Internet Engineering Task Force
Internet-Draft
Intended status: Standards Track
Expires: December 18, 2016

S. Jacob, Ed.
K. Tiruveedhula
Juniper Networks

June 16, 2016

Benchmarking Methodology for PBB-EVPN
draft-kishjac-bmwg-pbbevpn-00

Abstract

This document defines the methodologies for benchmarking performance of PBB-EVPN.PBB-EVPN is defined in RFC 7623. It is being deployed in provider network.This document provides the benchmarking methodologies for PBB-EVPN convergance,data plane,control plane learning of mac.

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 December 18, 2016.

Table of Contents

1. Introduction

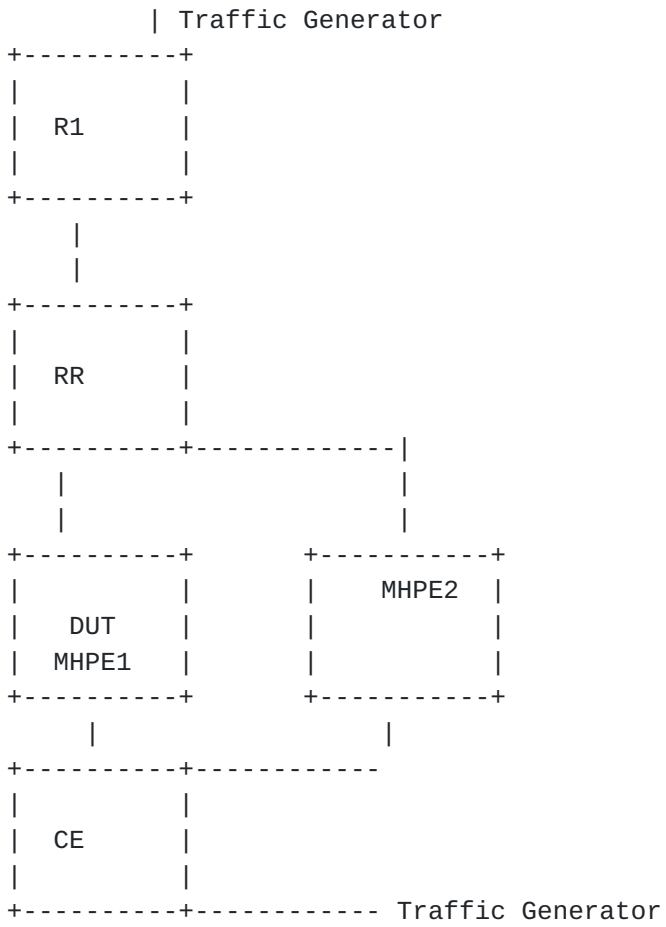
PBB-EVPN which is defined in RFC 7623 which describes procedures for BGP MPLS-based PBB-EVPN.This document defines the methodologies for benchmarking performance of PBB-EVPN.PBB-EVPN has been implemented with many varying designs in order to achieve their intended network functionality.The scope of this document is to provide methodologies for benchmarking pbb-evpn data, control plane mac learning, mac flush, mac ageing, convergence, high availablity, reliablity,scale.

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].

2. Test Topology

Topology Diagram



Topology Diagram

Figure 1

3. Network

The network consists of 5 routers and 2 traffic generator ports. DUT is acting as one of MH PE to CE.The RR is acting as route reflector and core router.R1 is a Single home router running pbbevpn. All four routers except CE are running mpls,bgp. CE is a dual home connected to DUT and MH PE1. The testing will be done on DUT to bench mark the service.DUT and MHPE2 is running PBB-EVPN with SA/AA with CE.The DUT and and other PE's will be running 100 PBB-EVN instances on 100 sub interfaces.

4. Test Procedure

The test defined to bench mark the performance of PBB-EVPN mac learning in control pland and data plane. Mac flush,High Availablity, convergence time in link failures,Reliablity,scale scenarios.

4.1. Customer MAC Learning in Data Plane and B-MAC in control plane

The Customer MAC will be learned in data plane, test is to measure the time taken to learn the "X" number of mac's in time "T". The data plane learning will from the locally connected interface. The control plane learning of B-MAC is through BGP advertisements from the remote PE.Let the local learning time be "T" and control plane learning of the B-MAC time be "T'".

4.2. MAC flush for locally learned and remote learned MAC

The time taken to flush the "X" locally learned mac, let it be "T1" once the traffic is stopped. The time taken flush the remote mac which learned by data plane that "X" macs when the traffic is stopped at remote side.Let the measured time is "T2".

