LANforge GUI Cookbook

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Overview

The LANforge GUI Cookbook provides a set of high-level examples of how to setup useful test scenarios in both LANforge FIRE and ICE. Each example intends to give the reader a brief introduction to the test scenario and a set of step-by-step instructions on how to use the LANforge GUI to configure the test.

All of the following examples will work on Linux systems running the LANforge software with the LANforge kernel and a sufficient license. If you are running another Linux kernel, you will not be able to exactly duplicate some of the examples, but there are usually work-arounds available to assist you. Please contact us at support@candelatech.com if you have any questions.

If you are using the Windows version of LANforge, you will have to modify ports using the Windows utilities and you will not be able to duplicate the Routed Mode ICE examples. Everything else should work approximately the same, but the performance is limited to 10Mbps speeds.

LANforge FIRE - Traffic Generation

Before attempting the examples below, ensure that you have successfully followed these software installation guides:
LANforge GUI Installation
LANforge Server Installation

It is also recommended that you back up your current running LANforge Server database so that you may safely return to your current operating state.

1. Generating Traffic to a Switched Network

Goal: To setup and run traffic on a switched network.

In this test scenario, a basic, unmanaged switch is the device under test (DUT) while LANforge FIRE is used to generate traffic and verify switch throughput.

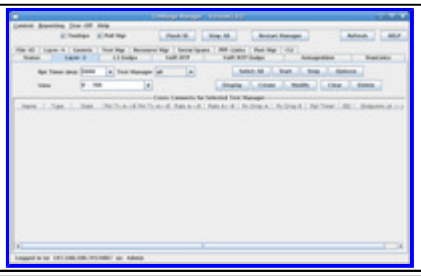
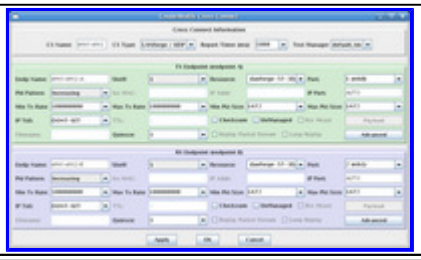
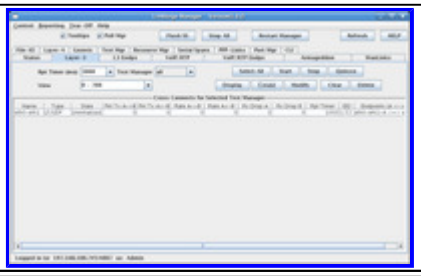
1. Connect two available data generating ports of your LANforge Server to the DUT, an unmanaged switch.

2. Setup the LANforge Ports so that they have valid IP addresses.

A: Go to the Port Manager.	
B: Modify port eth0.	
C: Modify port eth1.	
D: Verify port configuration.	

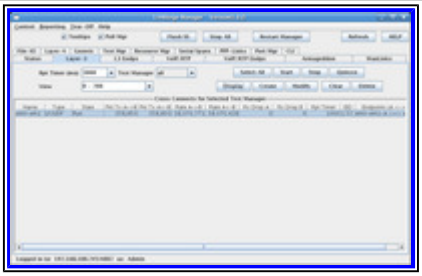
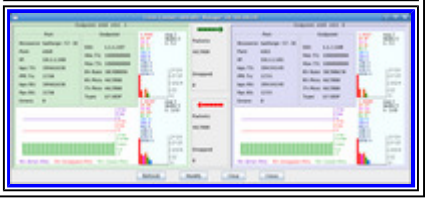
- For more information, see the LANforge User's Guide: Ports (Interfaces)

3. Create a Layer 3 Connection using the two configured ports.

A: Go to the Layer-3 tab.	
B: Create a new Cross-Connect.	
C: Verify new Cross-Connect.	

- For more information, see the LANforge User's Guide: Layer-3 Cross-Connects

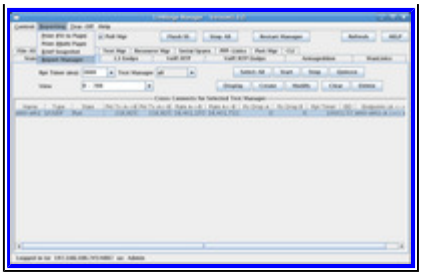
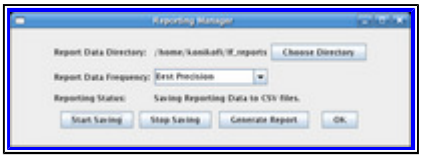
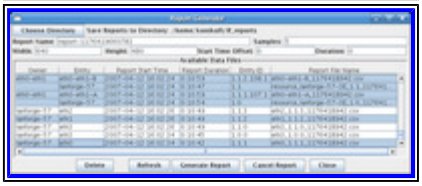
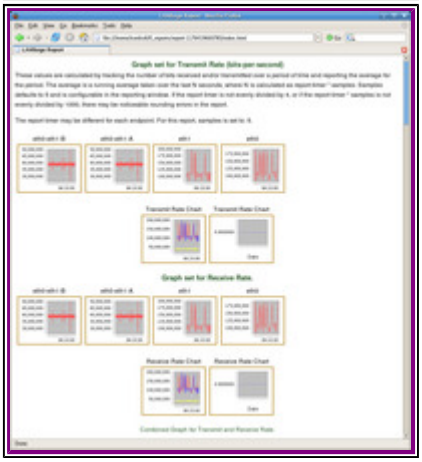
4. Run traffic and observe results.

