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Benchmarking Methodology for EVPN and PBB-EVPN  
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Abstract

This document defines the methodologies for benchmarking performance of EVPN and PBB-EVPN. EVPN is defined in RFC 7432. It is being deployed in provider network. This document provides the benchmarking methodologies for EVPN/PBB-EVPN convergence, data plane, control plane learning of mac.

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## 1. Introduction

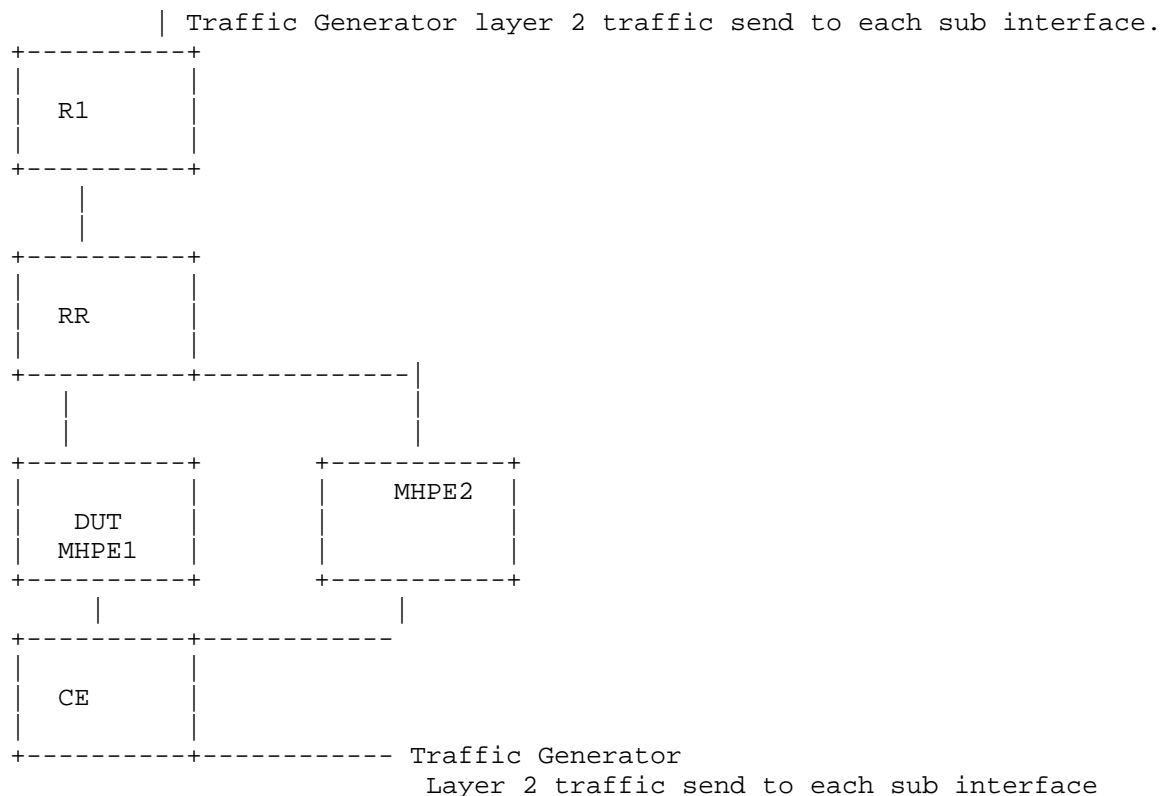
EVPN which is defined in RFC7432 which describes procedures for BGP MPLS-based Ethernet VPNs(EVPN). This document defines the methodologies for benchmarking performance of EVPN.EVPN has been implemented with many varying designs in order to achieve their intended network functionality.The scope of this document is to provide methodologies for benchmarking evpn data,control plane mac learning, mac flush,mac ageing,convergence,high availability,scale. The methodologies defined for evpn can be used for benchmarking the performance of PBB-EVPN.PBB-EVPN is defined in RFC 7623.It is being deployed in provider network.The difference between PBB-EVPN and EVPN is the former learns the customer mac in data plane the later learns in control plane.

### 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

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## 2.1 Terminologies

MHPE Multi homed Provide Edge router.

RR Route Reflector

CE Customer Router/Devices

PE2 Provider Edge router 2

AA EVPN Terminologies AA All-Active

SA EVPN Terminologies SA Single-Active

RT Router Tester

## 3. Network

The network consists of 5 routers and 2 traffic generator ports. DUT is acting as one of the MHPE to CE. The RR is acting as route reflector and core router. R1 is a Single home router running evpn. All four routers except CE are running mpls, bgp emulating a provider scenario. CE is a dual home connected to DUT and MHPE2. The testing will be done on DUT in order to benchmark the service. DUT and the MHPE2 is running EVPN with SA/AA, CE will be configured with layer 2 bridge. In AA EVPN there will be LAG running from CE to both MHPE's. The DUT and other PE's will be running X EVI's (EVPN instances) on X sub interfaces. The traffic generator will be connected to R1 and the CE, which is capable of sending layer 2 frames. The traffic will be sent either uni directional or bi directional based on the benchmark parameters to be measured.