4.3. High Availablity

The traffic is flowing bi direction. The bgp is converged, let the "X" numbers of macs learned locally and remotely. 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.

4.4. Reliablity

This is to measure during any events like adding a new PE or rebooting on of the MHPE in the same ethernet segment,there should not any issues in DF election. There should not be any loop. The DF elction must take place in t time where 4>t>3. The DF election must work on V mod N. There should not be any loop in traffic.

4.5. Convergence Time

During any events like link failure, hard reset measure the time taken to learn "X" mac's locally and remotely or time taken to learn "X" mac locally and remote.

4.6. Scale

This is to measure the performance of DUT in scaling to "X" PBB-EVPN instances. The measured parameters are CPU usage, memory leak,crashes.

4.7. SOAK

This is measuring the performance of DUT running with scaled configuration with traffic over a peroid of time "T'". In each interval "t1" the parameters measured are CPU usage, memory usage, crashes.

4.8. Measurement Statistics

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

5. Test Cases

5.1. MAC Learning in Control plane and Data Plane

The following tests are conducted to measure mac learning local and remote.

5.1.1. To check the time taken to learn the mac address in DUT

Objective:

To check the time taken to learn the mac address locally and time taken to send the locally learned routes to peers.

a. Send 100,000 unicast frames from CE to MHPE1(DUT) working in SA mode where DUT is the DF so that it can forward the traffic with different source and destination address,Measure the time taken to learn these mac in forwarding table.

Procedure:

Configure PBB-EVPN EVI in R1,MHPE2,DUT.All 4 routers except CE are running mpls,bgp,RR is acting as route reflector to R1,MHPE2 and DUT.Once the bgp comes up check the DUT evpn table.For MH PE ESI must be configured per IFD/Interface. Using RT (traffic generator) to send the traffic to the routers. Measurement The DUT mac table must learn the 100,000 mac address. Measurement The DUT mac table must

learn the 100,000 measure the time taken to learn the 100,000 mac address from locally.

5.1.2. To check the time taken to learn 100,000 routes from remote peer by DUT.

Objective:

Send 100,000 frames with different SA and DA to DUT from R1 using traffic generator. Measure the time taken to learn these 100,000 macs from remote peer and program the mac address table.

Procedure:

Configure PBB-EVPN EVI in R1, MHPE2, DUT. All 4 routers except CE are running mpls, bgp, RR is acting as route reflector to R1, MHPE2 and DUT.Once the bgp comes up check the DUT mac table. For MH PE ESI must be configured per IFD/Interface. Using RT(traffic generator) to send the traffic to the routers.

Measurement:

The DUT mac table must learn the 100,000 measure the time taken to learn the 100,000 mac address from remote peers.

5.1.3. To check the time taken to flush the local entry due to CE link failure

Objective:

Send 100,000 frames with different SA and DA to DUT from CE using traffic generator. Then wait to learn all 100,000 mac address. Then fail the DUT CE link and measure the time taken to flush these 100,000 routes from the mac table.

Procedure:

Configure PBB-EVPN EVI in R1,MHPE2,DUT. All 4 routers except CE are running mpls,bgp,RR is acting as route reflector to R1,MHPE2 and DUT. Once the bgp comes up check the DUT mac table. For MH PE ESI must be configured per IFD/Interface. Using RT(traffic generator) to send the traffic to the routers.

Measurement:

The DUT mac table must learn the 100,000 measure the time taken for flushing these 100,000 mac address.

5.1.4. To check the time taken by DUT to flush 100,000 routes learned from remote PE after R1 traffic generator link failure

Objective:

Send 100,000 frames with different SA and DA to DUT from R1 using traffic generator. Bring down the link between R1 and traffic generator. Then measure the time taken to flush the DUT mac address table.

Procedure:

Configure PBB-EVPN EVI in R1,MHPE2,DUT. All 4 routers except CE are running mpls,bgp,RR is acting as route reflector to R1,MHPE2 and DUT.Once the bgp comes up check the DUT mac table.For MH PE ESI must be configured per IFD/Interface. Using RT(traffic generator) to send the traffic to the routers.

Measurement:

Measure the time taken to flush 100,000 remote routes from mac table of DUT.

5.1.5. To measure the mac ageing time.

Objective:

Send 100,000 frames with different SA and DA to DUT from CE using traffic generator. Then wait to learn all 100,000 mac address. Then stop the traffic.Wait to see how long it takes to flush these mac entries due to ageing.