A: On the Layer-3 tab, highlight the cross-connect. Select Start, and then Display.	
B: Layer-3 cross-connect display.	

- For more information, see the LANforge User's Guide: Layer-3 Cross-Connect Display

5. In this case, the overall throughput of the DUT is approximately 76Mbps.
The Report Manager can also be used to record the throughput over time.

A: Select Report Manager from the Reporting Menu.	

	
B: Choose a directory and save data. After desired test duration, Stop Saving and Generate Report.	
C: Highlight desired entities, and Generate Report.	
D: Last line indicates location of HTML report.	
E: View HTML report.	

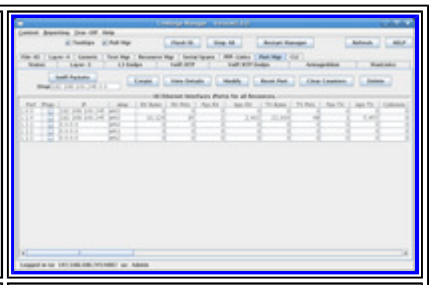
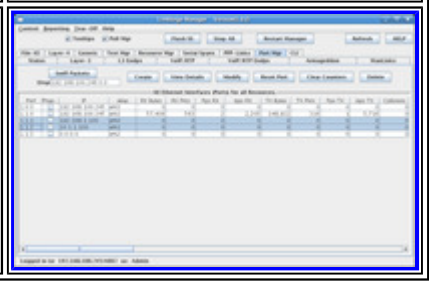
- For more information, see the LANforge User's Guide: Report Manager

2. Generating Traffic to a Routed Network

Goal: To setup and run traffic on a routed network.

In this test scenario, LANforge FIRE is used to generate traffic to a basic router in order to test throughput.

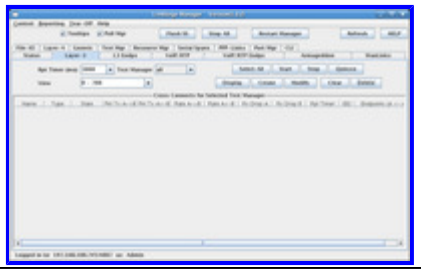
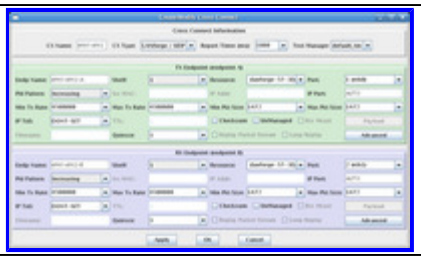
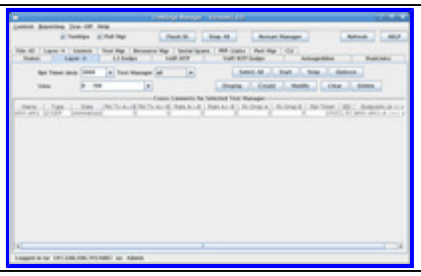
1. Connect one LANforge FIRE port to the router's LAN port.
2. Connect another LANforge FIRE port to the router's WAN port.
3. Setup the LANforge Ports so that they have valid IP addresses.

A: Go to the Port Manager.	
B: Modify port eth0. Set a valid network IP address and Gateway IP.	
C: Modify port eth1. Set a valid network IP address and Gateway IP.	
D: Verify port configuration.	

   - For more information, see the LANforge User's Guide: Ports (Interfaces)

4. Create a Layer 3 Connection using the two configured ports.

A: Go to the Layer-3 tab.	

	
B: Create a new Cross-Connect.	
C: Verify new Cross-Connect.	

- For more information, see the LANforge User's Guide: Layer-3 Cross-Connects

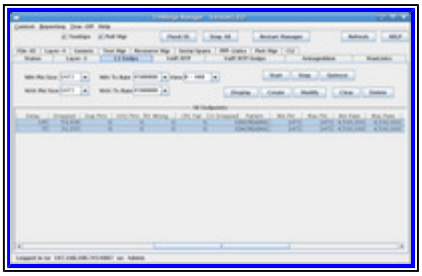
5. Run traffic and determine router throughput.

A: On the Layer-3 tab, highlight the cross-connect. Select Start, and then Display.	
B: Layer-3 cross-connect display.	

- For more information, see the LANforge User's Guide: Layer-3 Cross-Connect Display

6. For this example, a low performance router was used to illustrate poor throughput, variable latency, and dropped packets.

A: Go to the Layer-3 Endpoints tab.	