### 3.1 PBB-EVPN Network Setup

The network consists of 5 routers and 2 traffic generator ports. DUT is acting as one of the MHPE 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 emulating a provider scenario. CE is a dual home connected to DUT and MHPE2. DUT and MHPE2 is running PBB-EVPN with SA/AA with CE. CE will be configured with layer 2 bridge. In AA PBB-EVPN there will be LAG running from CE to both MHPE's. The DUT and other PE's will be running X EVI's (PBB-EVPN instances) on X sub interfaces.

The traffic generator will be connected to R1 and the CE, which is capable of sending layer 2 frames. The traffic will be sent either uni directional or bi directional based on the benchmark parameters to be measured.

#### 4. Test Procedure

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

##### 4.1 MAC Learning in Control plane and Data Plane

The MAC will be learned in data plane and control plane, test is to measure the time taken to learn the "X" number of mac's in time "T" sec. The data plane learning will from the locally connected interface. The control plane learning is through BGP advertisements from the remote PE. Let the local learning time be "T" and control plane learning time be "T'". The data plane mac learning can be measured using the parameters defined in RFC 2889 section 5.8.

##### 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" sec, once the traffic is stopped. The time taken to flush the remote mac which is learned by control plane let it be "X" macs. The time taken to flush the "X" remote macs, which is measured as "T2" sec.

##### 4.3 High Availability

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 Convergence Time

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

##### 4.5 Scale

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

##### 4.6 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.

##### 4.7 Measurement Statistics

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

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## 5 Test Cases

The following tests are conducted to measure mac learning of local as well as 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 X unicast frames from CE to MHPE1(DUT) working in SA mode with different source and destination address, where DUT is the DF so that it can forward the traffic. Measure the time taken to learn these mac in forwarding table and in control plane. The data plane learning is measured using RFC 2889 section 5.8. Sending frames to the limit of bridge domain of particular EVI. Measure the time taken to learn all X mac in data plane/hardware. The Range of MAC is known from RT and this is verified in DUT.
- b. Measure the time taken to send these X type 2 routes from DUT to its peers.

#### Procedure:

Configure 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 CE. The traffic is unidirectional. Since CE is working in bridge mode, frames will be sent to ingress sub interface of DUT.

#### Measurement

The DUT mac table must learn the X macs in data plane in T time frame. The DUT must send type 2 routes to remote router in T' time frame. Repeat the test and plot the data. The data plane measurement is taken by considering DUT as black box the range of X mac is known from RT and the same is learned in DUT, the time to learn that is measured.

PBB-EVPN To check the time taken to learn the mac address in DUT

#### Objective:

To check the time taken to learn the mac address locally.

- a. Send X unicast frames from CE to MHPE1(DUT) working in SA mode with different source and destination address, where DUT is the DF so that it can forward the traffic. Measure the time taken to learn these mac in forwarding table. The data plane learning is measured using RFC 2889 section 5.8. Sending frames to the limit of bridge domain of particular EVI. Measure the time taken to learn all X mac in data plane/hardware. The Range of MAC is known from RT and this is verified in 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

The DUT mac table must learn the X macs in data plane in T time frame. Repeat the test and plot the data.The data plane measurement is taken by considering DUT as black box the range of X mac is known from RT and the same is learned in DUT, the time to learn that is measured.

5.1.2. To check the time taken to learn X macs from remote peer by DUT

Objective:

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

Procedure:

Configure 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) send the traffic to R1. The traffic is uni directional. There wont be any traffic flow from CE to DUT during this test.

Measurement:

The DUT mac table must learn the X mac address in T time frame. Repeat these test and plot the data.

PBB-EVPN To check the time taken to learn X mac's from remote peer by DUT.

Objective:

Send X frames with different SA and DA to DUT from R1 using traffic generator.Measure the time taken to learn these X 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 pbb-evpn table. For MHPE ESI must be configured per IFD/Interface.Using RT(traffic generator) send the traffic to R1. The traffic is uni directional. There wont be any traffic flow from CE to DUT during this test.

Measurement:

The DUT mac table must learn the X mac address in T time frame. Repeat these test and plot the data.

The following test cases are executed to measure the time taken to flush the mac table in case of an event

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

Objective:

Send X frames with different SA and DA to DUT from CE using traffic generator. Wait for a while to learn all X mac address. Then fail the DUT CE link and measure the time taken to flush these X macs from the mac table and from control plane.