Procedure:

Configure PBB-EVPN EVI in R1,MHPE2,DUT. All 4 routers except CE are running mpls,bgp,RR is acting as route reflector to R1,MHPE2 and DUT.Once the bgp comes up check the DUT mac table. For MH PE ESI must be configured per IFD/Interface. Using RT(traffic generator) to send the traffic to the routers.

Measurement:

The DUT mac table must learn the 100,000 measure the time taken for flushing these 100,000 mac address due to ageing.

5.1.6. To check the time taken by DUT to age from remote PE after stopping the traffic at remote PE.

Objective:

Send 100,000 frames with different SA and DA to DUT from R1 using traffic generator.After stopping the traffic at remote PE(R1) traffic generator.Measure the time taken to remove these macs from DUT mac table.

Procedure:

Configure PBB-EVPN EVI in R1,MHPE2,DUT.All 4 routers except CE are running mpls,bgp,RR is acting as route reflector to R1,MHPE2 and DUT.Once the bgp comes up check the DUT mac table.For MH PE ESI must be configured per IFD/Interface. Using RT(traffic generator) to send the traffic to the routers.

Measurement:

Measure the time taken to flush 100,000 remote macs from mac table of DUT due to ageing.

5.2. Convergence

The following tests are executed to measure the convergence time in case of an event or by lerning the mac without any external trigger.

5.2.1. To check the time taken by DUT to learn 100,000 macs from local and 100,000 from remote and measure the time of flood from DUT.

Objective:

Send 100,000 frames with different SA and DA to DUT from R1 using traffic generator. Send 100,000 frames with different SA and DA from traffic generator connected to CE. The SA and DA of flows must be complimentary to have unicast flows. Measure the time taken by the DUT to learn 200,000 in mac table.Measure the flood time period of DUT.

Procedure:

Configure PBB-EVPN EVI in R1,MHPE2,DUT.All 4 routers except CE are running mpls,bgp,RR is acting as route reflector to R1,MHPE2 and DUT.Once the bgp comes up check the DUT evpn table. For MH PE ESI must be configured per IFD/Interface. Using RT(traffic generator) to send the traffic to the routers.

Measurement:

Measure the time taken to learn 200,000 mac address table in DUT. and measure the flood time of DUT.

5.2.2. To measure the time taken to elect a new DF by adding a a MHPE.

Objective:

Send 100,000 frames from CE to DUT from traffic generator with different SA and DA. Wait to learn all 100,000 mac address. Then add R1 to the same Ethernet segment by configuring the same ESI value configured in DUT,MHPE2 in IFD. Then the new DF election take place during that time there should not be any loop and measure the time taken to come up the new DF.Measure the time taken to elect the new DF.

Procedure:

Configure PBB-EVPN EVI in R1,MHPE2,DUT.All 4 routers except CE are running mpls,bgp,RR is acting as route reflector to R1,MHPE2 and DUT.Once the bgp comes up check the DUT evpn table. For MH PE ESI must be configured per IFD/Interface. Using RT(traffic generator) to send the traffic to the routers.

Measurement:

Measure the time taken for new DF election in DUT and there should not be any loop or forwarding the BUM traffic back to the same segment.

5.3. Reliability

These tests are conducted to check after an event there wont be any change in functionality.

5.3.1. To check the whether there is traffic loss due to routing engine failover for redundancy test.

Objective:

Send 100,000 frames from CE to DUT from traffic generator with different SA and DA. Send 100,000 frames from traffic generator to R1 with different SA and DA so that 200,000 mac address will be learned in DUT. There is a bi directional traffic flow with 100,000 pps in each direction. Then do a routing engine failover.
Procedure:

Configure PBB-EVPN EVI in R1,MHPE2,DUT.All 4 routers except CE are running mpls,bgp,RR is acting as route reflector to R1,MHPE2 and DUT.Once the bgp comes up check the DUT evpn table.For MH PE ESI must be configured per IFD/Interface. Using RT(traffic generator) to send the traffic to the routers.

Measurement:

There should not be any traffic loss,No change in the DF role. No withdraw of any routes.

5.3.2. To check the whether DF election is taking place properly after the one of the MH PE reboot.

Objective:

Send 100,000 frames from CE to DUT from traffic generator with different SA and DA. Send 100,000 frames from traffic generator to R1 with different SA and DA so that 200,000 mac address will be learned in DUT. There is a bi directional traffic flow with 100,000 pps in each direction. Then reboot DUT since there are 2 MH PE's the other PE will become the DF then after DUT comes back, then DF election has to re initiate.

