

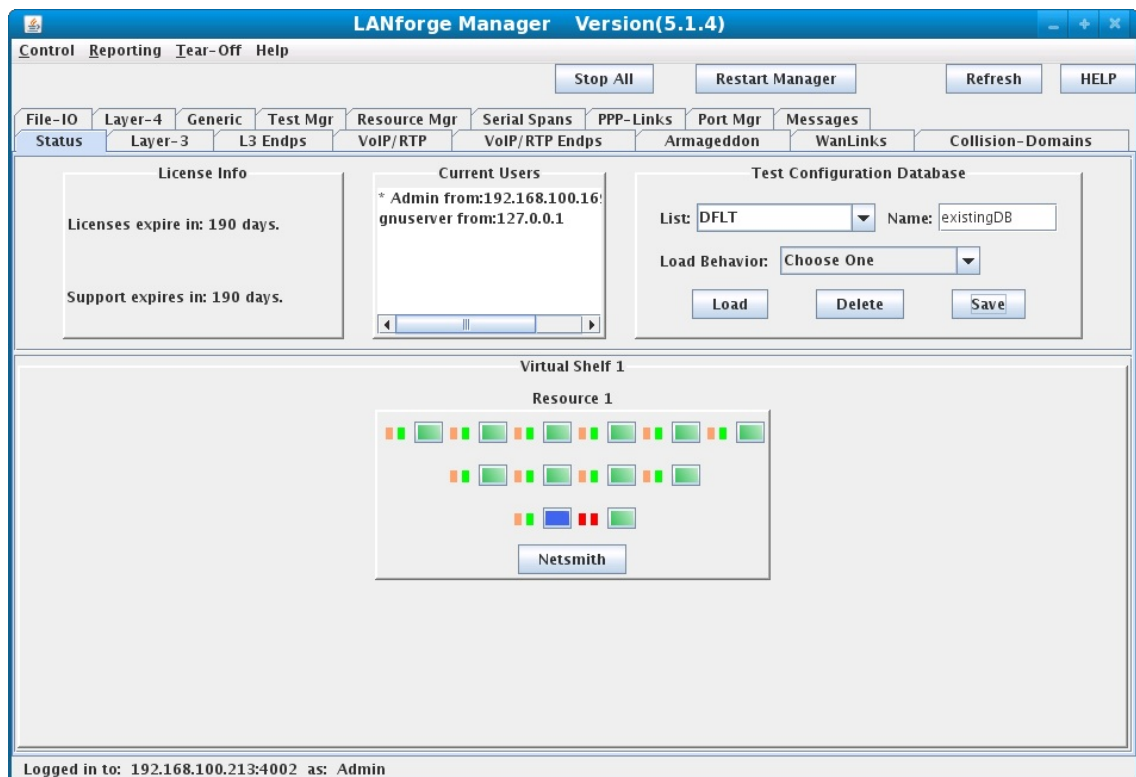
Multiple Physical Port Testing - CT970-48 Example

Goal: Use LANforge and a managed ethernet switch to create 48 unique WAN emulations.

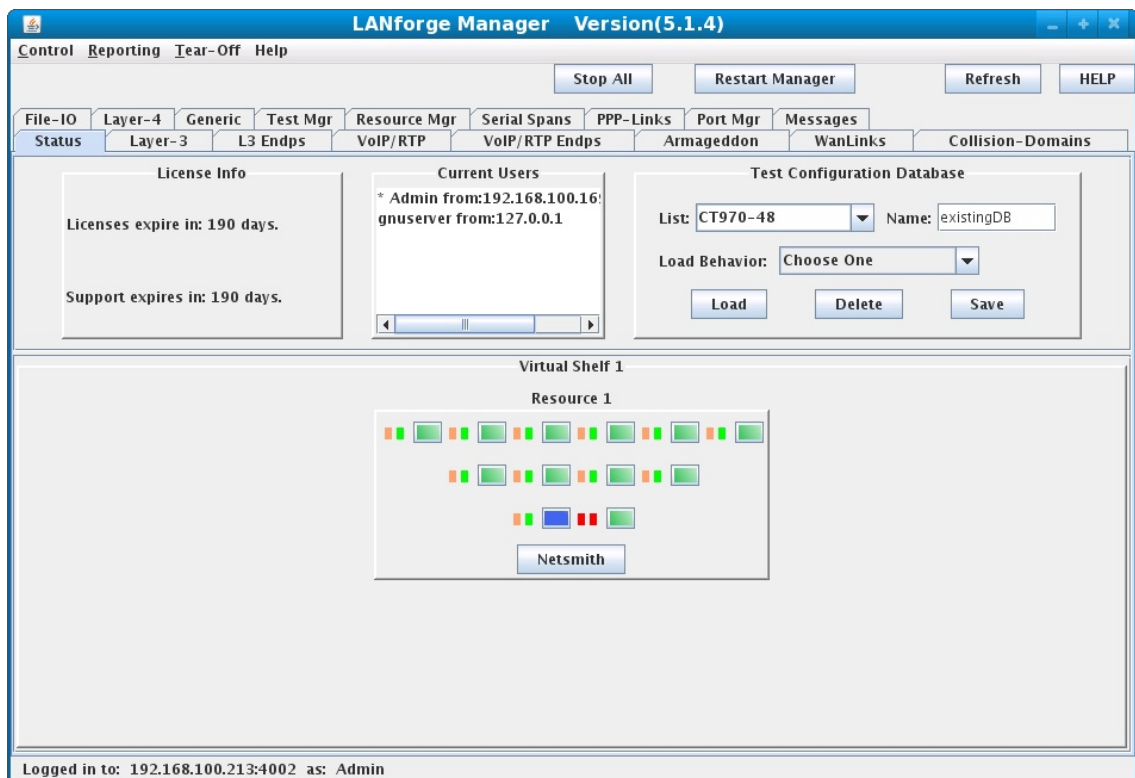
In this example, LANforge is paired with a managed ethernet switch to create 48 unique WAN emulations. Each of the 48 ports on the ethernet switch can be connected to an end-user device such as a PC or networked gaming console to provide 48 independent emulated links each with their own set of network impairments. Please see the [CT970-48 product description](#) for more details.

