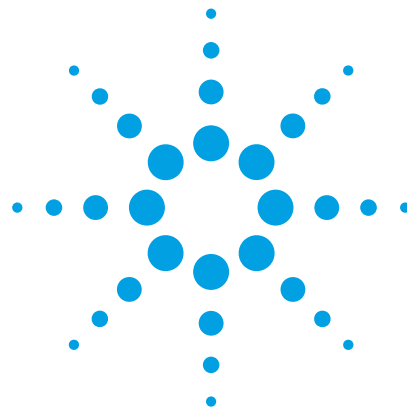




Agilent N2X

Setup Multicast VPN Topology QuickTool

Application Note



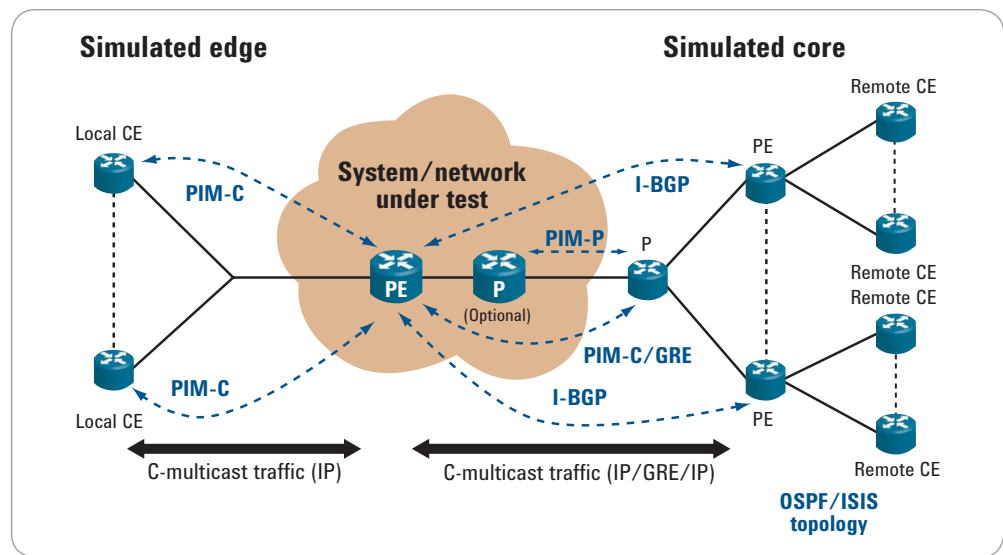
Agilent Technologies

Introduction

The N2X Packets & Protocols software includes a QuickTool utility called *Setup Multicast VPN Topology* that allows emulation of large multicast VPN topologies by configuring both the control and data plane. The SUT must be a PE router that supports either draft-rosen-vpn-mcast-06 or draft-rosen-vpn-mcast-08.

The N2X simulates an edge network (IPv4/IPv6) with PIM sessions using sub-interfaces connected to separate VPN sites with CE routers. The N2X also simulates a core network with remotely connected PE routers and PIM-C instances tunneled over GRE. Each PIM-C instance represents a VRF (IPv4/IPv6) on a simulated PE router.

Up to thirty-two edge ports and thirty-two core ports may be used. Ethernet, ATM and Frame Relay ports are supported on both sides of the network. POS ports are supported only on the core side. The QuickTool configures BGP and PIM protocol parameters including Default and Data MDTs, traffic sources and an IPv4 provider network.



Preconditions

The *Setup Multicast VPN Topology* QuickTool requires configuration of the link layer for the ports, including any sub-interfaces on edge ports. Optionally, IGP topologies can also be created through the QuickTool or manually to be advertised from the core ports. Standard L3 VPNs may be added to the simulated topology, or a multicast VPN topology may be added to the existing unicast L3 VPN topology.

Required Software

The following Agilent software is needed:

- Agilent N2X Packets & Protocols, version 6.10 or later
- *Setup Multicast VPN Topology* QuickTool, version 3.05 or later

Summary Procedure

Note: Items underlined must be obtained from the routers/system under test (SUT):

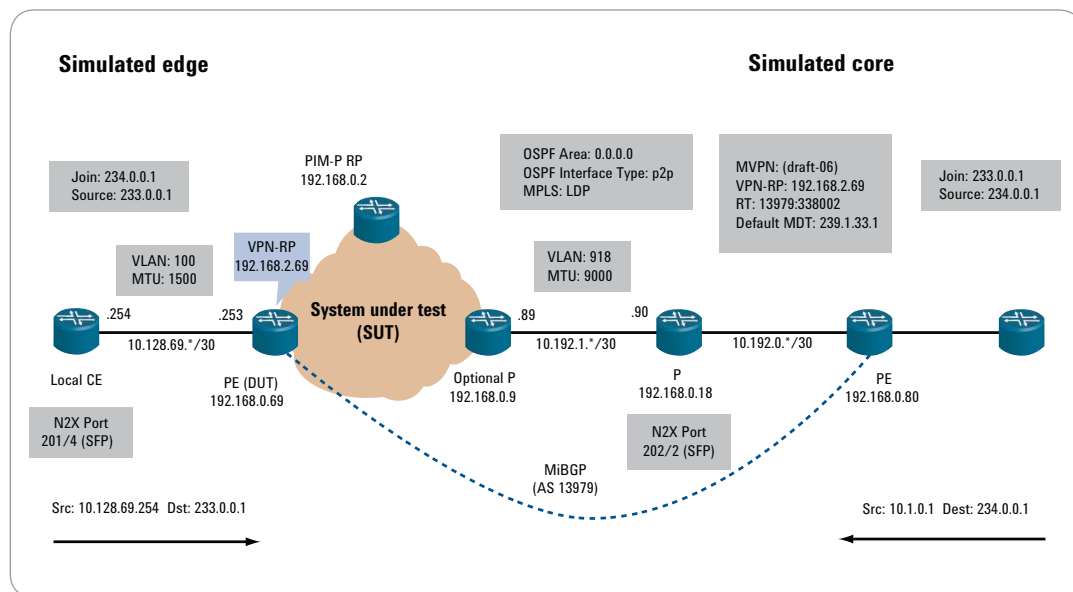
- Launch an N2X Packets & Protocols test session...
 - Select N2X test ports (minimum of two).
 - Set Physical and Link parameters, including N2X Tester and SUT IP address, and VLAN ID.
 - (Optional) Enable Jumbo frames for MTU=9000.
- Launch the *Setup Multicast VPN Topology* QuickTool then complete the following tabs.
- Setup the “Common Parameters” tab...
 - Under “Port Selection” define the Edge port(s) and Core port(s).
 - Select the draft Version and AS number for the BGP core.
 - Specify SUT PE loopback address (may also be a BGP route reflector).
 - Select BGP options.
- Setup the “Local CEs” tab ...
 - Click “Setup Topology” to add Local CEs and specify the Edge port(s) and IP Version.
 - Specify the Route Target (RT) for the first CE and the RT increment.
 - Enable and define the VPN RP address and specify if the RP is unique per VPN.
 - Specify whether E-BGP will be used with the CE.
- Setup the “Provider Core Topology” tab...
 - Click “Setup Topology” then specify the Core port.
 - Define the N2X Interface (IP) address and SUT Neighbor address for PIM and the IGP.
 - Specify the N2X PIM Instance Router ID and PIM RP address in the connected router(s).
 - Select the IGP (OSPF or ISIS) and set the Area ID.
 - Set the N2X Router ID/system ID for the IGP and Network type if using OSPF.
 - Enable MPLS signaling and select LDP or RSVP.

Summary Procedure

(Continued)

- Setup the “Simulated PEs & Remote CEs” tab...
 - Click “Add PE Routers” to add PEs and Remote CEs, then specify the Core port.
 - Define the number of peers (PEs) and the first PE IP address
 - Define the first IGP link address to be added into the IGP grid in the N2X.
 - In the “VPNv4 VRFs” tab, specify the number of VRFs.
 - Define the Local Pref and first Route Target and RT increment.
 - Specify the First unicast VPN route, increment and if routes are unique.
 - Define VPN RP address and if RPs are unique per VPN.
 - In the “VPNv4 Default MDTs” tab, specify the First default MDT.
 - Select PIM-SM, or PIM-SSM and specify source addresses.
 - (Optional) Set parameters in “VPNv4 Data MDTs”.
- Setup the “Local Traffic Sources” tab...
 - Click “Add Sources”, specify the Edge port, enable traffic destinations, then select transmit CEs.
 - Specify Source addresses and define Groups addresses.
 - Define StreamGroup parameters
- Setup the “Remote Traffic Sources” tab...
 - Click “Add Sources”, specify the Core port, select transmit PEs, and specify transmit options.
 - Specify Groups addresses and groups per VRF options.
 - Define StreamGroup parameters
- Setup the “Join PIM Group pools” tab...
 - Define Local CE Edge ports, VRFs, Group addresses to join, and join options.
 - Define Remote CE Core ports, VRFs, Group addresses to join, and joinoptions.
- Start routing engine on main N2X GUI
- Join/Leave PIM groups (from main N2X GUI)
- Start/stop traffic and run tests...

Basic MVPN Topology



Required Parameters (Basic MVPN Topology)

Parameters listed in **bold** are required while other parameters are shown un-bold or left blank.