	
B: Scroll to the right to view Latency and Dropped Packets.	

- For more information, see the LANforge User's Guide: Layer-3 Endpoints

3. Generating Traffic for Firewall Testing **Coming Soon...**

4. Generating Traffic for Web Server Testing **Coming Soon...**

5. Generating Traffic for DSLAM Testing **Coming Soon...**

6. Generating Traffic for VoIP Testing **Coming Soon...**

7. Generating Traffic for WLAN Testing **Coming Soon...**

LANforge ICE - Network Simulation

Before attempting the examples below, ensure that you have successfully followed these software installation guides:
LANforge GUI Installation
LANforge Server Installation

It is also recommended that you back up your current running LANforge Server database so that you may safely return to your current operating state.

1. Bridged Mode (Non-Routed) WanLink

Goal: To allow LANforge ICE to sit transparently on a network segment by using a Bridged Mode WanLink to simulate a WAN.

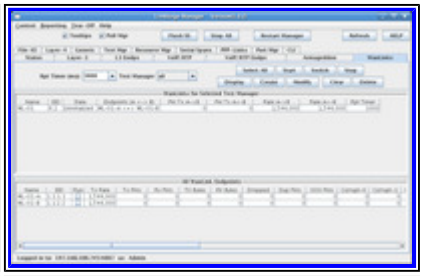
In this test scenario, a LANforge ICE WanLink is created in Bridged Mode to simulate a WAN consisting of a DS1 speed (1.544Mbps) link with 20ms of delay in one direction and 30ms of delay in the other direction.

1. Setup the LANforge Ports so that they have 0.0.0.0 IP addresses.
   Bridged Mode WanLinks use ports that have no IP address because the ports are transparent to the traffic flowing through them.

A: Go to the Port Manager.	
B: Modify port eth0. Set the IP address, IP Mask and Gateway IP to all zeroes (0.0.0.0).	
C: Modify port eth1. Set the IP address, IP Mask and Gateway IP to all zeroes (0.0.0.0).	
D: Verify port configuration.	

   - For more information, see the LANforge User's Guide: Ports (Interfaces)

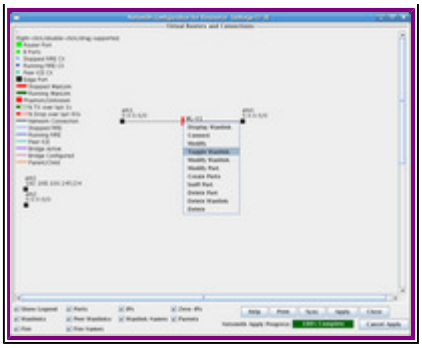
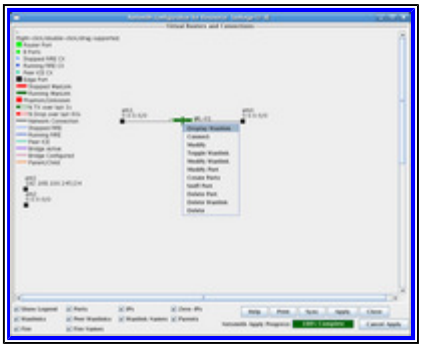
2. Create a WanLink.

A: Go to the WanLinks tab.	
B: Create a WanLink. To simulate a WAN, enter a specific amount of delay or other impairment. For this example, enter 20ms of delay for Entry Point A and 30ms of delay for Entry Point B. Also, be sure to set the correct ports, transfer rate and backlog buffer. Select 'OK' when done.	
C: Verify WanLink creation.	
D: Go to the Status tab and select Netsmith to view the graphical representation of the WanLink.	
E: This is the general form of a Bridged Mode WanLink in Netsmith. It consists of two 0.0.0.0 IP addressed ports with a vertical bar between them.	

- For more information, see the LANforge User's Guide: WanLinks (ICE)

3. Run traffic and verify results.

A: Right-click to toggle the WanLink to allow traffic from a transmitting device to flow to a receiving device.	

	
B: The transmitting/receiving devices can be just about anything that generates and receives traffic such as a web server and client or a pair of LANforge FIRE ports. Right-click to display the WanLink.	
C: WanLink display.	
D: On the WanLinks tab, highlight the WanLink Endpoints and scroll to the right to note the Serialization Delay which is the delay injected by LANforge to account for packet size and transfer rate. In this case, SD = (1514 bytes * 8 bits/byte) / 1.544Mbps = 7.8ms The total delay as experienced by the transmitting/receiving device is the sum of the WanLink configured delay and the serialization delay which in this case would be about 28ms in one direction and 38ms in the other.	