NOTE: If you are attempting to run this test scenario, you will need a LANforge license key that enables the correct number of WanLinks. Please contact us at support@candelatech.com for assistance.

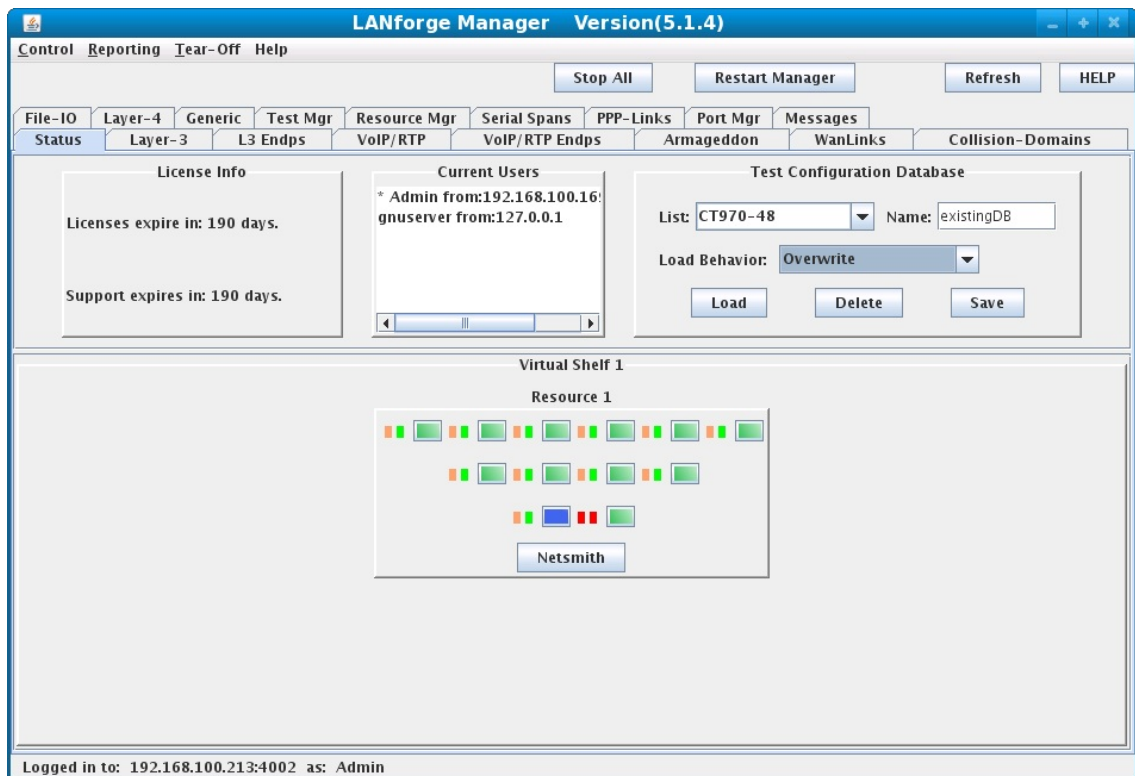
1. Download the CT970-48 configuration to your LANforge system. We have provided the LANforge database and managed switch configuration for this example to simplify the setup. You can download all of the [CT970-48 configuration files](#) to your /home/lanforge/DB/CT970-48 directory.
 - A. **NOTE:** This LANforge database uses eth0 as the Management port and eth2 as the VLAN trunk port. If you need to modify these, please contact us at support@candelatech.com for assistance.
 - B. **NOTE:** The managed switch referenced in this example is a [Netgear FSM7352SNA ProSafe 48-port 10/100 L3 Managed Switch](#).
2. Save your existing database, then load the new database into your LANforge system.
 - A. On the Status tab, under the Test Configuration Database Name field, type in a name for your existing configuration, then select the **Save** button.



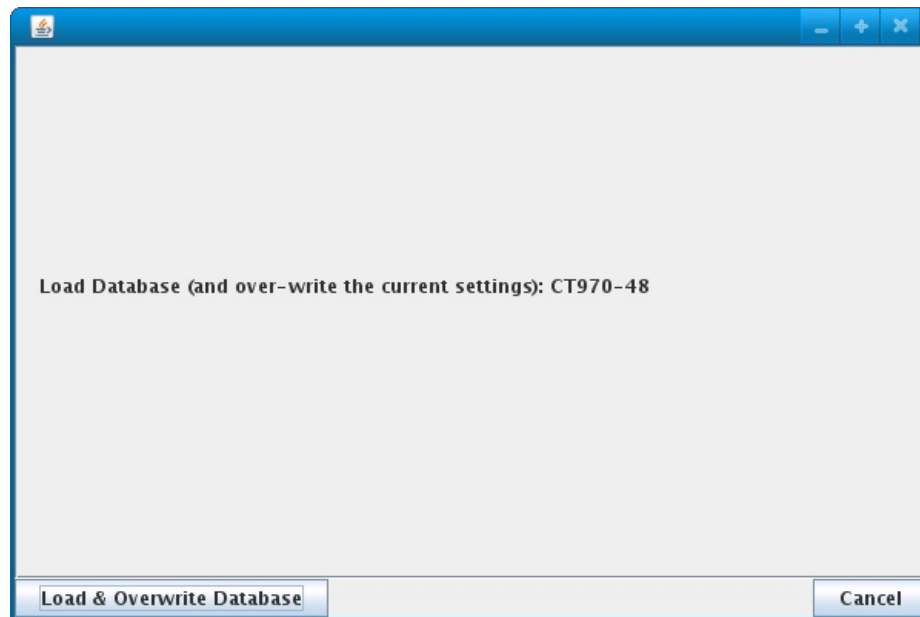
B. Select **CT970-48** from the Test Configuration Database List box.