Table 1. N2X port parameters

N2X port parameters			
Edge port(s): 201/4	Tester IP: 10.128.69.254/30	SUT IP: 10.128.69.253/30	VLAN: 100
Core port(s): 202/2	Tester IP: 10.192.1.90/30	SUT IP: 10.192.1.89/30	VLAN: 918
(Optional): Jumboframes (Y/N): (checked) (for Core port 202/2)			
MVPN QuickTool parameters			
Common			
Edge ports: 201/4		Core ports: 202/2	
IP Version: IPv4		Draft version: draft-06	
AS Number: 13979		SUT PE loopback (or RR): 192.168.0.69	
Advertise VRF via iBGP (Y/N): (checked)		Use Type 2 2-Byte ASN (Y/N): (checked)	
If draft-08 → Advertise MDT in BGP open (Y/N):		AFI:	SAFI:
Local CEs			
Edge port: 201/4	First route target: 13979:338002		Increment:
Define VPN RP address (Y/N): (checked)		Unique RP (Y/N):	
First RP address: 192.168.2.69		Increment:	
Define unicast addresses advertised by E-BGP (from CE) (Y/N):			
First unicast VPN route:		Increment:	
Number of routes per VPN:		Unique routes per VPN (Y/N):	
First tester AS number		Unique tester AS per VPN (Y/N):	

Table 2. Provider core topology

Provider core topology				
Core port : 202/2				
Interface address (N2X): 10.192.1.90		Neighbor address (SUT): 10.192.1.89		
PIM-P router ID (N2X): 10.192.1.90		PIM-P RP address (SUT): 192.168.0.2		
Use IGP (Y/N): (checked)	OSPF -or- ISIS: OSPF		Area ID: 0.0.0.0	
SUT router ID (SUT): 192.168.0.9		Tester router ID (N2X): 10.192.1.90		
OSPF network type: Point-To-Point				
Use MPLS (Y/N): (checked)		LDP -or- RSVP: LDP		
Simulated PEs and remote CEs				
Core port: 202/2		Number of peers (PEs) : 1		
First IP address (PE): 192.168.0.80		Increment:		
First IGP link address (OSPF): 12.1.1.0		Increment:		
Simulated PEs and remote CEs → VPNv4 VRFs				
Number of VRFs: 1		Local pref PA:		
First route target: 13979:338002		Increment:		
First unicast VPN route: 10.1.0.1		Increment:		
Unique VPN routes (Y/N):		Increment per VPN:		
Define VPN RP address (Y/N): (checked)		First RP address: 192.168.2.69		
Unique RP each VPN (Y/N):		Increment per VPN:		
Simulated PEs and remote CEs → VPNv4 default MDTs				
First default MDT: 239.1.33.1		Increment:		
Join default MDT group (Y/N): (checked)		PIM-SM -or- PIM-SSM: PIM-SM (selected)		
PIM-SSM: Use SUT IP address as source -or- Use IP address as source or- Manually configure IP source addresses				
Simulated PEs and remote CEs → VPNv4 data MDTs				
Define data MDTs (Y/N):	First Data MDT range:		Increment:	
Data MDTs per VRF:				
Enable data MDT (S,G) group pool (Y/N):		Join data MDT (S,G) group pool (Y/N):		
Use SUT (or RR) IP address as source -or- Use IP address as source -or- Manually configure IP source addresses				
Local traffic sources				
Edge port: 201/4				
Include edge ports as destinations (Y/N): (unchecked)				
Transmit from all CEs -or- Transmit from selected CEs:				
Selected CEs:				
Use CE link address -or- Use ALL routes advertised by E-BGP –or- Use ___ host addresses on E-BGP networks incr ___				
First group address: 233.0.0.1		Increment:		Groups per CE: 1
Unique groups each CE (Y/N):		Increment:		
Create send/receive register (S,G) group pools (Y/N): (checked)				
Name prefix:	IP packet length:	Min:	Max:	Incr:
IP bandwidth:		% of maximum -or- Packets/sec -or- Mb/sec:		

Table 3. Remote traffic sources

Remote traffic sources				
Core port: 202/2				
Transmit from all PEs (Y/N): (checked)			PE router:	
Transmit from all VRFs -or- Transmit from selected VRFs:				
Selected VRFs:				
First group address: 234.0.0.1		Increment:	Groups per VRF: 1	
Unique groups each VRF (Y/N):		Increment:		
Unique groups each PE (Y/N):		Increment:		
Use data MDT (Y/N):		Data MDT group address:		
Name prefix	IP Packet Length:	Min:	Max:	Incr:
IP bandwidth:		% of maximum -or- packets/sec -or- Mb/sec:		
Join PIM group pools (local CE)				
Local CE -or- Remote CE: Local CE		Edge Port: 20¼		
All VRFs -or- Selected VRF:		Selected VRFs:		
First group address: 234.0.0.1		Increment:	Groups per local CE: 1	
Unique groups for each local CE (Y/N):		Increment:		
Join group pool upon creation (Y/N):		Enable (S,G) joins (Y/N):		
Include sources from other edge ports (Y/N):		Define multiple group address ranges (Y/N):		
Number (of address ranges):		Increment:		
Join PIM group pools (remote CE)				
Local CE -or- Remote CE: Remote CE (selected)		Core Port: 202/2		
All PE routers (Y/N):		PE router:		
First group address: 233.0.0.1		Increment:	Groups per remote CE: 1	
Unique groups for each remote CE (Y/N):		Increment:		
Join group pool upon creation (Y/N):		Enable (S,G) joins (Y/N):		

Detailed Procedures (Basic MVPN Topology)

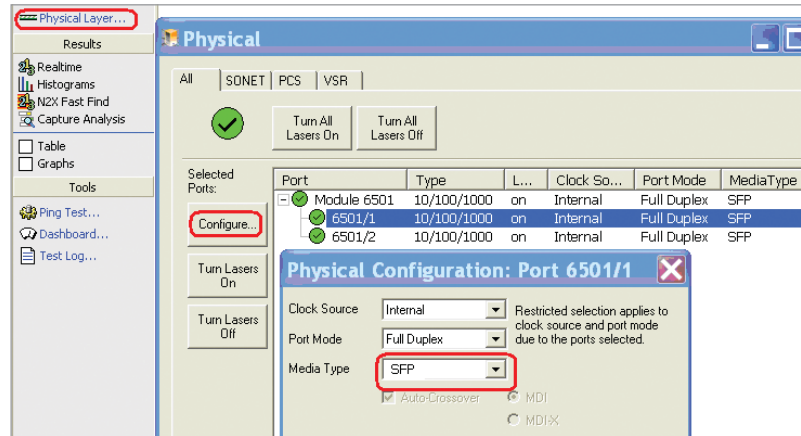
These procedures describe the steps to configure the Basic Multicast VPN Topology described above.

The N2X test ports used in these detailed procedures are simulated and correspond to the actual test ports as follows:

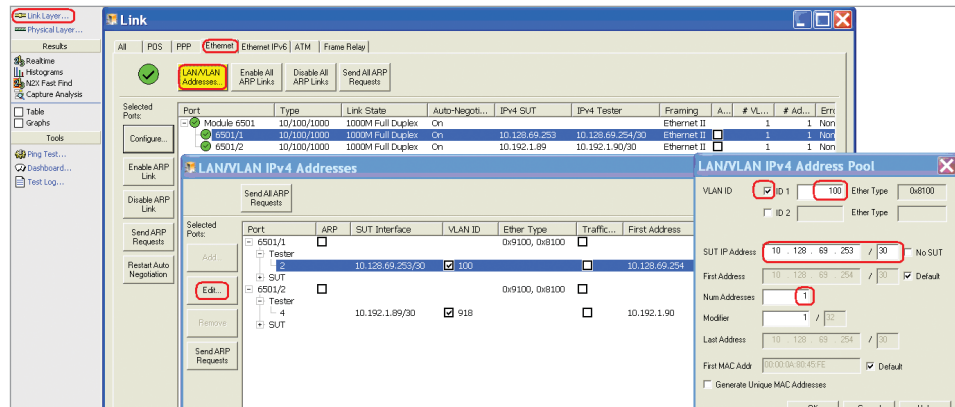
Edge port 201/4 = 6501/1 and Core port 202/2 = 6501/2

N2X packets & protocols

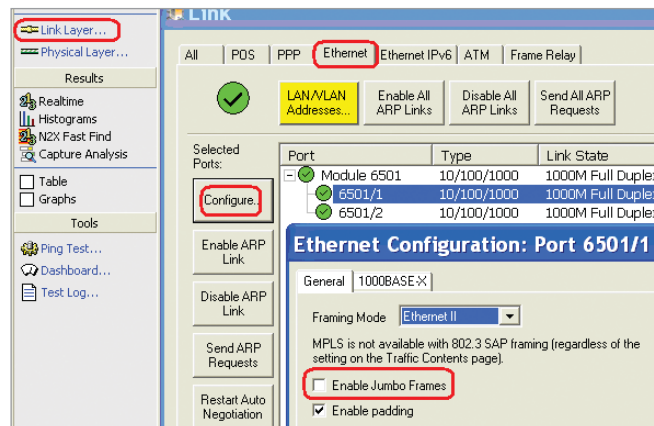
1. Launch an N2X test session and select two tri-rate Ethernet test ports.
2. In "Physical Layer" select interface type of SFP



3. In "Link Layer" set N2X Tester and SUT IP address, and VLAN ID.

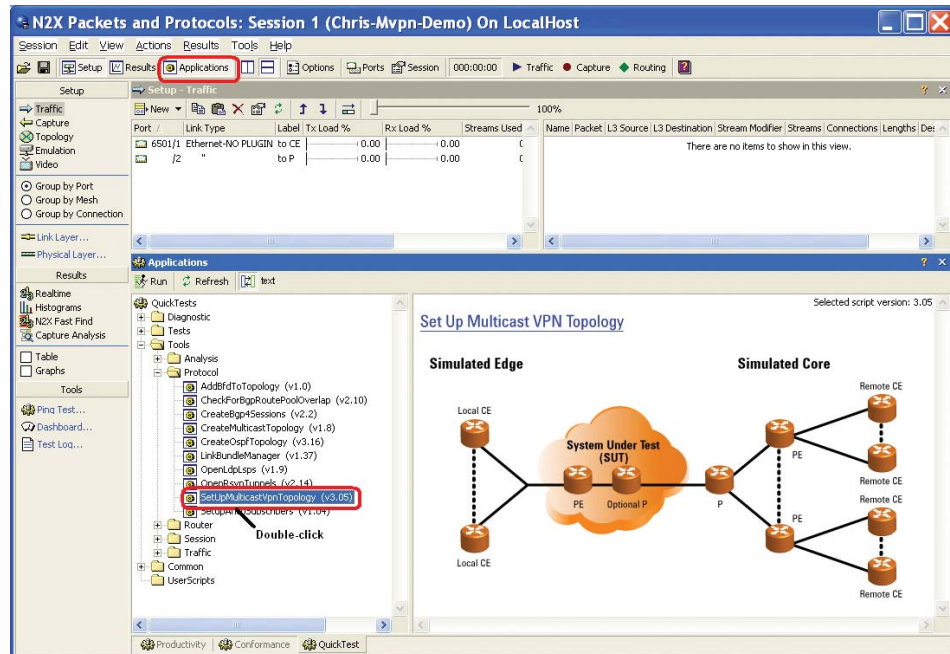


4. (Optional) Enable Jumbo frames for MTU=9000.