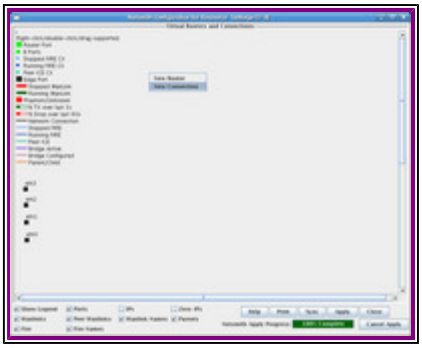
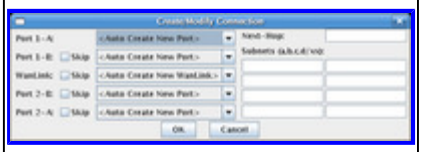
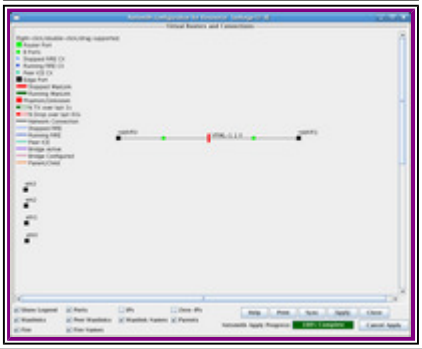
- For more information, see the LANforge FAQ: Serialization Delay

2. Bridged Mode WanLink with Virtual Ports/Redirect Devices

Goal: To setup a Bridged Mode WanLink using RDDs (Redirect Devices).

In this test scenario, a LANforge ICE WanLink is created in Bridged Mode using Redirect Devices to illustrate an example of how to send LANforge FIRE traffic to yourself through LANforge ICE. This is useful when physical ports are in short supply and a proof-of-concept test is needed.

1. Setup a Netsmith Connection.

A: Go to the Status tab and select Netsmith.	
B: Right-click to create a new connection.	
C: Take defaults, Auto Create everything and select 'OK'. **NOTE:**The new connection is composed of two pairs of Redirect Devices, Port 1A, 1B and Port 2A, 2B and a WanLink. The new connection is not created until you select the 'Apply' button in the Netsmith window.	
D: Apply the new connection. **NOTE:**The new connection is created and has a Bridged Mode WanLink between Redirect Device ports 1B and 2B which are shown as smaller, green squares (B-Ports) connected by a vertical bar (WanLink).	

- For more information, see the LANforge User's Guide: Virtual Interfaces

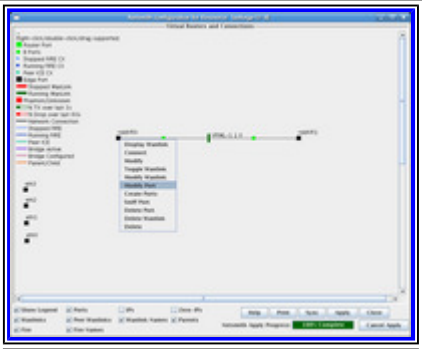
2. Setup the WanLink.

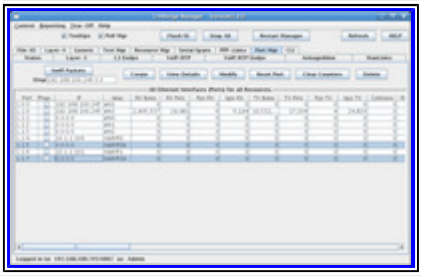
A: Right-click the WanLink select Modify WanLink.	
B: Verify that the B-side ports of the Redirect Device pairs are filled in which in this case are rddVR0b and rddVR1b. Also be sure to set the impairment, if any, backlog-buffer and transfer rate. Select 'OK' when done.	

	
C: Right-click to toggle the WanLink status to Running (green).	

- For more information, see the LANforge User's Guide: WanLinks (ICE)

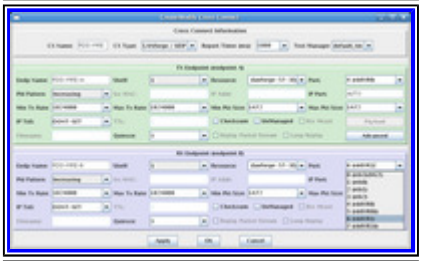
3. Setup the ports.

A: Right-click port rddVR0 and select Modify Port.	
B: Assign an IP address and Network Mask.	
C: Right-click port rddVR1 and select Modify Port.	
D: Assign an IP address and Network Mask. **NOTE:**An alternative method to set Network Mask is	

after the IP address, put a / followed by the number of mask bits. In this case, /24 is equivalent to 255.255.255.0	
E: Select IPs at the bottom of the Netsmith window to verify port configuration.	
F: Go to the Port Mgr tab to verify port configuration. **NOTE:**The Bridged Mode WanLink is connected between rddVR0b and rddVR1b which both have 0.0.0.0 IP addresses.	

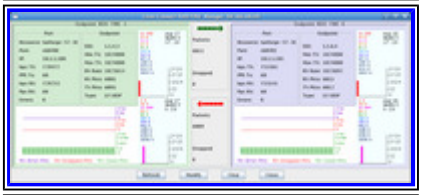
- For more information, see the LANforge User's Guide: Ports (Interfaces)

4. Create a Layer-3 Connection.

A: Go to the Layer-3 tab and select Create.	
B: The RDD-FIRE connection will use the A-side ports of the Redirect Device pairs. These are the ports rddVR0 and rddVR1 that were assigned IP addresses in step 2.	
C: Verify the Layer-3 connection.	