C. Select Load Behavior **Overwrite**.

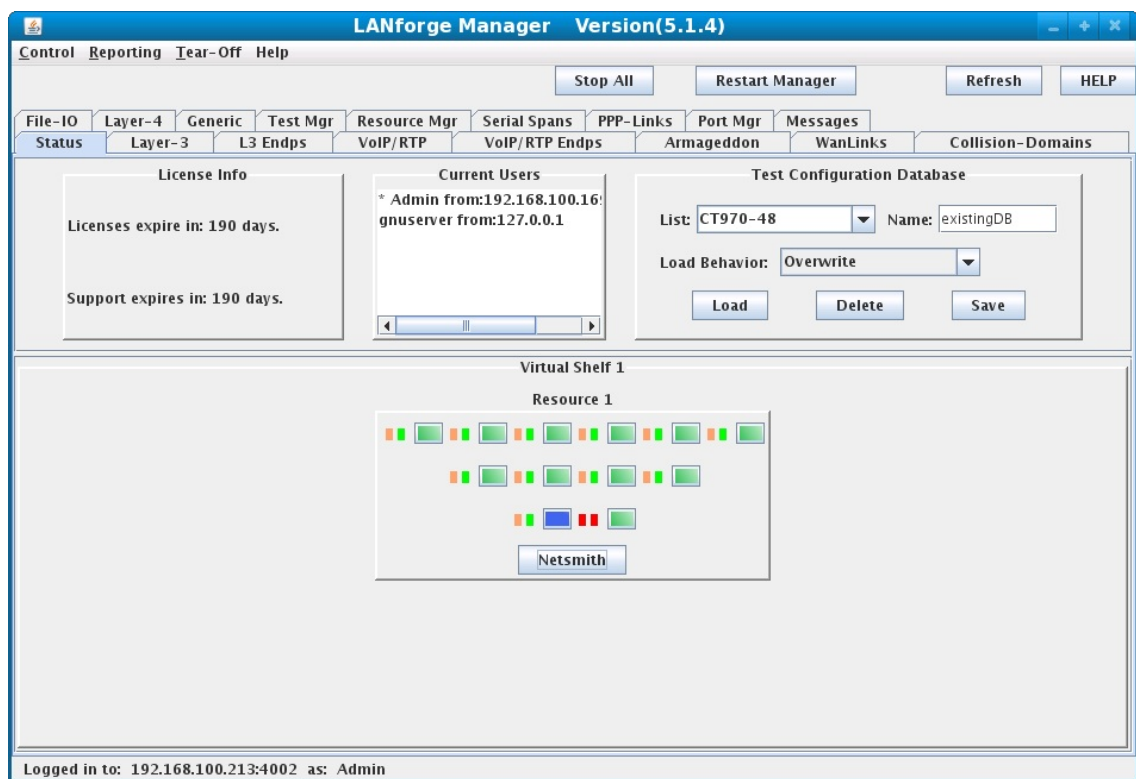


- D. Select the **Load** button and acknowledge the confirmation pop-up message.



3. After LANforge is finished loading the new database, open Netsmith to view the 48 WanLinks and modify if necessary.

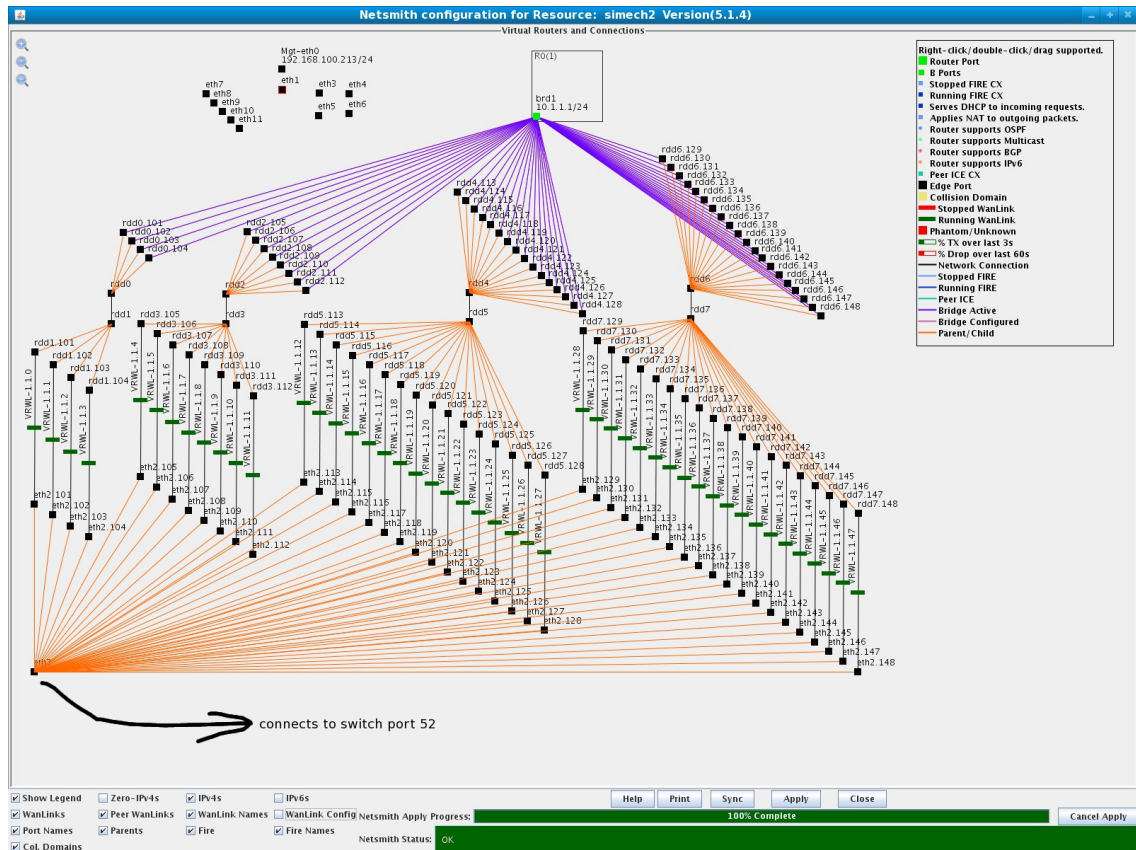
- A. On the Status tab, under Resource 1, select the **Netsmith** button.