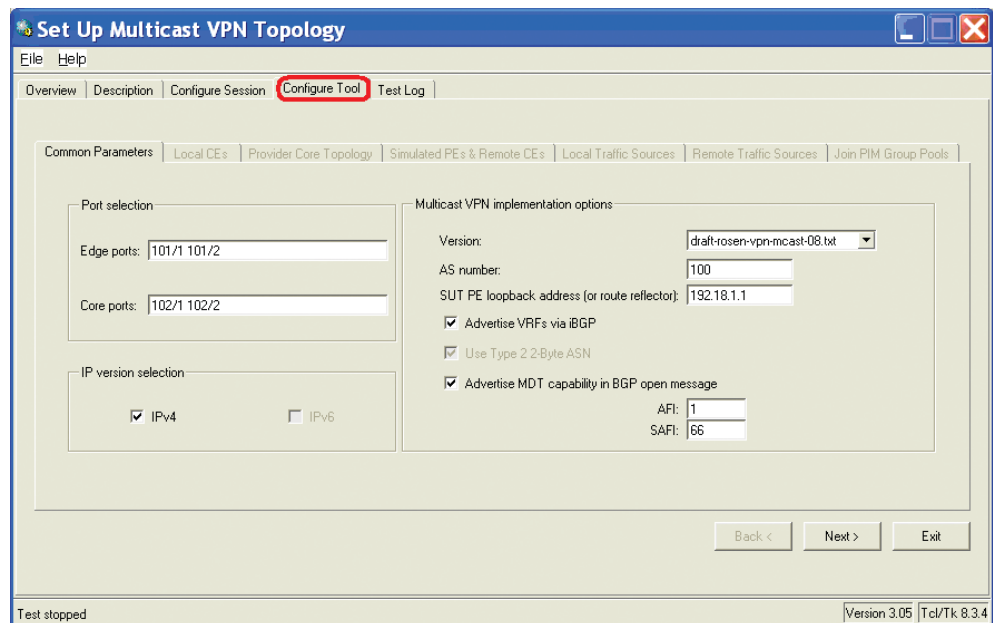


Multicast VPN QuickTool launch and common parameters

1. Launch the *Setup Multicast VPN Topology* QuickTool by clicking on “Applications” then navigating the QuickTests menu to Tools → Protocol, then double-click “SetUpMulticastVpnTopology”...



2. Click on the “Configure Tool” tab the begin the “Common Paramters” tab...



3. Under “Port Selection” define the Edge ports that will emulate CEs and Core ports that will emulate PEs...

Port selection	
Edge ports:	6501/1
Core ports:	6501/2

4. Select the draft Version 6 (draft-08 advertises MDT AFI/SAFI which are not needed in this example). Note that the “Advertise VRFs via iBGP” and “Use Type 2 2-Byte ASN” checkboxes are enabled by default...

Multicast VPN implementation options

Version:

AS number:

SUT PE loopback address (or route reflector):

Advertise VRFs via iBGP

Use Type 2 2-Byte ASN

Advertise MDT capability in BGP open message

AFI:

SAFI:

5. Specify the AS number for the BGP core and SUT PE loopback address, which may also be a BGP route reflector, that peers with the emulated PEs...

AS number:

SUT PE loopback address (or route reflector):

6. Click Next to complete “Common Parameters” tab...

Set Up Multicast VPN Topology

File Help

Overview | Description | Configure Session | Configure Tool | Test Log

Common Parameters | Local CEs | Provider Core Topology | Simulated PEs & Remote CEs | Local Traffic Sources | Remote Traffic Sources | Join PIM Group Pools

Port selection

Edge ports:

Core ports:

IP version selection

IPv4 IPv6

Multicast VPN implementation options

Version:

AS number:

SUT PE loopback address (or route reflector):

Advertise VRFs via iBGP

Use Type 2 2-Byte ASN

Advertise MDT capability in BGP open message

AFI:

SAFI:

Back < **Next >** Exit

Test stopped

Version 3.05 Tcl/Tk 8.3.4

7. The next pop-up allows cleanup from previous configurations...

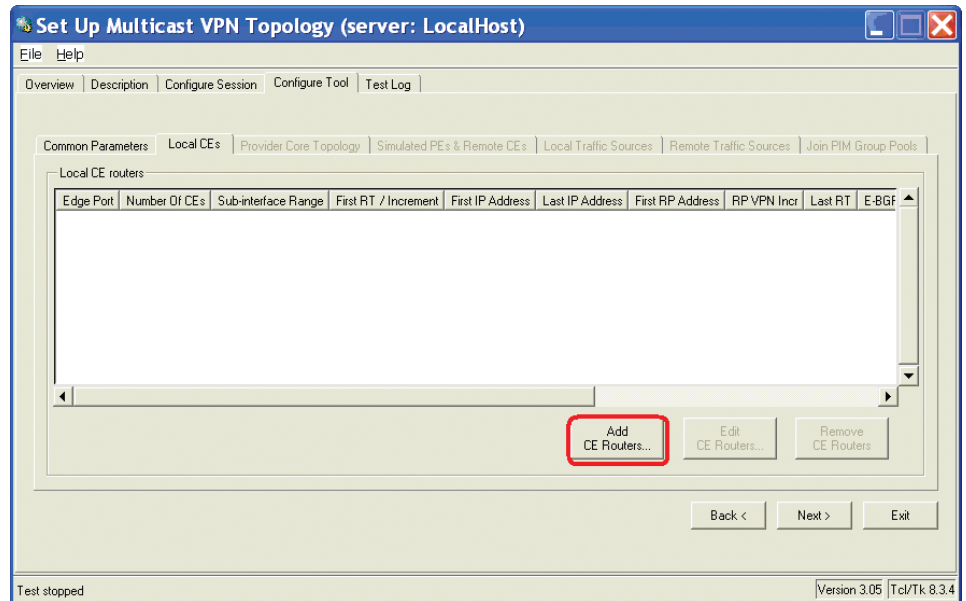
Please confirm

Do you want the session cleaned up (all traffic, BGP and PIM sessions, VPN definitions, multicast group pools and source pools removed) before continuing?

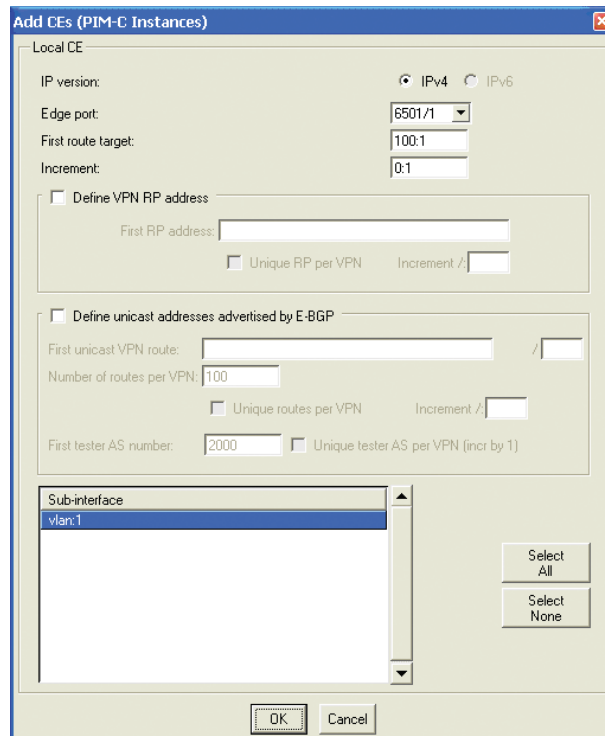
Yes No Cancel

Multicast VPN QuickTool local CEs parameters

1. Begin setup of the “Local CEs” tab by clicking on the “Add CE Routers” button. In this example only one CE will be added. However larger topologies may add CEs on several ports and on sub-interfaces (VLANs, PVCs, etc.) within ports that have been setup prior to running the QuickTool...



2. Start by selecting the Edge port...



3. Specify the First route target and RT Increment. Note that this value will be re-used in other parts of the setup...

First route target:	13979:33800
Increment:	0:1

4. Enable the Define VPN RP address and enter the First RP address. For this example, leave the Unique RP per VPN box unchecked, but this will allow incrementing the RP with multiple VPNs. The VPN RP address represents the customer RP in a real CE device, where each can be a sub-interface on a single CE device...