Procedure:

Configure 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. In this traffic will be only send from CE.

Measurement:

Measure the time taken for flushing these X mac address. Repeat the test and plot the data.

PBB-EVPN To check the time taken to flush the local entry due to CE link failure

Objective:

Send X frames with different SA and DA to DUT from CE using traffic generator. Wait for a while to learn all X mac address. Then fail the DUT CE link and measure the time taken to flush these X macs 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 pbb-evpn table. For MH PE ESI must be configured per IFD/Interface. Using RT(traffic generator) to send the traffic to the routers. In this traffic will be only send from CE.

Measurement:

The DUT mac table must learn the X mac address and measure the time taken for flushing these X mac address.

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

Objective:

Send X 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 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 R1. There won't be any traffic flowing to CE from RT.

Measurement:

Measure the time taken to flush X remote routes from mac table of DUT. Repeat the test and plot the data.

- PBB-EVPN To check the time taken by DUT to flush X macs learned from remote PE after R1 traffic generator link failure

Objective:

Send X 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. The remote macs will be learned by Data plane, but the B-MAC will be learned by control plane.

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 pbb-evpn table. For MH PE ESI must be configured per IFD/Interface. Using RT (traffic generator) to send the traffic to the routers. In this traffic will be only sent from CE.

Measurement:

Measure the time taken to flush X remote macs from mac table of DUT.

The following test cases are executed to measure the mac ageing in locally learned and remote mac learned by control plane.

#### 5.1.5. To measure the mac ageing time.

##### Objective:

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

##### Procedure:

Configure 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. The traffic will be flowing from CE to DUT. There won't be any traffic from R1.

##### Measurement:

Measure the time taken to flush X mac address due to ageing. Repeat the test and plot the data.

PBB-EVPN To measure the mac ageing time.

##### Objective:

Send X frames with different SA and DA to DUT from CE using traffic generator. Wait to learn all X 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 X mac address, measure the time taken for flushing these X mac address due to ageing.

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

Objective:

Send X frames with different SA and DA to DUT from R1 using traffic generator. After stopping the traffic at remote PE R1 traffic generator due to mac ageing it will withdraw its routes from remote PE's. Measure the time taken to remove these macs from DUT mac table.

Procedure:

Configure 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 R1. There wont be any traffic from CE.

Measurement:

Measure the time taken to flush X remote macs from mac table of DUT due to ageing.Repeat the test and plot the data.

PBB-EVPN To check the time taken by DUT to age X mac from remote PE after stopping the traffic at remote PE.

Objective:

Send X 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 the remote macs from mac table of DUT due to ageing.

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

5.1.7. To check the time taken by DUT to learn X routes from local and X from remote and measure the time of flood from DUT.

Objective:

Send X frames with different SA and DA to DUT from R1 using traffic generator. Send X 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 2X in mac table and in control plane. Measure the flood time period of DUT.

Procedure:

Configure 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. The traffic is bi directional.

Measurement:

Measure the time taken to learn 2X routes in control and mac address table in DUT and measure the flood time of DUT. Repeat the test and plot the data.

PBB-EVPN To check the time taken by DUT to learn X macs from local and X from remote and measure the time of flood from DUT.

Objective:

Send X frames with different SA and DA to DUT from R1 using traffic generator. Send X 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 2X 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 2X mac address table in DUT.  
and measure the flood time of DUT.Repeat the test  
and plot the data.

**5.1.8. To measure the time taken to elect a new DF by adding a a MHPE.****Objective:**

Send X frames from CE to DUT from traffic generator with  
different SA and DA.Wait to learn all X mac address.Then  
add a new router configured with evpn to the same ethernet segment.  
configure same ESI value which is configured in DUT and in MHPE1 on  
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 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 MHPE 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.

**PBB-EVPN To measure the time taken to elect a new DF by adding a a MHPE.****Objective:**

Send X frames from CE to DUT from traffic generator with  
different SA and DA.Wait to learn all X mac address.Then  
add a new router 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.

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## 5.2 High Availability

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

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

#### Objective:

Send X frames from CE to DUT from traffic generator with different SA and DA. Send X frames from traffic generator to R1 with different SA and DA so that 2X mac address will be learned in DUT. There is a bi directional traffic flow with X pps in each direction. Then do a routing engine failover.

#### Procedure:

Configure 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 be 0 traffic loss which is the ideal case,  
No change in the DF role.No withdraw of any routes.

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

Objective:

Send X frames from CE to DUT from traffic generator with different SA and DA. Send X frames from traffic generator to R1 with different SA and DA so that 2X mac address will be learned in DUT. There is a bi directional traffic flow with X 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 be 0 packet loss which is a ideal case, No change in the DF role.