Procedure:

Configure PBB-EVPN EVI in R1,MHPE2,DUT.All 4 routers except CE are running mpls,bgp,RR is acting as route reflector to R1,MHPE2 and DUT.Once the bgp comes up check the DUT evpn table.For MH PE ESI must be configured per IFD/Interface. Using RT(traffic generator) to send the traffic to the routers.

Measurement

The DF election has to take place again once the DUT comes back online.There should not be any DF stuck casefor 100 PBB-EVPN instances.

5.4. Scale

5.4.1. To Scale the DUT to 4k PBB-EVPN instances and clear bgp in DUT without traffic.

Objective:

The main purpose of the test the DUT performance to scale 4k PBB-EVPN instances. Then clear bgp neighbor. There should not be any loss of routes or any crashes.

Procedure:

Configure PBB-EVPN instances in R1,MHPE2,DUT.All 4 routers except CE are running mpls,bgp,RR is acting as route reflector to R1,MHPE2 and DUT.Once the bgp comes up check the DUT evpn table.For MH PE ESI must be configured per IFD/Interface. Using RT(traffic generator) to send the traffic to the routers.

Measurement

There should not be any loss of route types 2,3 and 4 in DUT.

5.4.2. To Scale the DUT to 4k PBB-EVPN instances and clear bgp in DUT with traffic. Measure the convergence time

Objective:

The main purpose of the test the DUT performance to scale 4k pbb-evpn instances with traffic.Then clear bgp neighbor.There should not be any loss of routes or any crashes. Send 100,000 frames from CE to DUT from traffic generator with different SA and DA for 5 pbb-evpn instances.Send 100,000 frames from traffic generator to R1 with different SA and DA for 5 pbb-evpn instances.so that 1,000,000 mac address will be learned in DUT. There is a bi directional traffic flow with 500,000 pps in each direction. Then clear the bgp nei in DUT after the bgp comes up and started learning the routes, measure the time taken to learn all 1,000,000 macs in DUT.

Procedure:

Configure PBB-EVPN instances in R1,MHPE2,DUT.All 4 routers except CE are running mpls,bgp,RR is acting as route reflector to R1,MHPE2 and DUT.Once the bgp comes up check the DUT evpn table.For MH PE ESI must be configured per IFD/Interface. Using RT(traffic generator) to send the traffic to the routers.

Measurement:

The DUT must learn all 1,000,000 mac address.Measure the time taken to learn 1,000,000 mac in DUT, measure the flood traffic time "T" of DUT

5.5. Soak Test

5.5.1. To Scale the DUT to 4k PBB-EVPN instances in DUT with traffic and run the set up for 24hrs

Objective:

Configure PBB-EVPN instances in R1,MHPE2,DUT.All 4 routers except CE are running mpls,bgp,RR is acting as route reflector to R1,MHPE2 and DUT.Once the bgp comes up check the DUT evpn table.For MH PE ESI must be configured per IFD/Interface. Using RT(traffic generator) to send the traffic to the routers.

Procedure:

Measurement:

Take the hourly reading of CPU,process memory.There should not be any leak,crashes,CPU spikes.

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. IANA Considerations

This memo includes no request to IANA.

8. Security Considerations

There is no additional consideration from RFC 6192.

9. References

9.1. Normative References

[RFC2119] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", BCP 14, RFC 2119, DOI 10.17487/RFC2119, March 1997, <http://www.rfc-editor.org/info/rfc2119>.

[RFC2544] Bradner, S. and J. McQuaid, "Benchmarking Methodology for Network Interconnect Devices", RFC 2544, DOI 10.17487/RFC2544, March 1999, <http://www.rfc-editor.org/info/rfc2544>.

9.2. Informative References

[RFC7432] Sajassi, A., Ed., Aggarwal, R., Bitar, N., Isaac, A., Uttaro, J., Drake, J., and W. Henderickx, "BGP MPLS-Based Ethernet VPN", RFC 7432, DOI 10.17487/RFC7432, February 2015, <http://www.rfc-editor.org/info/rfc7432>.

Appendix A. Appendix

Authors' Addresses

Sudhin Jacob (editor)
Juniper Networks
Bangalore
India

Phone: +91 8061212543
Email: sjacob@juniper.net

Kishore Tiruveedhula
Juniper Networks
10 Technology Park Dr
Westford, MA 01886
USA

Phone: +1 9785898861
Email: kishoret@juniper.net