Define VPN RP address

First RP address:

Unique RP per VPN Increment /:

5. Optionally the definition of unicast addresses can be enabled (not used in this example) in order to advertise via E-BGP from Local CE to SUT PE. If enabled, the unicast routes are specified that will act as traffic source addresses and allow scaling the number of routes per VPN, either uniquely or not, and with unique AS numbers and selected sub-interfaces...

Define unicast addresses advertised by E-BGP

First unicast VPN route:

Number of routes per VPN:

6. Click OK to complete "Add CEs (PIM-C Instances)" ...
7. Click Next to complete "Local CEs" tab...

Set Up Multicast VPN Topology (server: LocalHost)

File Help

Overview | Description | Configure Session | Configure Tool | Test Log

Common Parameters | Local CEs | Provider Core Topology | Simulated PEs & Remote CEs | Local Traffic Sources | Remote Traffic Sources | Join PIM Group Pools

Local CE routers

Edge Port	Number Of CEs	Sub-interface Range	First RT / Increment	First IP Address	Last IP Address	First RP Address	RP VPN Incr	Last RT
6501/1	1 (IPv4)	vlan:1	13979.338002 / 0.1	10.128.63.254	10.128.63.254	192.168.2.69		13979.338002

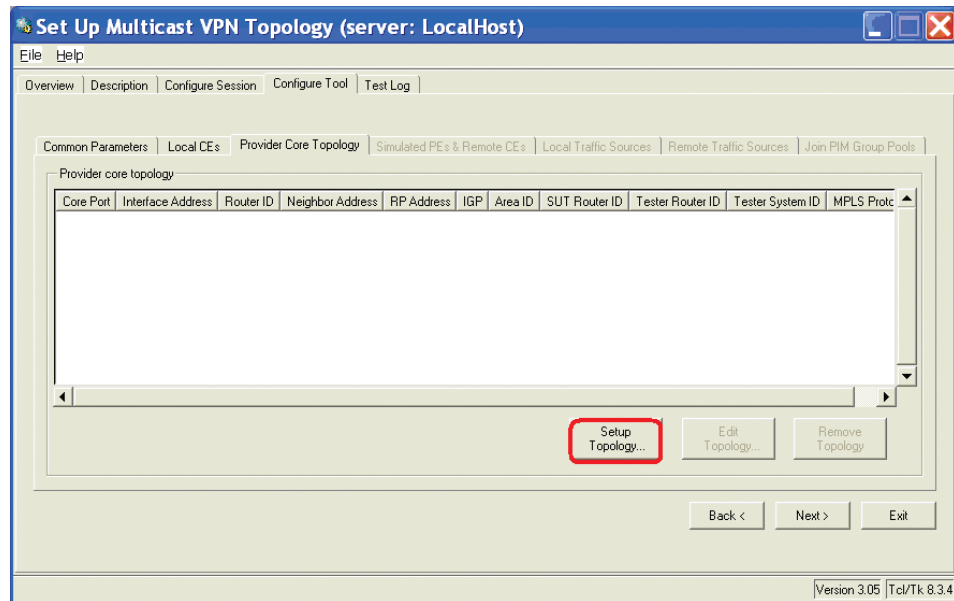
Add CE Routers... Edit CE Routers... Remove CE Routers

Back < **Next >** Exit

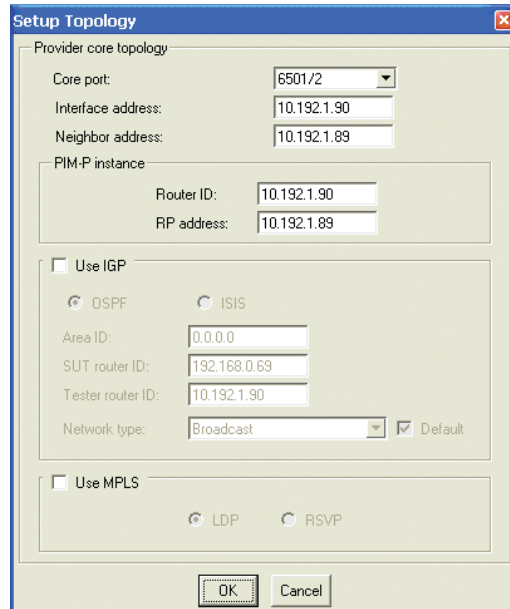
Version 3.05 | Tcl/Tk 8.3.4

Multicast VPN QuickTool provider core topology parameters

1. Begin setup of the "Provider Core Topology" tab by clicking on the "Setup Topology" button...



2. CONTINUE HERE-----Start by selecting the Core port...



3. Define the N2X Interface (IP) address and SUT Neighbor address for PIM and the IGP...

Interface address:	10.192.1.90
Neighbor address:	10.192.1.89

4. Specify the N2X PIM Instance Router ID and PIM RP address in the connected router(s)...

PIM-P instance	
Router ID:	10.192.1.90
RP address:	192.168.0.2

5. Select OSPF, set the Area ID, set the N2X Router ID and OSPF Network type. If “Use IGP” is not checked, then static routes to the simulated PE routers and the P router will need to be defined on the directly connected SUT interface.

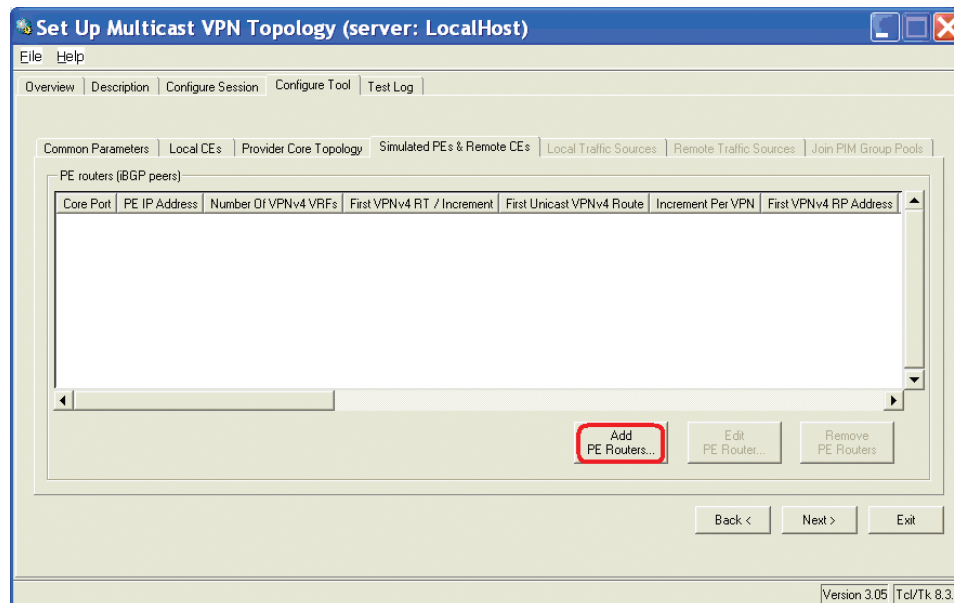
6. Enable MPLS signaling and select LDP (or RSVP). Note, MPLS is only required if unicast VPN traffic is also required. To create a Multicast VPN topology, MPLS is not required.

7. Click OK to complete “Setup Topology”...
8. Click Next to complete “Provider Core Topology” tab...

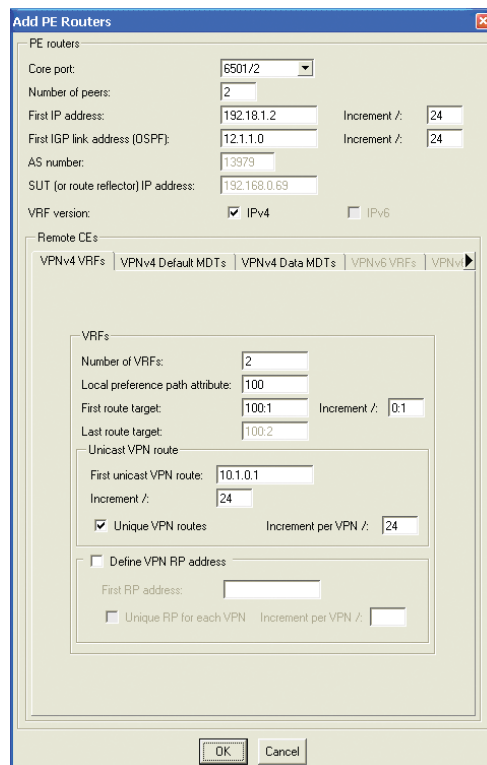
Core Port	Interface Address	Router ID	Neighbor Address	RP Address	IGP	Area ID	SUT Router ID	Tester Router ID	Tester System ID	MPLS
6501/2	10.192.1.90	10.192.1.90	10.192.1.89	192.168.0.2	OSPF	0.0.0.0	192.168.0.9	10.192.1.90		LDP

Multicast VPN QuickTool simulated PEs and remote CEs parameters

1. Begin setup of the “Simulated PEs and Remote CEs” tab by clicking on the “Add PE Routers” button...



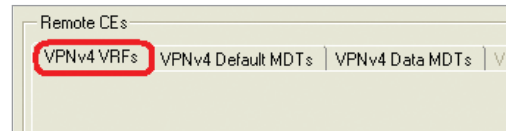
2. Start by selecting the Core port...



3. Set the number of peers (PEs) to one and the first PE IP address and define the first IGP link address to be added into the IGP grid in the N2X...