- For more information, see the LANforge User's Guide: Layer-3 Cross Connects (FIRE)

5. Run LANforge FIRE to yourself through LANforge ICE!

A: Highlight the Layer-3 Cross Connect and select 'Start'.	
B: Select 'Display' to show the Layer-3 Cross Connect details.	
C: Go to the Status tab and select 'Netsmith' to view the graphical representation of the setup.	
D: Right-click to display the WanLink details.	

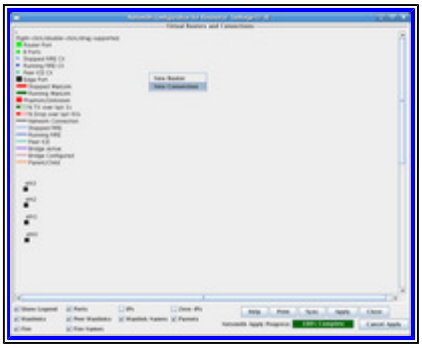
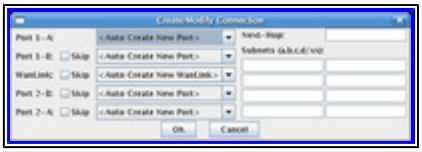
3. Routed Mode WanLinks with Virtual Routers

Goal: To setup a Routed Mode WanLink between two Virtual Routers.

In this test scenario, LANforge ICE is used to simulate a routed network where incoming traffic on one port is sent through one Virtual Router then through a WanLink, then through a second Virtual Router and then finally out to a port on a different network.

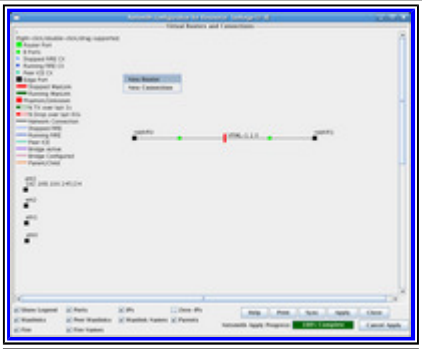
1. Setup a Netsmith Connection.

A: Go to the Status tab and select Netsmith.	

	
B: Right-click to create a new connection.	
C: Take defaults, Auto Create everything and select 'OK'.	
D: Select 'Apply' in the Netsmith window to create the connection.	

- For more information, see the LANforge User's Guide: Netsmith

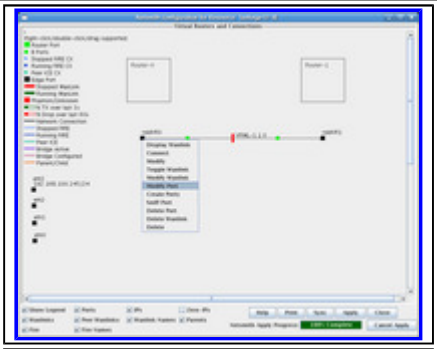
2. Setup two Virtual Routers

A: Right-click to create a new router.	
B: Take defaults, or change the name, graphical size and notes about the Virtual Router. Select 'OK' when done.	
C: Repeat for the second Virtual Router.	

	
D: Select the 'Apply' button in the Netsmith window. **NOTE:**After making any changes to the Netsmith window, you must select 'Apply' or your changes will NOT be implemented and could be lost. Also, note the Netsmith Apply Progress bar displayed at the bottom of the Netsmith window.	

- For more information, see the LANforge User's Guide: Netsmith

3. Configure the ports on the ends of the WanLink.

A: Right-click port rddVR0 and select Modify Port.	
B: Assign an IP address and Network Mask. This example uses 10.1.1.100 and 255.255.255.0.	
C: Right-click port rddVR1 and select Modify Port.	
D: Assign an IP address and Network Mask. This example uses 10.1.1.101 and 255.255.255.0.	

- For more information, see the LANforge User's Guide: Netsmith

4. Drag the ends of the WanLink into the Virtual Routers.

A: Left-click and drag rddVR0 into Router-0.	
B: Left-click and drag rddVR1 into Router-1.	
C: Select the 'Apply' button at the bottom of the Netsmith window.	

- For more information, see the LANforge User's Guide: Netsmith

5. Setup the Routed Mode WanLink characteristics.

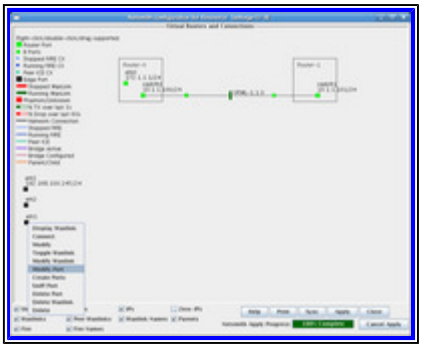
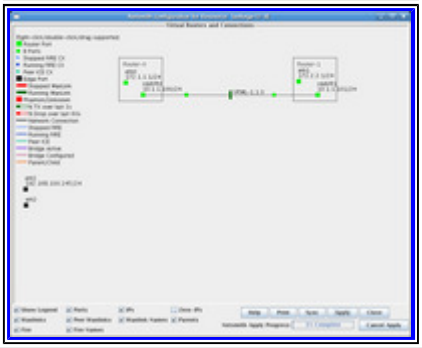
A: Right-click the WanLink and select Modify Wanlink.	