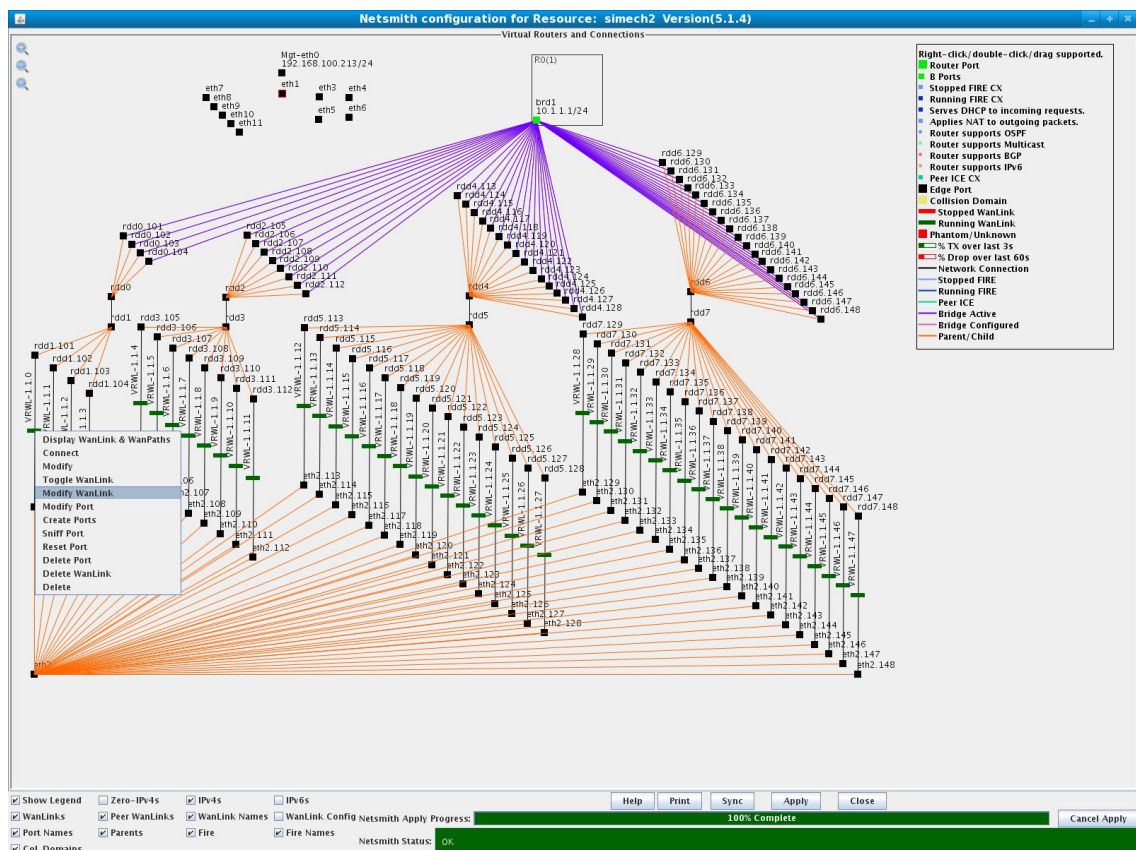
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- The screenshot displays the NetSmith configuration tool interface. The main window shows a hierarchical network diagram. At the top, a router labeled 'rd01' (10.1.1.24) is connected to a large number of other routers, including 'rd00', 'rd02', 'rd03', 'rd04', 'rd05', 'rd06', 'rd07', 'rd08', 'rd09', 'rd10', 'rd11', 'rd12', 'rd13', 'rd14', 'rd15', 'rd16', 'rd17', 'rd18', 'rd19', 'rd20', 'rd21', 'rd22', 'rd23', 'rd24', 'rd25', 'rd26', 'rd27', 'rd28', 'rd29', 'rd30', 'rd31', 'rd32', 'rd33', 'rd34', 'rd35', 'rd36', 'rd37', 'rd38', 'rd39', 'rd40', 'rd41', 'rd42', 'rd43', 'rd44', 'rd45', 'rd46', 'rd47', 'rd48', 'rd49', 'rd50', 'rd51', 'rd52', 'rd53', 'rd54', 'rd55', 'rd56', 'rd57', 'rd58', 'rd59', 'rd60', 'rd61', 'rd62', 'rd63', 'rd64', 'rd65', 'rd66', 'rd67', 'rd68', 'rd69', 'rd70', 'rd71', 'rd72', 'rd73', 'rd74', 'rd75', 'rd76', 'rd77', 'rd78', 'rd79', 'rd80', 'rd81', 'rd82', 'rd83', 'rd84', 'rd85', 'rd86', 'rd87', 'rd88', 'rd89', 'rd90', 'rd91', 'rd92', 'rd93', 'rd94', 'rd95', 'rd96', 'rd97', 'rd98', 'rd99', 'rd100'. These routers are further connected to a large number of hosts, including 'hh01', 'hh02', 'hh03', 'hh04', 'hh05', 'hh06', 'hh07', 'hh08', 'hh09', 'hh10', 'hh11', 'hh12', 'hh13', 'hh14', 'hh15', 'hh16', 'hh17', 'hh18', 'hh19', 'hh20', 'hh21', 'hh22', 'hh23', 'hh24', 'hh25', 'hh26', 'hh27', 'hh28', 'hh29', 'hh30', 'hh31', 'hh32', 'hh33', 'hh34', 'hh35', 'hh36', 'hh37', 'hh38', 'hh39', 'hh40', 'hh41', 'hh42', 'hh43', 'hh44', 'hh45', 'hh46', 'hh47', 'hh48', 'hh49', 'hh50', 'hh51', 'hh52', 'hh53', 'hh54', 'hh55', 'hh56', 'hh57', 'hh58', 'hh59', 'hh60', 'hh61', 'hh62', 'hh63', 'hh64', 'hh65', 'hh66', 'hh67', 'hh68', 'hh69', 'hh70', 'hh71', 'hh72', 'hh73', 'hh74', 'hh75', 'hh76', 'hh77', 'hh78', 'hh79', 'hh80', 'hh81', 'hh82', 'hh83', 'hh84', 'hh85', 'hh86', 'hh87', 'hh88', 'hh89', 'hh90', 'hh91', 'hh92', 'hh93', 'hh94', 'hh95', 'hh96', 'hh97', 'hh98', 'hh99', 'hh100'. The diagram is color-coded: red for routers, green for hosts, and blue for network links. A legend on the right side of the window provides a key for the colors and line styles used. The status bar at the bottom indicates '100% Complete'.