Number of peers:	1		
First IP address:	192.168.0.80	Increment /:	24
First IGP link address (OSPF):	12.1.1.0	Increment /:	24

4. Click on the “VPNv4 VRFs” tab...



5. Specify the number of VRFs, the Local preference, First route target and Increment...

Number of VRFs:	<input type="text" value="1"/>		
Local preference path attribute:	<input type="text" value="100"/>		
First route target:	<input type="text" value="13979:33800"/>	Increment /:	<input type="text" value="0:1"/>
Last route target:	<input type="text" value="13979:33800"/>		

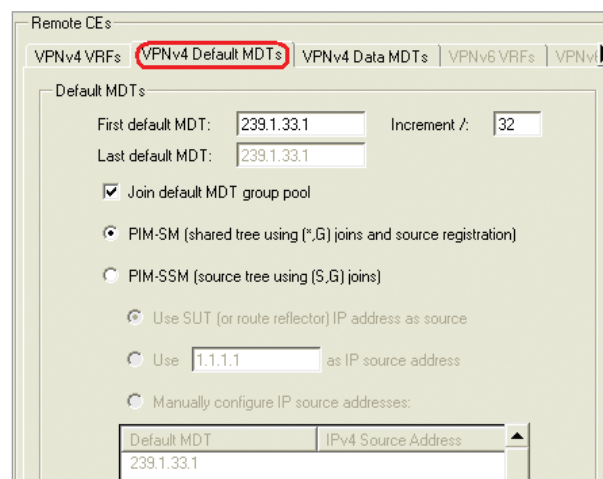
6. Specify unicast routes to be advertised by the CE, set the Increment, if the routes are unique and the increment per VPN (increments only apply if Number of VRFs is more than one)...

Unicast VPN route		
First unicast VPN route:	<input type="text" value="10.1.0.1"/>	
Increment /:	<input type="text" value="24"/>	
<input checked="" type="checkbox"/> Unique VPN routes	Increment per VPN /:	<input type="text" value="24"/>

7. Enable VPN RP address, then define the first RP address (enable unique RP for each VPN if more than one)...

<input checked="" type="checkbox"/> Define VPN RP address		
First RP address:	<input type="text" value="192.168.2.69"/>	
<input type="checkbox"/> Unique RP for each VPN	Increment per VPN /:	<input type="text"/>

8. Click on the “VPNv4 Default MDTs” tab...



9. Define the First default MDT (increment does not apply)...

First default MDT:	<input type="text" value="239.1.33.1"/>	Increment /:	<input type="text" value="32"/>
Last default MDT:	<input type="text" value="239.1.33.1"/>		

10. Select PIM-SM (or PIM-SSM and select source address method)...

The screenshot shows a configuration window with the following options:

- PIM-SM (shared tree using (*,G) joins and source registration)
- PIM-SSM (source tree using (S,G) joins)
 - Use SUT (or route reflector) IP address as source
 - Use 1.1.1.1 as IP source address
 - Manually configure IP source addresses:

Default MDT	IPv4 Source Address
239.1.33.1	

11. Select PIM-SM (or PIM-SSM and select source addresses) then click on “VPNv4 Data MDTs”...

The screenshot shows the "Remote CEs" dialog box with the "VPNv4 Data MDTs" tab selected. The "Default MDTs" section is visible:

First default MDT: 239.1.33.1 Increment /: 32
Last default MDT: 239.1.33.1

Join default MDT group pool

- PIM-SM (shared tree using (*,G) joins and source registration)
- PIM-SSM (source tree using (S,G) joins)
 - Use SUT (or route reflector) IP address as source
 - Use 1.1.1.1 as IP source address
 - Manually configure IP source addresses:

Default MDT	IPv4 Source Address
239.1.33.1	

12. The “VPNv4 Data MDTs” parameters are not used in this example, so click OK to complete “Add PE Routers”...

The screenshot shows the "Remote CEs" dialog box with the "VPNv4 Data MDTs" tab selected. The "Data MDTs" section is visible:

Define data MDTs

First data MDT range: 239.1.1.0 Increment /: 24
Data MDTs per VRF: 1
Last data MDT range: 239.1.1.0 ~ 239.1.1.0

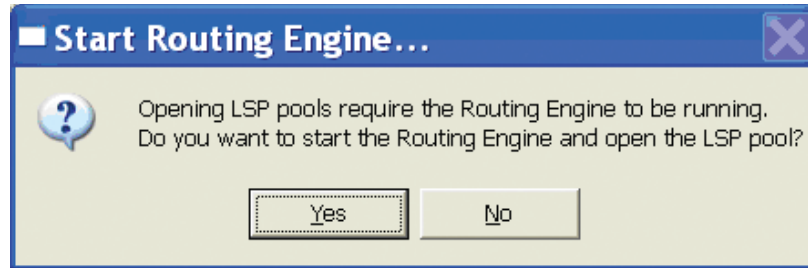
Enable data MDT (S,G) group pool
 Join data MDT (S,G) group pool

- Use SUT (or route reflector) IP address as source
- Use 1.1.1.1 as IP source address
- Manually configure IP source addresses:

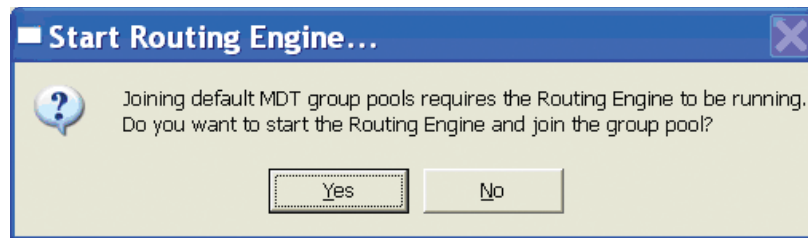
Data MDT	IPv4 Source Address
239.1.1.0	

OK Cancel

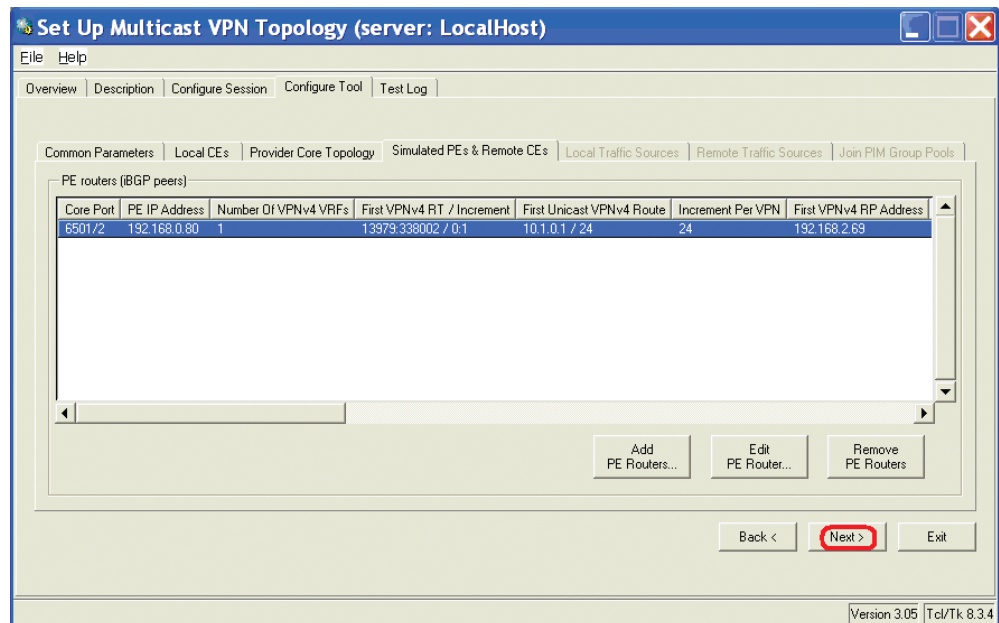
13. The next pop-up allows the Routing Engine to be started. Click “Yes” to start all protocols and open LSPs or click “No” to start manually in the N2X GUI...