	
B: Verify that the B-side ports, rddVR0b and rddVR1b are filled in. Also be sure to set the impairment, if any, as well as backlog-buffer and transfer rate. Select 'OK' when done.	
C: Right-click the WanLink and select Toggle Wanlink to set its status to Running (green).	

- For more information, see the LANforge User's Guide: Netsmith

6. Setup the physical ports.

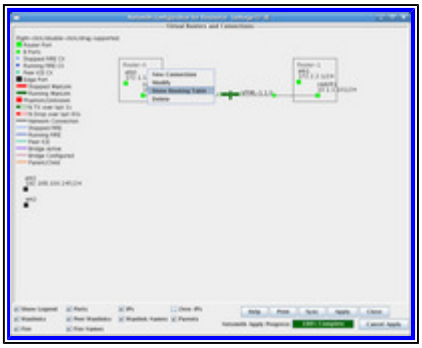
A: Right-click port eth0 and select Modify Port.	
B: Assign port eth0 an IP address and Network Mask. This example uses 172.1.1.1 and 255.255.255.0.	
C: Drag port eth0 into Router-0.	

	
D: Right-click port eth1 and select Modify Port.	
E: Assign port eth1 an IP address and Network Mask. This example uses 172.2.2.1 and 255.255.255.0.	
F: Drag port eth1 into Router-1.	
G: Select the 'Apply' button at the bottom of the Netsmith window.	

- For more information, see the LANforge User's Guide: Netsmith

7. Run traffic and verify results.

A: Verify that the traffic on eth0 is being sent to Default Gateway 172.1.1.1 and that traffic on eth1 is	

being sent to Default Gateway 172.2.2.1. In this example, traffic to eth0 is from a port configured with IP address 172.1.1.105 Network Mask 255.255.255.0 and Default Gateway 172.1.1.1. Traffic to eth1 is from a port configured with IP address 172.2.2.106 Network Mask 255.255.255.0 and Default Gateway 172.2.2.1. If your physical configuration is complete, Netsmith should appear as shown.	
B: Right-click one of the Virtual Routers and select Show Routing Table to view the internal routing table of the Virtual Router.	
C: Virtual Routers use simple subnet routing. Routing protocols and redundant links are not supported at this time.	

- For more information, see the LANforge User's Guide: Netsmith

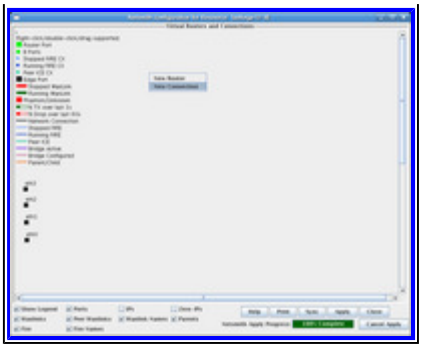
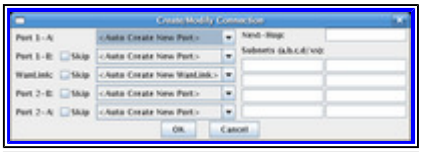
4. Routed Mode WanLinks with a Single Physical Port

Goal: To setup a Routed Mode WanLink between two Virtual Routers that only use one physical port.

In this test scenario, LANforge ICE is used to simulate a routed network where a single physical port is used for incoming and outgoing traffic. The traffic will enter the physical port and will then be sent through two Virtual Routers connected by a WanLink and then back out the same physical port.

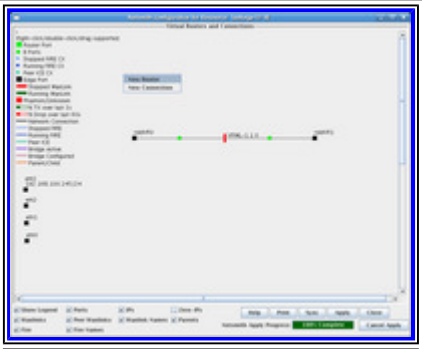
1. Setup a Netsmith Connection.

A: Go to the Status tab and select Netsmith.	
B: Right-click to create a new connection.	

	
C: Take defaults, Auto Create everything and select 'OK'.	
D: Select 'Apply' in the Netsmith window to create the connection.	