4. When the 48port-sw-config.txt is loaded into the Netgear FSM7352SNA switch, port 52 on the switch is configured as the VLAN trunk which will connect to LANforge port eth2. Each switch port and VLAN correspond to a WanLink in LANforge. Here, incoming traffic on switch port 1 is tagged for VLAN 101 and sent out switch port 52 to LANforge eth2 then on to WanLink VRWL-1.1.0 via endpoints eth2.101 and rdd1.101.

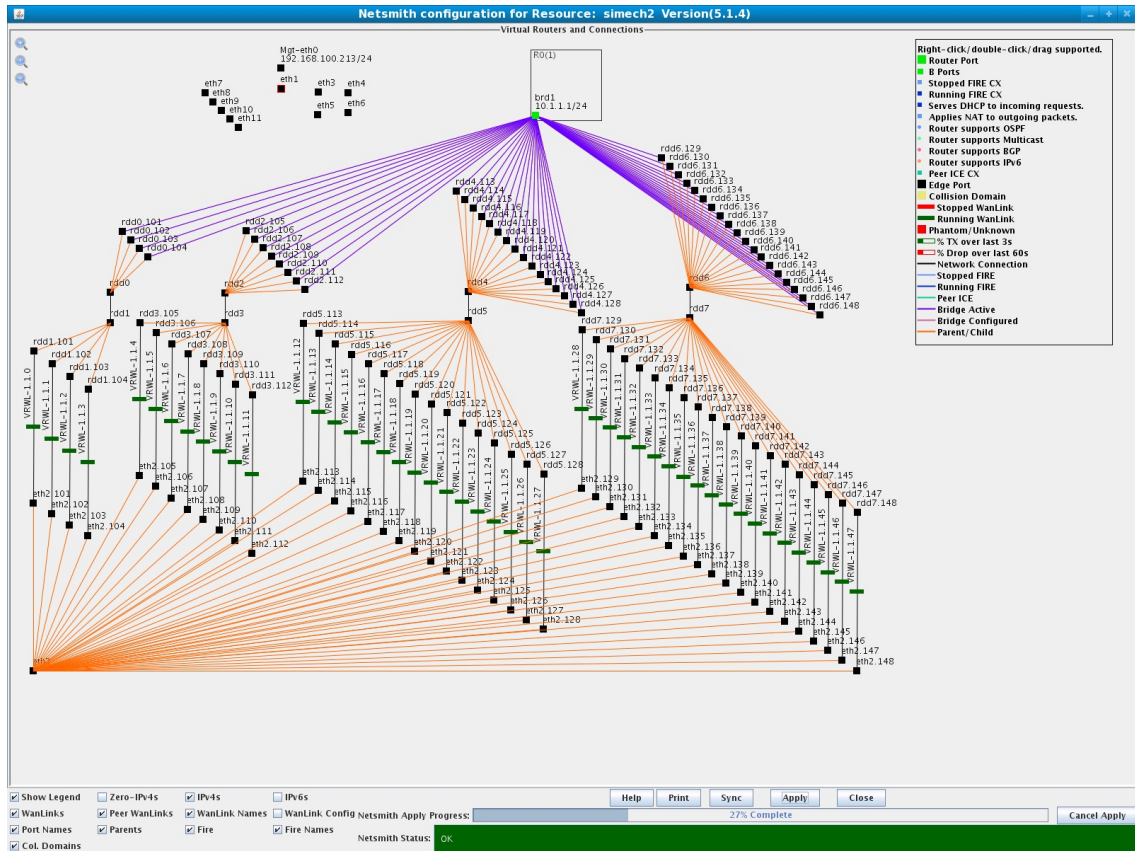
A. Connect LANforge port eth2 to the FSM7352SNA switch, port 52 which is trunking vlans 101 - 148 to the LANforge system.



B. Here, each WanLink can be modified to have its own unique impairment profile so that each end-device has a different upstream connection.



- C. If any changes are made to NetSmith, then select the **Apply** button to commit the changes to the LANforge server.



- D. Alternatively, a group of WanLinks can be modified together using the Batch Modify on the WanLinks tab in the main LANforge GUI. Highlight the group of WanLinks that you want to modify, then select **Batch Modify** to modify the highlighted set of WanLinks.