14. A similar pop-up appears for the default MDT...

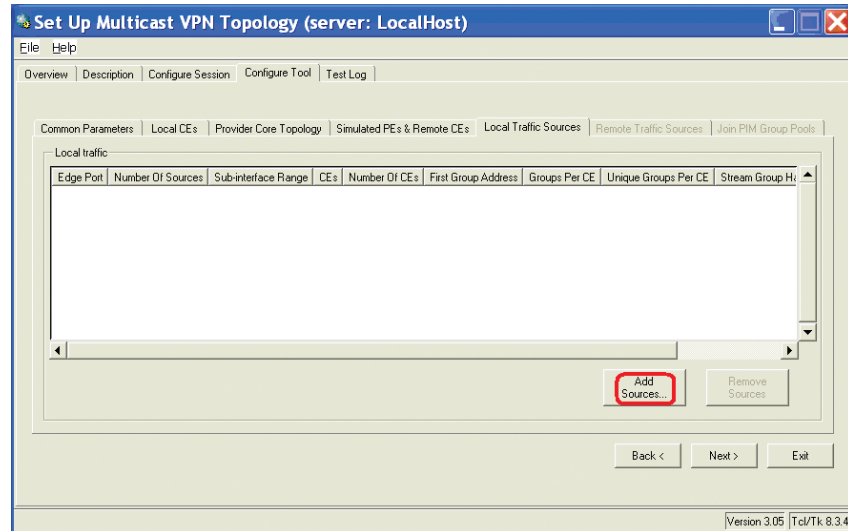


15. Click Next to complete “Simulated PEs and Remote CEs” tab...

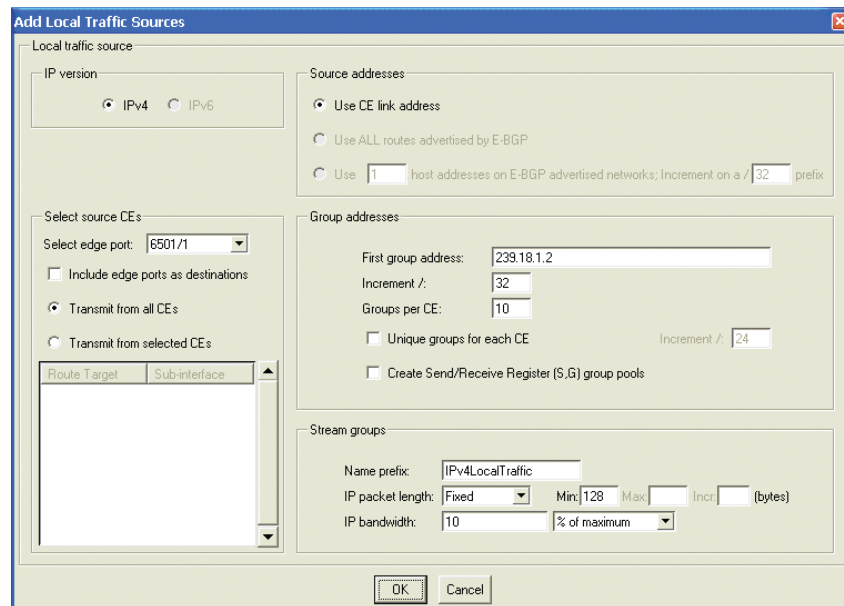


Multicast VPN QuickTool local traffic sources parameters

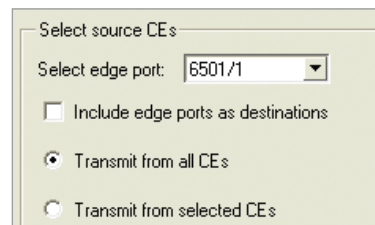
1. Begin setup of the “Local Traffic Sources” tab by clicking on the “Add Sources” button...



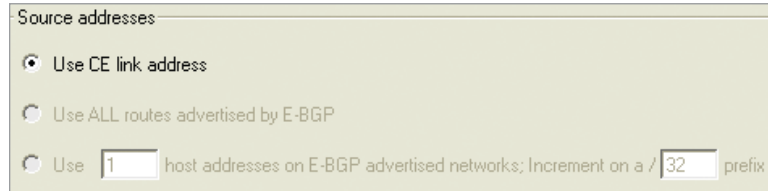
2. Start by selecting the edge port...



3. Disable “Include edge ports as destinations” and select “Transmit from all CE’s”. Note, if there is only a one edge port as in this example, the option “Include edge ports as destinations” is irrelevant. Enable this option only if you have more than one edge port in your test topology and you intend to receive traffic on the other edge ports.



4. Source addresses use CE links since E-BGP was previously not enabled at the CE in this example...



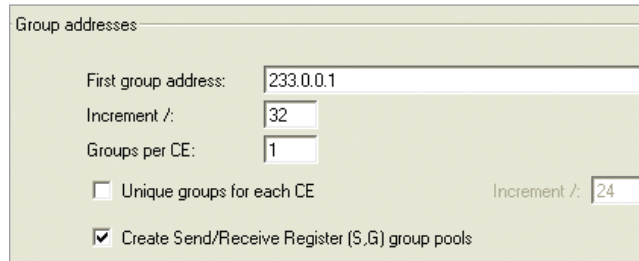
Source addresses

Use CE link address

Use ALL routes advertised by E-BGP

Use host addresses on E-BGP advertised networks; Increment on a / prefix

5. Define the first group address, set the Groups per CE to one, then enable "Create Send/Receive Register..."



Group addresses

First group address:

Increment /:

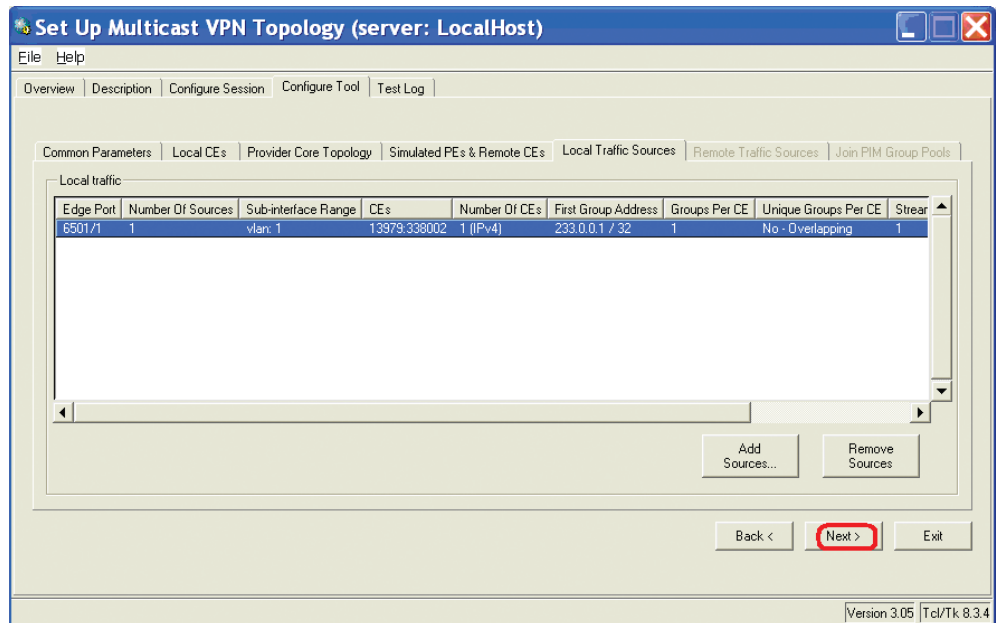
Groups per CE:

Unique groups for each CE Increment /:

Create Send/Receive Register (S,G) group pools

6. After reviewing Stream group parameters (unchanged in this example), click OK to complete "Add Local Traffic sources"...

7. Click Next to complete "Local Traffic Sources" tab...



Set Up Multicast VPN Topology (server: LocalHost)

File Help

Overview | Description | Configure Session | Configure Tool | Test Log

Common Parameters | Local CEs | Provider Core Topology | Simulated PE's & Remote CEs | **Local Traffic Sources** | Remote Traffic Sources | Join PIM Group Pools

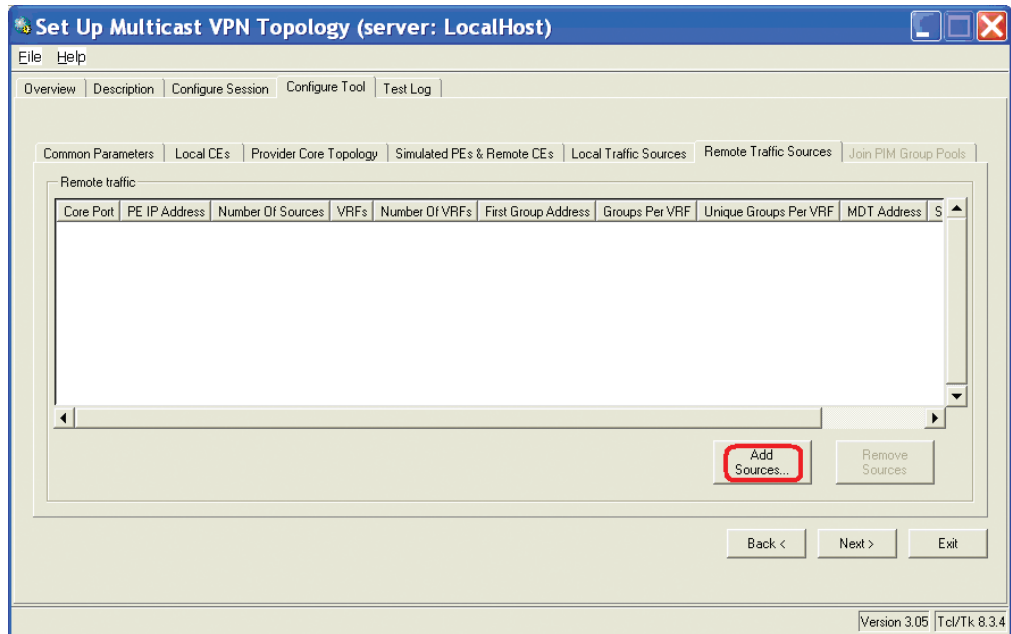
Local traffic

Edge Port	Number Of Sources	Sub-interface Range	CEs	Number Of CEs	First Group Address	Groups Per CE	Unique Groups Per CE	Stream
6501/1	1	vlan: 1	13979.338002	1 (IPv4)	233.0.0.1 / 32	1	No - Overlapping	1

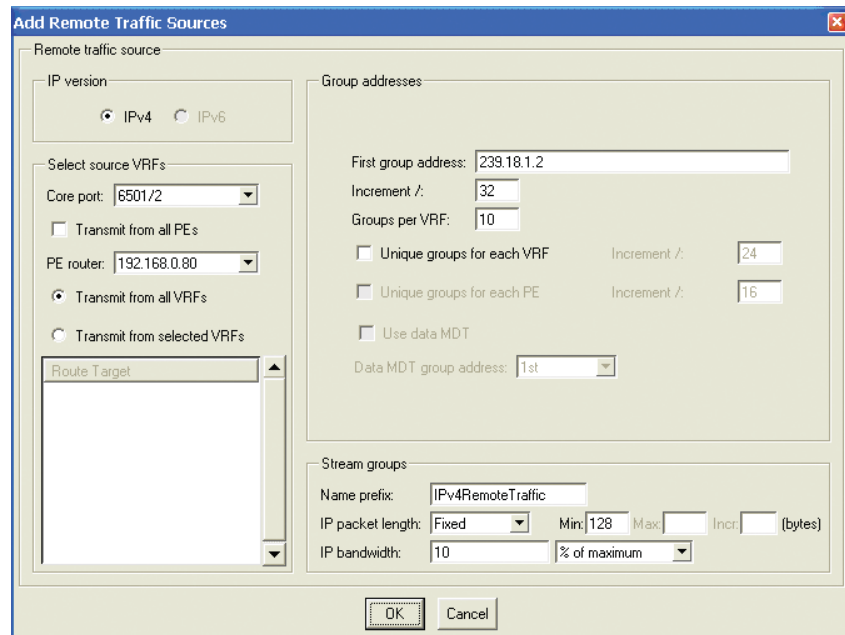
Version 3.05 | Tcl/Tk 8.3.4

Multicast VPN QuickTool remote traffic sources parameters

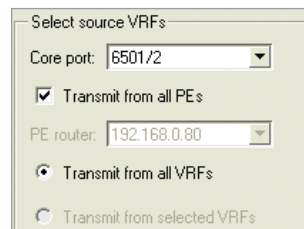
1. Begin setup of the “Remote Traffic Sources” tab by clicking on the “Add Sources” button...