- For more information, see the LANforge User's Guide: Netsmith

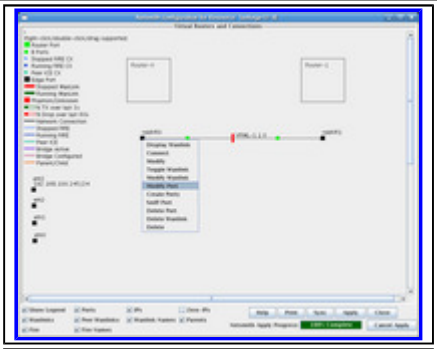
2. Setup two Virtual Routers

A: Right-click to create a new router.	
B: Take defaults, or change the name, graphical size and notes about the Virtual Router. Select 'OK' when done.	
C: Repeat for the second Virtual Router.	
D: Select the 'Apply' button in the Netsmith window.	

NOTE: After making any changes to the Netsmith window, you must select 'Apply' or your changes will NOT be implemented and could be lost. Also, note the Netsmith Apply Progress bar displayed at the bottom of the Netsmith window.	

- For more information, see the LANforge User's Guide: Netsmith

3. Configure the ports on the ends of the WanLink.

A: Right-click port rddVR0 and select Modify Port.	
B: Assign an IP address and Network Mask. This example uses 10.1.1.100 and 255.255.255.0.	
C: Right-click port rddVR1 and select Modify Port.	
D: Assign an IP address and Network Mask. This example uses 10.1.1.101 and 255.255.255.0.	

- For more information, see the LANforge User's Guide: Netsmith

4. Drag the ends of the WanLink into the Virtual Routers.

A: Left-click and drag rddVR0 into Router-0.	
B: Left-click and drag rddVR1 into Router-1.	
C: Select the 'Apply' button at the bottom of the Netsmith window.	

- For more information, see the LANforge User's Guide: Netsmith

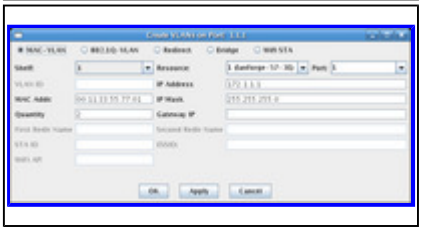
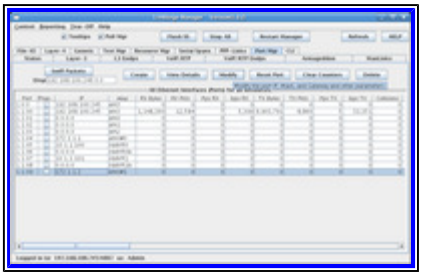
5. Setup the Routed Mode WanLink characteristics.

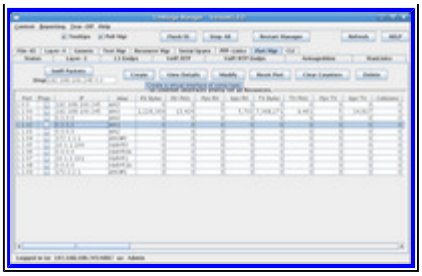
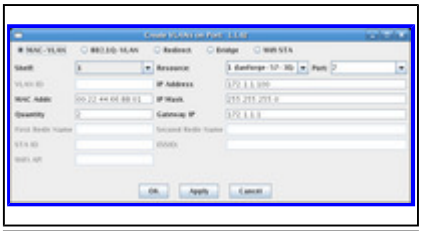
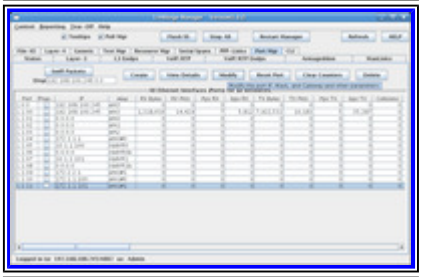
A: Right-click the WanLink and select Modify Wanlink.	
B: Verify that the B-side ports, rddVR0b and rddVR1b are filled in. Also be sure to set the impairment, if any, as well as backlog-buffer and transfer rate. Select 'OK' when done.	

	
C: Right-click the WanLink and select Toggle Wanlink to set its status to Running (green).	

- For more information, see the LANforge User's Guide: Netsmith

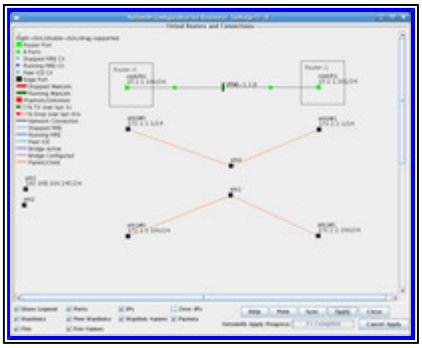
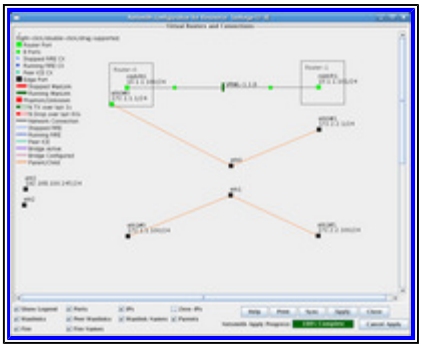
6. Setup MAC VLANs.