LANforge Manager Version(5.1.4)

Control Reporting Tear-Off Help

Stop All Restart Manager Refresh HELP

File-IO Layer-4 Generic Test Mgr Resource Mgr Serial Spans PPP-Links Port Mgr Messages

Status Layer-3 L3 Endps VoIP/RTP VoIP/RTP Endps Armageddon WanLinks Collision-Domains

Rpt Timer (ms): 3000 Go Test Manager all

Select All Start Switch Stop Clear

Display Create Modify Batch Modify Delete

WanLinks for Selected Test Manager

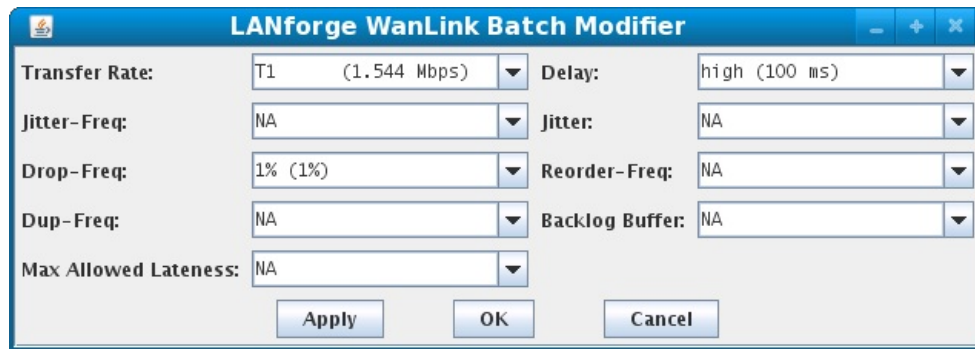
Name	EID	K-M	State	Endpoints (A <-> B)	Pkt Tx A->B	Pkt Tx A<-B	Rate A->B	Rate A<-B	Rpt Time
VRWL-1.1.11	6.6	✓	Run	VRWL-1.1.11-A <-> B	1	0	2,000,000	2,000,000	5.0
VRWL-1.1.12	6.19	✓	Run	VRWL-1.1.12-A <-> B	1	0	2,000,000	2,000,000	5.0
VRWL-1.1.13	6.18	✓	Run	VRWL-1.1.13-A <-> B	1	0	2,000,000	2,000,000	5.0
VRWL-1.1.14	6.17	✓	Run	VRWL-1.1.14-A <-> B	1	0	2,000,000	2,000,000	5.0
VRWL-1.1.15	6.16	✓	Run	VRWL-1.1.15-A <-> B	0	0	2,000,000	2,000,000	5.0
VRWL-1.1.16	6.15	✓	Run	VRWL-1.1.16-A <-> B	0	0	2,000,000	2,000,000	5.0
VRWL-1.1.17	6.14	✓	Run	VRWL-1.1.17-A <-> B	1	0	2,000,000	2,000,000	5.0
VRWL-1.1.18	6.29	✓	Run	VRWL-1.1.18-A <-> B	1	0	2,000,000	2,000,000	5.0
VRWL-1.1.19	6.28	✓	Run	VRWL-1.1.19-A <-> B	1	0	2,000,000	2,000,000	5.0

All WanLink Endpoints

Name	EID	Run	Script	Tx Rate	Tx Pkts	Rx Pkts	TX Bytes	RX Bytes	Dropped	Tx-Failed	Failed-Late	D
VRWL-1.1.10-A	1.1.43....	✓	None	2,000,000	0	1	0	90	0	0	0	0
VRWL-1.1.10-B	1.1.12....	✓	None	2,000,000	1	0	90	0	0	0	0	0
VRWL-1.1.11-A	1.1.44....	✓	None	2,000,000	0	1	0	90	0	0	0	0
VRWL-1.1.11-B	1.1.12....	✓	None	2,000,000	1	0	90	0	0	0	0	0
VRWL-1.1.12-A	1.1.61....	✓	None	2,000,000	0	1	0	90	0	0	0	0
VRWL-1.1.12-B	1.1.12....	✓	None	2,000,000	1	0	90	0	0	0	0	0
VRWL-1.1.13-A	1.1.62....	✓	None	2,000,000	0	1	0	90	0	0	0	0
VRWL-1.1.13-B	1.1.13....	✓	None	2,000,000	1	0	90	0	0	0	0	0
VRWL-1.1.14-A	1.1.63....	✓	None	2,000,000	0	1	0	90	0	0	0	0
VRWL-1.1.14-B	1.1.13....	✓	None	2,000,000	1	0	90	0	0	0	0	0
VRWL-1.1.15-A	1.1.64....	✓	None	2,000,000	0	0	0	0	0	0	0	0

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E. The Batch Modifier will apply changes to the group of highlighted WanLinks.



The image shows a Windows-style dialog box titled "LANforge WanLink Batch Modifier". It contains several configuration options, each with a label and a dropdown menu. The options are arranged in two columns. At the bottom, there are three buttons: "Apply", "OK", and "Cancel".

Parameter	Value
Transfer Rate:	T1 (1.544 Mbps)
Delay:	high (100 ms)
Jitter-Freq:	NA
Jitter:	NA
Drop-Freq:	1% (1%)
Reorder-Freq:	NA
Dup-Freq:	NA
Backlog Buffer:	NA
Max Allowed Lateness:	NA

5. In this example, any end-devices connected to switch ports 1 - 48 can communicate with each other. Here, an end-device such as PC1 connected to switch port 1 can communicate to PC2 connected to switch port 2 through the network path:

PC1 - switch port 1 - vlan 101 - switch port 52 - LANforge port eth2 - WanLink VRWL-1.1.0 - Virtual Router R0 - vlan 102 - WanLink VRWL-1.1.1 - LANforge port eth2 - switch port 52 - switch port 2 - PC2.

The end-devices used here are LANforge-FIRE interfaces on a separate system. Each interface has its own MAC and IP address and will generate traffic to and receive traffic from the switch port it is connected to.