2. Start by selecting the Core port...



3. Enable “Transmit from all PEs” and select “Transmit from all VRFs”...



4. Define the first group address then set the Groups per VRF to one...

First group address:

Increment /:

Groups per VRF:

Unique groups for each VRF Increment /:

Unique groups for each PE Increment /:

Use data MDT

Data MDT group address:

5. Click Next to complete "Remote Traffic Sources" tab...

Set Up Multicast VPN Topology (server: LocalHost)

File Help

Overview | Description | Configure Session | Configure Tool | Test Log

Common Parameters | Local CEs | Provider Core Topology | Simulated PEs & Remote CEs | Local Traffic Sources | **Remote Traffic Sources** | Join PIM Group Pools

Remote traffic

Core Port	PE IP Address	Number Of Sources	VRFs	Number Of VRFs	First Group Address	Groups Per VRF	Unique Groups Per VRF	MDT Ad
6501/2	192.168.0.80	1	13979-338002	1 (IPv4)	234.0.0.1 / 32	1	No - Overlapping	Default

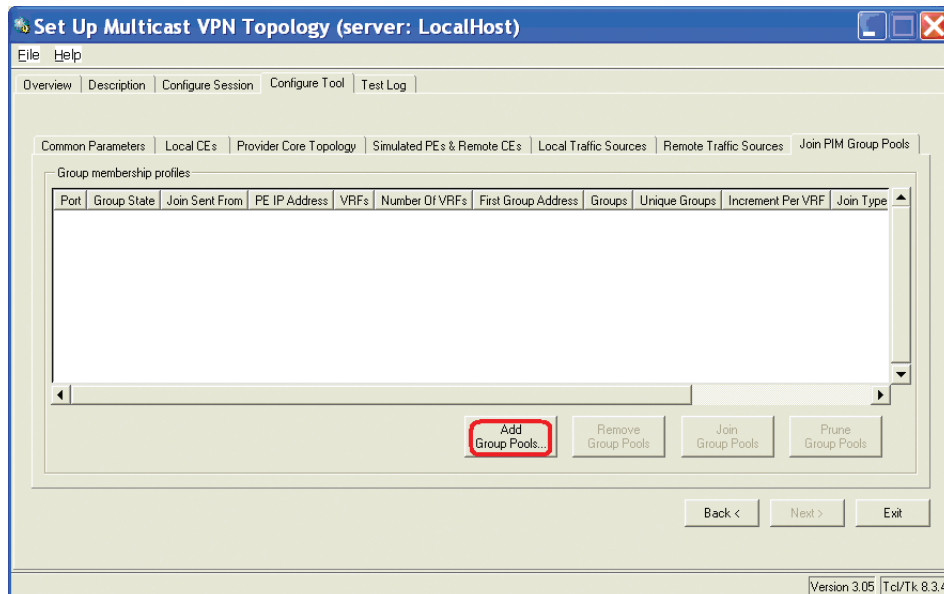
Add Sources... Remove Sources

Back < **Next >** Exit

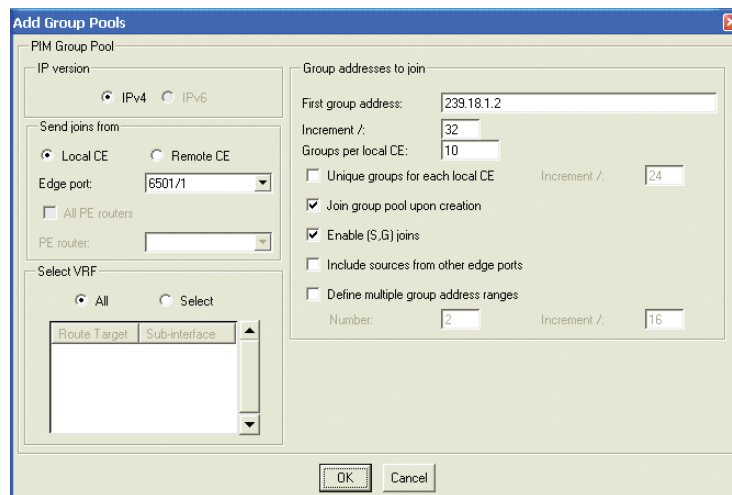
Version 3.05 | Tcl/Tk 8.3.4

Multicast VPN QuickTool join PIM group pools parameters

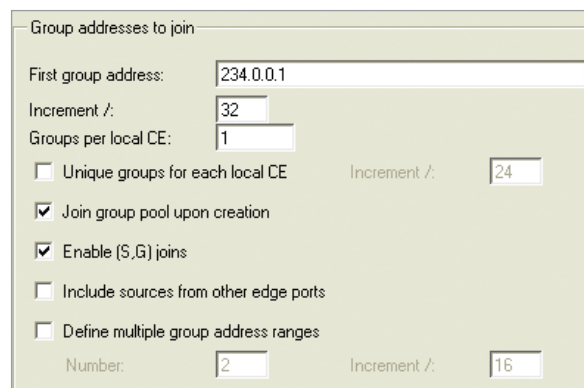
1. Begin setup of the “Join PIM Group Pools” tab by clicking on the “Add Group Pools” button...



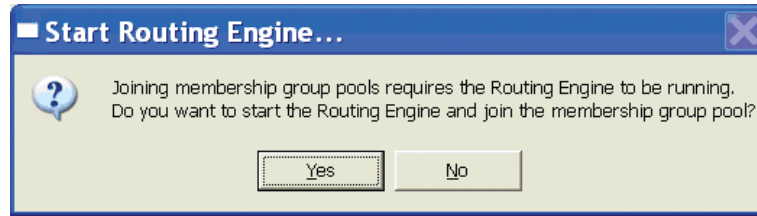
2. Start by selecting the “Local CE” and then the Edge port...



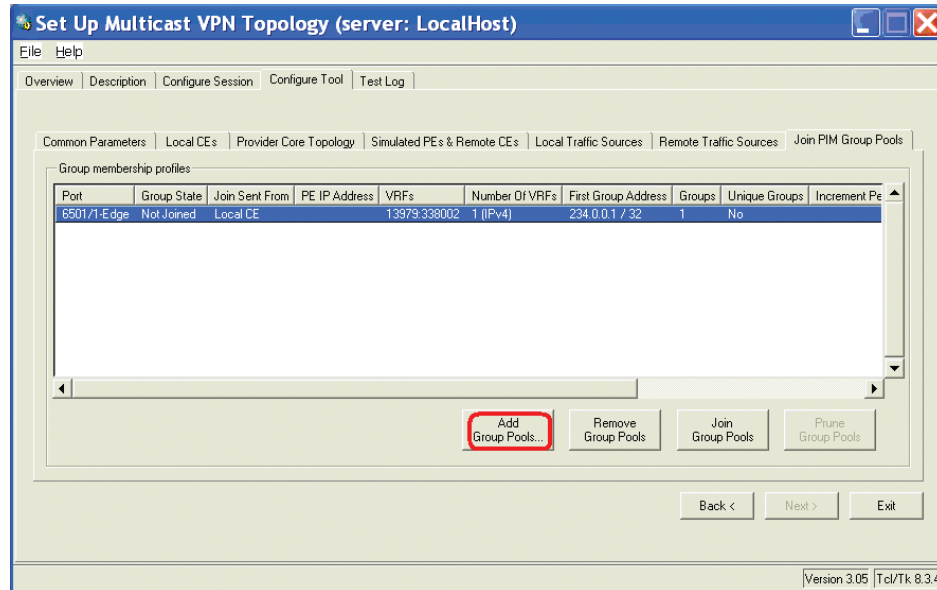
3. Define the “First group address” and set “Groups per local CE” then click OK to complete “Add Group Pools” for the Local CE...



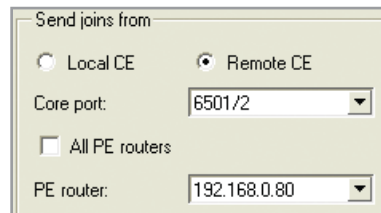
- The next pop-up will appear if the Routing Engine was not previously started. Click “Yes” to start all protocols and open LSPs or click “No” to start manually in the N2X GUI...



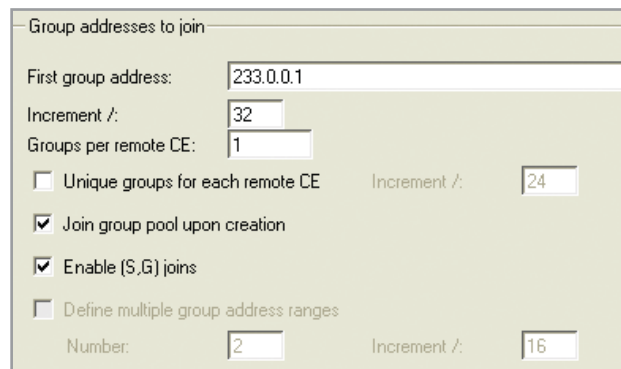
- Continue setup of the “Join PIM Group Pools” tab by clicking on the “Add Group Pools” button again...