No withdraw of any routes.

### 5.3 ARP/ND Scaling

These tests are conducted to check the scaling parameter of arp/ND of the DUT.

EVPN: To check the ARP/ND scale of the DUT when the gateway is configured.

Objective:

Send X arp/icmpv6 request from RT to DUT, that with different sender ip/ipv6 address to the same target gateway ip address.

Procedure:

Configure EPN 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 arp request to the DUT which has gateway configured.

Measurement:

The DUT must learn X mac+ip/mac+ipv6 and it must advertise the X mac+ip/mac+ipv6 to the remote router.

## 6. Scale

### 6.1. To Scale the DUT to N EVI and clear bgp in DUT with out traffic.

#### Objective:

The main purpose of the test the DUT performance to scale N EVI's. Then clear bgp neighbor. There should not be any loss of routes or any crashes.

#### Procedure:

Configure 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 MHPE,DUT 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 1,2,3 and 4 in DUT.

### PBB-EVPN To Scale the DUT to N PBB-EVPN instances and clear bgp in DUT without traffic.

#### Objective:

The main purpose of the test the DUT performance to scale N 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.

- 6.2. To Scale the DUT to N EVI and clear bgp in DUT with traffic.  
Measure the convergence time

Objective:

The main purpose of the test the DUT performance to scale N EVI's with traffic. Then clear bgp neighbor. There should not be any loss of routes or any crashes. Send F frames from CE to DUT from traffic generator with different SA and DA for N EVI's. Send F frames from traffic generator to R1 with different SA and DA for N EVI's. so that 2F number of mac address will be learned in DUT. There is a bi directional traffic flow with F 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 2F mac routes.

Procedure:

Configure 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 must learn all 2F mac address. Measure the time taken to learn 2F mac in DUT, measure the flood traffic time "t" of DUT

PBB-EVPN To Scale the DUT to "N" 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 N pbb-evpn instances with traffic. Then clear bgp neighbor. There should not be any loss of routes or any crashes. Send F frames from CE to DUT from traffic generator with different SA and DA for N pbb-evpn instances. Send F frames from traffic generator to R1 with different SA and DA for N pbb-evpn instances. so that F mac address will be learned in DUT. There is a bi directional traffic flow with F 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 2F 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 2F mac address.Measure the time taken to learn 2F mac in DUT, measure the flood traffic time "t" of DUT

**7. Soak Test**

- 7.1. To Scale the DUT to N EVI in DUT with traffic and run the set up for 24hrs

**Objective:**

The main purpose of the test the DUT performance to scale N EVI's with traffic. Then clear bgp neighbor. There should not be any loss of routes or any crashes. Send F frames from CE to DUT from traffic generator with different SA and DA for N EVI's. Send F frames from traffic generator to R1 with different SA and DA for N EVI's.so that 2F mac address will be learned in DUT. There is a bi directional traffic flow with F pps in each direction.Keep the setup up and running for 24 hrs,take hourly CPU utilization,memory usage.

**Procedure:**

Configure 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:**

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

PBB-EVPN To Scale the DUT to N PBB-EVPN instances in DUT with traffic and run the set up for 24hrs

**Objective:**

The main purpose of the test the DUT performance to scale N EVI's with traffic. Then clear bgp neighbor. There should not be any loss of routes or any crashes. Send F frames from CE to DUT from traffic generator with different SA and DA for N EVI's. Send F frames from traffic generator to R1 with different SA and DA for N EVI's.so that 2F mac address will be learned in DUT. There is a bi directional traffic flow with F pps in each direction.Keep the setup up and running for 24 hrs,take hourly CPU utilization,memory usage.

**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:**

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

## 8. Acknowledgements

We would like to thank Fioccola Giuseppe of Telecom Italia reviewing our draft and commenting it.

## 9. IANA Considerations

This memo includes no request to IANA.

## 10. Security Considerations

There is no additional consideration from RFC 6192.

## 11. References

### 11.1. Normative References

- [RFC2119] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", BCP 14, RFC 2119, DOI 10.17487/RFC2119, June 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, June 1999, <<http://www.rfc-editor.org/info/rfc2544>>.
- [RFC2889] R. Mandeville and J. Perser "Benchmarking Methodology for LAN Switching Devices"

### 11.2. 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>>.
- [RFC7623] Sajassi, A., Ed., Aggarwal, R., Bitar, N., Isaac, A., J., Drake, J., and W. Henderickx, " Provider Backbone Bridging Combined with Ethernet VPN(PBB-EVPN)", RFC 7623, DOI 10.17487/RFC7623, September 2015, <<http://www.rfc-editor.org/info/rfc7623>>.

Appendix A. Appendix

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