- A. On the Port Mgr tab, assign an IP address on the 10.1.1.0/24 network and a default gateway 10.1.1.1

Shelf: 1 Resource: 1 Port: 2 (ice-si-dmz: eth2) (Configure Settings)

Port Status Information

Current: LINK-UP 1000bt-FD AUTO-NEGOTIATE Flow-Control PROMISC TSO GSO
Supported: 10bt-HD 10bt-FD 100bt-HD 100bt-FD 1000bt-FD AUTO-NEGOTIATE SEND-TO-SELF
Partner: NONE-SET
Advertising: 10bt-HD 10bt-FD 100bt-HD 100bt-FD 1000bt-FD Flow-Control
Driver Info: Port Type: Ethernet Driver: e1000e(L.0.2-k2) Bus: 0000:08:00.0

Port Configurables

General Interface Settings

☒ Set IP Info
☒ Set IP6 Info
☐ Set Alias
☐ Set MAC
☐ Set TX Q Len
☐ Set MTU
☐ Set Offload
☐ Set Rate Info
☐ Set PROMISC
☐ Set RX-All
☐ Set Bypass
☒ Set Rpt Timer
☐ Set Bridge Info
☐ Set CPU Mask

☐ DHCP-IPv4

IP Address: 10.1.1.12 Global IPv6: AUTO
IP Mask: 255.255.255.0 Link IPv6: AUTO
Gateway IP: 10.1.1.1 IPv6 GW: AUTO
Alias: MTU: 1500
MAC Addr: 00 15 17 90 56 60 TX Q Len: 1000
Br Cost: ignore Priority: ignore
Rpt Timer: 1000 Watchdog: 0
CPU Mask: NO-SET

Port Rates

☐ 10bt-HD
☐ 10bt-FD
☐ 100bt-HD
☐ 100bt-FD
☐ 1000-FD
☐ 10G-FD
☒ Autonegotiate

☐ Renegotiate
☐ Restart Xcvr
☒ PROMISC
☐ RX-ALL
☐ Bypass NOW!
☐ Bypass Power-UP
☐ Bypass Power-DOWN
☐ Bypass Disconnect

Advertise Rates

☒ 10bt-HD
☒ 10bt-FD
☒ 1000bt-HD
☒ 1000bt-FD
☐ 10G-FD
☒ Flow-Control

☒ TSO Enabled
☐ UFO Enabled
☐ LRO Enabled
☐ GRO Enabled

View Details Probe Sync Apply OK Cancel

- B. On the Port Mgr tab, assign an IP address on the 10.1.1.0/24 network and a default gateway 10.1.1.1

Shelf: 1 Resource: 1 Port: 3 (ice-si-dmz: eth3) (Configure Settings)

Port Status Information

Current: LINK-UP 1000bt-FD AUTO-NEGOTIATE Flow-Control PROMISC TSO GSO
Supported: 10bt-HD 10bt-FD 100bt-HD 100bt-FD 1000bt-FD AUTO-NEGOTIATE SEND-TO-SELF
Partner: NONE-SET
Advertising: 10bt-HD 10bt-FD 100bt-HD 100bt-FD 1000bt-FD Flow-Control
Driver Info: Port Type: Ethernet Driver: e1000e(L.0.2-k2) Bus: 0000:08:00.1

Port Configurables

General Interface Settings

☒ Set IP Info
☒ Set IP6 Info
☐ Set Alias
☐ Set MAC
☐ Set TX Q Len
☐ Set MTU
☐ Set Offload
☐ Set Rate Info
☐ Set PROMISC
☐ Set RX-All
☐ Set Bypass
☒ Set Rpt Timer
☐ Set Bridge Info
☐ Set CPU Mask

☐ DHCP-IPv4

IP Address: 10.1.1.13 Global IPv6: AUTO
IP Mask: 255.255.255.0 Link IPv6: AUTO
Gateway IP: 10.1.1.1 IPv6 GW: AUTO
Alias: MTU: 1500
MAC Addr: 00 15 17 90 56 61 TX Q Len: 1000
Br Cost: ignore Priority: ignore
Rpt Timer: 1000 Watchdog: 0
CPU Mask: NO-SET

Port Rates

☐ 10bt-HD
☐ 10bt-FD
☐ 100bt-HD
☐ 100bt-FD
☐ 1000-FD
☐ 10G-FD
☒ Autonegotiate

☐ Renegotiate
☐ Restart Xcvr
☒ PROMISC
☐ RX-ALL
☐ Bypass NOW!
☐ Bypass Power-UP
☐ Bypass Power-DOWN
☐ Bypass Disconnect

Advertise Rates

☒ 10bt-HD
☒ 10bt-FD
☒ 1000bt-HD
☒ 1000bt-FD
☐ 10G-FD
☒ Flow-Control

☒ TSO Enabled
☐ UFO Enabled
☐ LRO Enabled
☐ GRO Enabled

View Details Probe Sync Apply OK Cancel

6. The impairment settings on each WanLink will only apply to traffic that is sent or received from the switch port that it is associated with via the VLAN used with that WanLink. For example, WanLinks VRWL-1.1.0 and VRWL-1.1.1 are both set to have a total of 100ms of delay, so PC1 would see a 200ms round-trip delay when sending or receiving traffic to PC2.

