termed, as out profile by COS marking must not be counted.When the traffic is send with single 802.1p priority the loss measurement must record value only for that particular COS level.

Test Procedure

Configure a layer2 point-to-point service between PE1 and PE2.
Configure Y.1731 loss measurement over the service.
Observe the loss measurement in the following conditions of traffic in the network.

Praveen & Sudhin Expires August 03,2017

[Page 13]

- d.Send 80% of Line-rate traffic with different priorities with different frame size.
- e.Send 40% of Line-rate traffic with different priorities with different frame size.
- f. Without any line traffic

The result of all the 3 conditions above are noted and correlated.

Test Measurement

The factors which need to be considered is the acceptable absolute loss for the given network.

Impairment

This is to benchmark loss measurement even when both data and PDUs are dropped in the network using the impairment tool.

Measurement

When the data is dropped it must show the loss correctly and PM PDUs are dropped the counting should not be affected, there should not be any abnormal output.

High Availability

During routing engine failover the historical data must not reset. Ideal case there must be 0 packet loss.

Scale

This is to measure the performance of DUT in scaling to "X" CFM sessions with Performance monitoring running over it. There should not be any crashes, memory leaks. Each session must record loss measurement correctly.

Soak

The bi directional traffic is send over service over 24 to 48 hours and measure after the stipulated time there must not be any change in behavior in the network for performance monitoring

Praveen & Sudhin Expires August 03, 2017
Measurement

[Page 14]

There should not be any core or crashes, memory leaks.

Result

+-----+ Traffic sent Loss measurement over the service (With cos) for bi direction +-----+	
+-----+ 7 Streams at Near End = 100% 100% line rate Far End = 100% with priority from 0 to 7 +-----+	
+-----+ Dropping 50% Near End 50% of line rate Far end 100% at near end Near End loss for priority observed 50% marked 0 (priority 0) +-----+	
+-----+ Dropping 50% Near End 100% of line rate Far end 50% at far end for Far End Loss priority 0 observed 50% +-----+	

| (priority 0) |
+-----+

5.5.1 Basic Testing Objective

The test defined methodology for benchmarking synthetic loss in the network. The testing needs to be done in multiple environment where

- a. All data packets from traffic generator are sent with single 802.1p priority and the network do not have a COS profile defined. The synthetic loss measurement also uses the same 802.1p priority as that of traffic.
- b. All data packets from traffic generator are sent with single 802.1p priority and the network have pre-defined COS profile defined. The synthetic loss measurement also uses the same 802.1p priority as that of traffic.
- c. All data packets from traffic generator are sent with 0 to 7 values for 802.1p priority and the network do not have a COS profile defined. The synthetic loss measurement also uses the same 802.1p priority as that of traffic. Hence 8 sessions are tested in parallel.
- d. All data packets from traffic generator are sent with 0 to 7 values for 802.1p priority and the network have pre-defined COS profile defined. The synthetic loss measurement also uses the same 802.1p priority as that of traffic. Hence 8 sessions are tested in parallel.

The COS profile defined needs to have 2 factors

1. COS needs to treat different 802.1p as separate class of packets.
2. Each Class of packets needs to have defined CIR for the specific network.

The objective is to benchmark the protocol behavior under different networking conditions and correlate the data. The objective is not to test the actual functioning of Y.1731 Loss measurement.

Test Procedure

Configure a layer2 point-to-point service between PE1 and PE2.
Configure Y.1731 loss measurement over the service. Observe the synthetic loss measurement in the following conditions of traffic in the network

- a. Send 80% of Line-rate traffic with different priorities
 - b. Send 40% of Line-rate traffic with different priorities
 - c. Without any line traffic
- The result of all the 3 conditions above are noted and correlated.

The factors which need to be considered is the acceptable absolute loss

for the given network.

Impairment

This is to benchmark synthetic loss measurement even when both data and PDUs are dropped in the network using the impairment tool.

Measurement

When the data is dropped it must not affect the SLM counters but if synthetic frames are dropped the loss must be shown accordingly.

High Availability

During routing engine failover the historical data must not reset.

Scale

This is to measure the performance of DUT in scaling to "X" CFM sessions with Performance monitoring running over it. There should not be any crashes, memory leaks.

Soak

The bi directional traffic is send over service over 24 to 48 hours and measure after the stipulated time there must not be any change in behavior in the network for performance monitoring

Measurement

There should not be any core or crashes, memory leaks.

Praveen & Sudhin Expires August 03, 2017

[Page 17]

6. Acknowledgements

We would like to thank Al Morton of (ATT) for their support and encouragement. We would like to thank Fioccola Giuseppe of Telecom Italia reviewing our draft and commenting it.

7. Security Considerations

NA

8. IANA Considerations

NA

Appendix A. Appendix

Authors' Addresses

Sudhin Jacob
Juniper Networks
Bangalore

Email: sjacob@juniper.net

sudhinjacob@rediffmail.com

Praveen Ananthasankaran
Nokia
Manyata Embassy Tech Park,
Silver Oak (Wing A), Outer Ring Road,
Nagawara, Bangalore-560045

Email: praveen.ananthasankaran@nokia.com

Praveen & Sudhin

Expires August 03,2017

[Page 18]