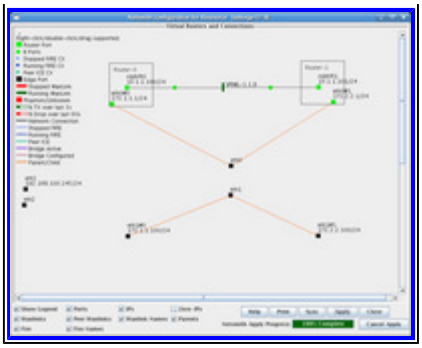
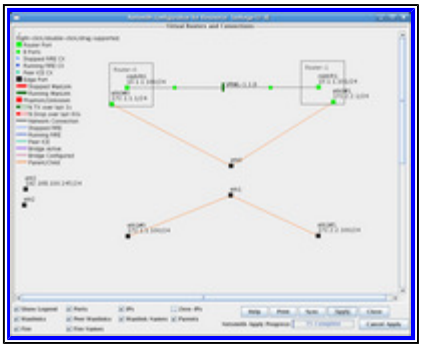
A: Go to the Port Mgr tab, highlight eth0 and select 'Create'.	
B: Check the MAC-VLAN button. Set a MAC address that begins with 00 such as 00:11:33:55:77:01. Set the Quantity to 2. Set the IP Address to 172.1.1.1 and IP Mask to 255.255.255.0. Leave the Gateway IP field blank. Select 'OK' when done.	
C: Highlight eth0#1 and select 'Modify'.	
D: Set eth0#1 IP address to 172.2.2.1 and IP Mask to 255.255.255.0.	

E: Highlight eth1 and select 'Create'.	
F: Check the MAC-VLAN button. Set a MAC address that begins with 00 such as 00:22:44:66:88:01. Set the Quantity to 2. Set the IP Address to 172.1.1.100 and IP Mask to 255.255.255.0. Set the Gateway IP to 172.1.1.1. Select 'OK' when done.	
G: Highlight eth1#1 and select 'Modify'.	
H: Set eth1#1 IP address to 172.2.2.100, IP Mask to 255.255.255.0 and Gateway IP to 172.2.2.1.	

- For more information, see the LANforge User's Guide: Virtual Interfaces

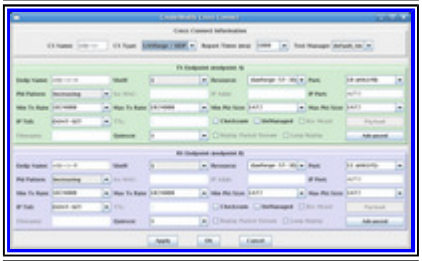
7. Configure Netsmith.

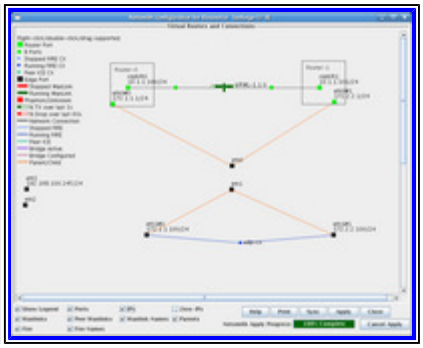
A: On the Netsmith window, move the ports so that they are more clearly visible. **NOTE:**Be sure to select 'Apply' after moving objects so that their new positions are saved to the database.	
B: Drag eth0#0 into Router-0.	

C: Drag eth0#1 into Router-1.	
D: Select 'Apply' in the Netsmith window. LANforge is now ready to accept incoming traffic on eth0, the single physical port that is connected to a Routed Mode WanLink. For this example, we will place a loopback cable between ports eth0 and eth1, then configure the MAC VLANs on eth1 to generate test traffic to the Routed Mode WanLink.	

- For more information, see the LANforge User's Guide: Netsmith

8. Setup a Layer-3 UDP connection between eth1#0 and eth1#1.

A: Go to the Layer-3 tab and select 'Create'.	
B: Set Endpoint A to be eth1#0 and Endpoint B to be eth1#1. Set the name of the CX, CX Type to LANforge UDP and set the Report Timer to 1000. Set the Min/Max Tx Rate to 1024000 and the Min/Max Pkt Size to 1472.	
C: Highlight the new connection and select 'Start'.	
D: You will get a pop-up warning, but you can ignore it because the two MAC VLAN interfaces are on different subnets and are connected by the Routed Mode WanLink.	

E: Netsmith now shows the new connection and traffic flowing through the Routed Mode WanLink.	

- For more information, see the LANforge User's Guide

5. Simulating a Network with IP Filtering **Coming Soon...**

6. Simulating a Multiple Hop Network **Coming Soon...**

7. Simulating a Network with Multiple Physical Ports **Coming Soon...**

Email Candela Technologies at: support@candelatech.com if you have any questions or suggestions.

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