- Select the “Remote CE” this time. The Core port and other settings can remain at defaults...

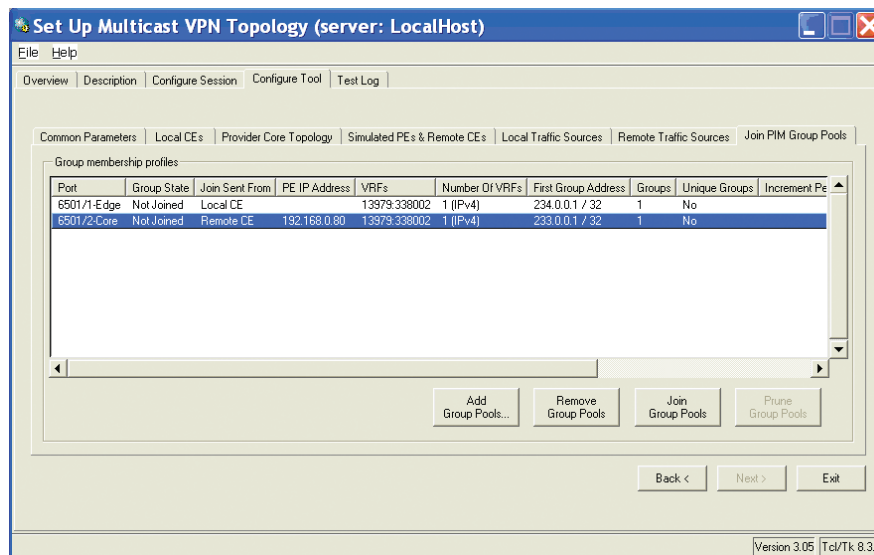


- Define the “First group address” and set “Groups per local CE” then click OK to complete “Add Group Pools” for the Remote CE...

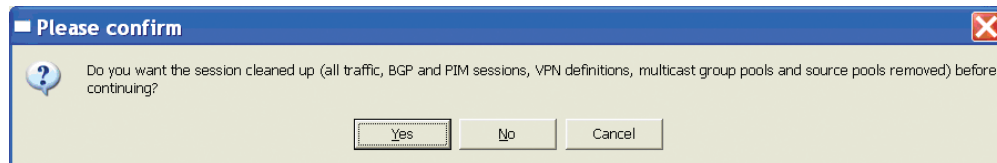


- This completes the steps to setup the Multicast VPN Topology. The QuickTool can now either be minimized or closed. If you intend to continue to modify your mVPN configuration, keep the QuickTool open and return to it and edit the configuration as required – the new Multicast VPN topology will be re-created in the main N2X GUI.

CAUTION: If you intend to close the QuickTool, read the next step prior to closing the QuickTool...

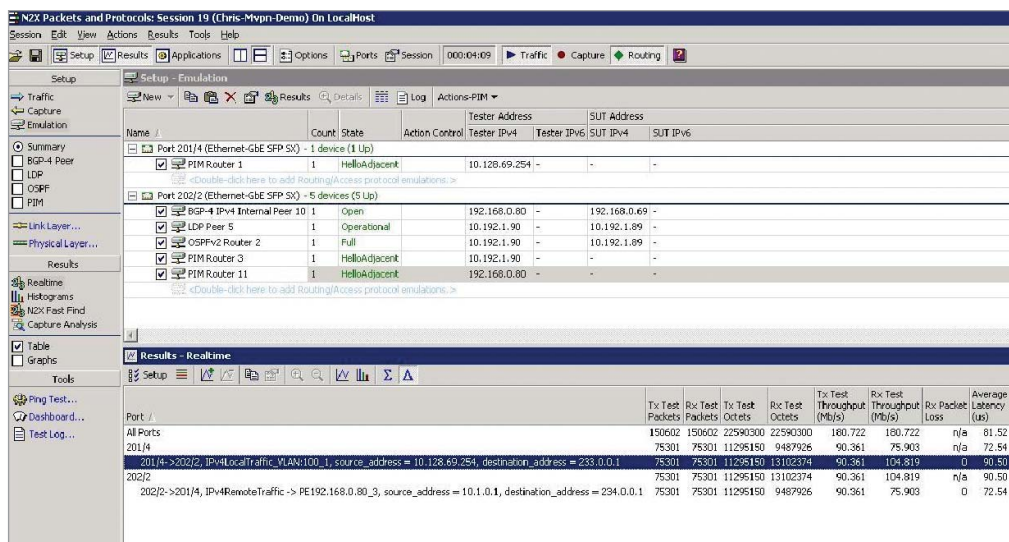


- When closing the QuickTool click “No” in the pop-up so the topology will not be deleted in the main N2X GUI...



- Once the Routing Engine and Traffic have been started, the GUI should show all protocols in functional states and no loss in the Results statistics.

Note: Some protocol operations may need to be performed, including opening BGP and joining PIM groups...



Required Parameters (Blank Form)

Table 4. Required parameters (blank form)

N2X port parameters			
Edge port(s):	Tester IP:	SUT IP:	VLAN:
Core port(s):	Tester IP:	SUT IP:	VLAN:
(Optional): Jumbo frames (Y/N):			
MVPN QuickTool parameters			
Common			
Edge ports:	Core ports:		
IP version (IPv4/IPv6):	Draft version:		
AS number:	SUT PE loopback (or RR):		
Advertise VRF via iBGP (Y/N):	Use Type 2 2-Byte ASN (Y/N):		
If draft-08 → Advertise MDT in BGP open (Y/N):	AFI:	SAFI:	
Local CEs			
Edge port:	First route target:	Increment:	
Define VPN RP address (Y/N):	Unique RP (Y/N):		
First RP address:	Increment:		
Define unicast addresses advertised by E-BGP (from CE) (Y/N):			
First unicast VPN route:	Increment:		
Number of routes per VPN:	Unique Routes per VPN (Y/N):		
First Tester AS number	Unique tester AS per VPN (Y/N):		
Provider Core Topology			
Core port :			
Interface address (N2X):		Neighbor address (SUT):	
PIM-P router ID (N2X):		PIM-P RP address (SUT):	
Use IGP (Y/N):	OSPF -or- ISIS:	Area ID:	
Tester router ID (N2X):		SUT router ID (SUT):	
OPSF network type:			
Use MPLS (Y/N):		LDP -or- RSVP:	
Simulated PEs and remote CEs			
Core port:		Number of peers (PEs) :	
First IP address (PE):		Increment:	
First IGP link address (OSPF):		Increment:	
Simulated PEs and remote CEs → VPNv4 VRFs			
Number of VRFs:		Local pref PA:	
First Route target:		Increment:	
First unicast VPN route:		Increment:	
Unique VPN routes (Y/N):		Increment per VPN:	
Define VPN RP address (Y/N):		First RP address:	
Unique RP each VPN (Y/N):		Increment per VPN:	
Simulated PEs and remote CEs → VPNv4 default MDTs			
First default MDT:		Increment:	
Join default MDT group (Y/N):		PIM-SM -or- PIM-SSM:	
PIM-SSM: Use SUT IP address as source -or- Use IP address as source or- Manually configure IP source addresses			
Simulated PEs and remote CEs → VPNv4 data MDTs			
Define data MDTs (Y/N):	First data MDT range:	Increment:	
Data MDTs per VRF:			
Enable data MDT (S,G) group pool (Y/N):		Join data MDT (S,G) group pool (Y/N):	
Use SUT (or RR) IP address as source -or- Use IP address as source -or- Manually configure IP source addresses			

Table 5. Local traffic sources (blank form)

Local traffic sources				
Edge port:				
Include edge ports as destinations (Y/N):				
Transmit from all CEs -or- Transmit from selected CEs:				
Selected CEs:				
Use CE link address -or- Use ALL routes advertised by E-BGP -or- Use ___ host addresses on E-BGP networks incr___				
First group address:		Increment:		Groups per CE:
Unique groups each CE (Y/N):		Increment:		
Create send/receive register (S,G) group pools (Y/N):				
Name prefix:	IP packet length:	Min:	Max:	Incr:
IP bandwidth:		% of maximum -or- packets/sec -or- Mb/sec:		
Remote traffic sources				
Core port:				
Transmit from all PEs (Y/N):		PE router:		
Transmit from all VRFs -or- Transmit from selected VRFs:				
Selected VRFs:				
First group address:		Increment:		Groups per VRF:
Unique groups each VRF (Y/N):		Increment:		
Unique groups each PE (Y/N):		Increment:		
Use data MDT (Y/N):		Data MDT group address:		
Name prefix	IP packet length:	Min:	Max:	Incr:
IP bandwidth:		% of maximum -or- packets/sec -or- Mb/sec:		
Join PIM group pools (local CE)				
Local CE -or- remote CE: Local CE		Edge port:		
All VRFs -or- Selected VRF:		Selected VRFs:		
First group address:		Increment:		Groups per local CE:
Unique groups for each local CE (Y/N):		Increment:		
Join group pool upon creation (Y/N):		Enable (S,G) joins (Y/N):		
Include sources from other edge ports (Y/N):		Define multiple group address ranges (Y/N):		
Number (of address ranges):		Increment:		
Join PIM group pools (remote CE)				
Local CE -or- remote CE: Remote CE		Core port:		
All PE routers (Y/N):		PE router:		
First group address:		Increment:		Groups per remote CE:
Unique groups for each remote CE (Y/N):		Increment:		
Join group pool upon creation (Y/N):		Enable (S,G) joins (Y/N):		



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Revised: March 24, 2009

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Printed in USA, June 14, 2009
5990-4131EN



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