A. The total latency of WanLinks VRWL-1.1.0 and VRWL-1.1.1 is 100ms.

LANforge Manager Version(5.1.4)

Control Reporting Tear-Off Help

Stop All Restart Manager Refresh HELP

File-IO Layer-4 Generic Test Mgr Resource Mgr Serial Spans PPP-Links Port Mgr Messages

Status Layer-3 L3 Endps VoIP/RTP VoIP/RTP Endps Armageddon WanLinks Collision-Domains

Rpt Timer (ms): 3000 Go Test Manager all

Select All Start Switch Stop Clear

Display Create Modify Batch Modify Delete

WanLinks for Selected Test Manager

Name	EID	K-M	State	Endpoints (A <-> B)	Pkt Tx A->B	Pkt Tx A<-B	Rate A->B	Rate A<-B	Rpt Time
VRWL-1.1.0	6.2	✓	Run	VRWL-1.1.0-A <=>...	853,158	853,157	44,736,000	44,736,000	5,0
VRWL-1.1.1	6.3	✓	Run	VRWL-1.1.1-A <=>...	853,653	853,155	44,736,000	44,736,000	5,0
VRWL-1.1.10	6.7	✓	Run	VRWL-1.1.10-A <=>...	8	0	44,736,000	44,736,000	5,0
VRWL-1.1.11	6.6	✓	Run	VRWL-1.1.11-A <=>...	8	0	44,736,000	44,736,000	5,0
VRWL-1.1.12	6.19	✓	Run	VRWL-1.1.12-A <=>...	8	0	44,736,000	44,736,000	5,0
VRWL-1.1.13	6.18	✓	Run	VRWL-1.1.13-A <=>...	8	0	44,736,000	44,736,000	5,0
VRWL-1.1.14	6.17	✓	Run	VRWL-1.1.14-A <=>...	8	0	44,736,000	44,736,000	5,0
VRWL-1.1.15	6.16	✓	Run	VRWL-1.1.15-A <=>...	8	0	44,736,000	44,736,000	5,0
VRWL-1.1.16	6.15	✓	Run	VRWL-1.1.16-A <=>...	8	0	44,736,000	44,736,000	5,0

All WanLink Endpoints

QO Pkts	QDisc	Corrupt-0	Corrupt-1	Corrupt-2	Corrupt-3	Corrupt-4	Corrupt-5	Delay	SerDelay	MaxJitter	Reorder	DropFreq
0 FIFO		0	0	0	0	0	0	50	0.271	0	0	0
0 FIFO		0	0	0	0	0	0	50	0.271	0	0	0
0 FIFO		0	0	0	0	0	0	50	0.271	0	0	0
0 FIFO		0	0	0	0	0	0	50	0.271	0	0	0
0 FIFO		0	0	0	0	0	0	0	0.271	0	0	0
0 FIFO		0	0	0	0	0	0	0	0.271	0	0	0
0 FIFO		0	0	0	0	0	0	0	0.271	0	0	0
0 FIFO		0	0	0	0	0	0	0	0.271	0	0	0
0 FIFO		0	0	0	0	0	0	0	0.271	0	0	0
0 FIFO		0	0	0	0	0	0	0	0.271	0	0	0
0 FIFO		0	0	0	0	0	0	0	0.271	0	0	0
0 FIFO		0	0	0	0	0	0	0	0.271	0	0	0

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- B. Each end of the connection experiences 100ms of delay which gives a total round-trip delay of 200ms.

LANforge Manager Version(5.1.4)

Control Reporting Tear-Off Help

Stop All Restart Manager Refresh HELP

File-IO Layer-4 Generic Test Mgr Resource Mgr Serial Spans PPP-Links Port Mgr Messages

Status Layer-3 L3 Endps VoIP/RTP VoIP/RTP Endps Armageddon WanLinks Collision-Domains

MIN Pkt Size 1k (1,024 B) Go MAX Pkt Size 1k (1,024 B) Go

MIN Tx Rate <Custom> Go MAX Tx Rate <Custom> Go

View 0 - 400 Go

Start Stop Quiesce Clear

Display Create Modify Batch Modify Delete

All Endpoints

Name	EID	Run	Mng	Script	Tx Rate	Tx Rate(1)	Rx Rate	Rx Rate(1)	Rx Drop %	Tx Pkts	Rx Pkts	Delay	Dropped
u001-A	1.1.10...	☒	☒	None	9,982,083	9,990,090	9,982,083	9,990,090	0	215,787	215,787	100	0
u001-B	1.1.11...	☒	☒	None	9,990,739	9,989,996	9,990,693	9,989,996	0	215,729	215,728	100	0
u002-A	1.1.12...	☐	☒	None	0	0	0	0	0	0	0	0	0
u002-B	1.1.13...	☐	☒	None	0	0	0	0	0	0	0	0	0
u003-A	1.1.14...	☐	☒	None	0	0	0	0	0	0	0	0	0
u003-B	1.1.15...	☐	☒	None	0	0	0	0	0	0	0	0	0
u004-A	1.1.16...	☐	☒	None	0	0	0	0	0	0	0	0	0
u004-B	1.1.17...	☐	☒	None	0	0	0	0	0	0	0	0	0
u005-A	1.1.18...	☐	☒	None	0	0	0	0	0	0	0	0	0
u005-B	1.1.19...	☐	☒	None	0	0	0	0	0	0	0	0	0
u006-A	1.1.20...	☐	☒	None	0	0	0	0	0	0	0	0	0
u006-B	1.1.21...	☐	☒	None	0	0	0	0	0	0	0	0	0
u007-A	1.1.22...	☐	☒	None	0	0	0	0	0	0	0	0	0
u007-B	1.1.23...	☐	☒	None	0	0	0	0	0	0	0	0	0
u008-A	1.1.24...	☐	☒	None	0	0	0	0	0	0	0	0	0
u008-B	1.1.25...	☐	☒	None	0	0	0	0	0	0	0	0	0
u009-A	1.1.26...	☐	☒	None	0	0	0	0	0	0	0	0	0
u009-B	1.1.27...	☐	☒	None	0	0	0	0	0	0	0	0	0
u010-A	1.1.28...	☐	☒	None	0	0	0	0	0	0	0	0	0
u010-B	1.1.29...	☐	☒	None	0	0	0	0	0	0	0	0	0
u011-A	1.1.30...	☐	☒	None	0	0	0	0	0	0	0	0	0

Logged in to: 192.168.100.228:4002 as: Admin