

Virtual Router with NAT

Goal: Setup a Virtual Router with one interface performing NAT on outgoing traffic.

In this test scenario, a pair of Virtual Routers are connected with a Redirected Interface connection with one side of the connection performing NAT on outgoing traffic. Two additional Redirected Interface connections are configured to pass traffic and demonstrate NAT.

1. Setup two Virtual Routers and three Netsmith Connections.

A. Right-click inside the Netsmith window and select New Router

• Netsmith configuration for Resource: If0350-10ac(1.1) Version: 5.3.7	00	
-Virtual Routers and Connections		
Q.		
Q.		
NewRouter		
NewConnection		
New Bridge		
		=
Mateth0		
eth1		
•		
ern2		
		-
WanLinks Show Legend Fire IPV4s Info Print Sync Apply Close		
WanLink Names Port Names Fire Names Zero-IPv4s Apply Progress: 100% Complete Cance	el App	oly
Peer WanLinks Parents Col. Domains IPv6s Netsmith Status: OK		
WanLink Config		

B. Repeat to create another virtual router

0	Netsmi	ith configuratio	n for Resou	urce: lf0350-10a	c(1.1) Ve	ersion: 5.3.	7	\odot \otimes \otimes
<u>ଟ୍</u> କ୍ 		RO(NA)	-Virtual Rout	ters and Connection	ns —			
Mgt-eth eth1 eth2	0	New Router New Connec New Bridge	tion					E
								▼
WanLinks	Show Legend	✓ Fire	IPv4s	Info	Print	Sync	Apply	Close
🛛 WanLink Names	Port Names	🖌 Fire Names	Zero-IPv4	s Apply Progress:		100% Compl	ete	Cancel Apply
✓ Peer WanLinks✓ WanLink Config	Parents	Col. Domains	IPv6s	Netsmith Status:	ок			

C. Right-click inside the Netsmith window and select New Connection



D. Select the 'Skip' option on Port 1-B, WanLink and Port 2-B, then click **OK**

	•	Create/Mo	dify Connection	×					
			Interface-Cost:	1					
	Port 1-A:	<auto create="" new="" port=""></auto>	RIP-Metric:	1					
	Port 1-B: Skip	<auto create="" new="" port=""></auto>	OSPF Area:	000.000.000.000					
	Wastisk I Ckis	-Auto Crooto New Washinks	VRRP IP:	1					
	wanunk: 💌 экір	< Auto create New Wantink> V	VRRP Priority:	100					
	Port 2-B: 🗹 Skip	<auto create="" new="" port=""></auto>	VRRP Interval:	1					
	Port 2-A: 🔲 Skip	<auto create="" new="" port=""></auto>	Next-Hop:						
	DHCP Lease Time:		Subnets (a.b.c.d/xx):						
Mat-eth	DHCP DNS:								
■ oth1	DHCP Range Min:								
eth2	DHCP Range Max:								
	DHCP Domain:		Next Line IDvC						
	DHCPv6 DNS:		IPv6 Subnets (asav0/w)						
	DHCPv6 Range Min:			· · · · · · · · · · · · · · · · · · ·					
	DHCPv6 Range Max:								
	DHCPd Config File:								
	NAT DHCP	DHCPv6 Custom DHCF	VRRP Cand-RP						
		OK	Cancel						

E. Repeat and create two more connections



F. Click the Apply button followed by the Sync button



- A. NOTE: Modifications in Netsmith are only sent to the LANforge-Server after Applying them
- B. Clicking Sync makes sure any changes are synchronized with the current database

For more information see LANforge-GUI User Guide: Virtual Interfaces

2. Setup the Ports.

A. Right-click the rdd ports and select Modify Port



- A. Assign each pair of rdd ports a unique subnet and IP address
- B. Select the 'IPv4s' checkbox to view the IP addresses of the rdd ports



C. Configure rddVR3 and rddVR5 with a Gateway IP that corresponds to their peer rdd interface

		Current: LIN Driver Info: Por	Port Status Informa K-UP TSO GSO t Type: Redirect-Device Pe	er: rddvR1 rddvR1		
Standard Configura	ation Extended	Config	Port Configura	bles		
Enable		General In	Port Rates	Advert Rates		
Set MAC	Down	Aux-Mgt	DHCP Hostname:	None	0 10bt-HD 0 10bt-FD 0 100bt-HD	10bt-HD
Set MTU	DHCP-IPv6	DHCP Release	DHCP Vendor ID:	None 🗸	0 100bt-FD	100bt-HD
Set Offload	DHCP-IPv4	Secondary-IPs	DHCP Client ID:	None	0 2.5G-FD 5G-FD	100bt-FD
Set Rx-All/FCS	DNS Servers:	BLANK	Peer IP:	NA	0 10G-FD 40G-FD	2.5G-FD
Set Bridge Info	IP Address:	20.20.20.20	Global IPv6:	AUTO	 Autonegotiate 	5G-FD
	IP Mask:	255.255.255.0	Link IPv6:	AUTO	Renegotiate	10G-FD
Services	Gateway IP:	20.20.20.1	IPv6 GW:	AUTO	Restart Xovr	40G-FD
НТТР	Alias:		MTU:	1500	PRÓMISC	Flow-Control
FTP	MAC Addr:	5e:67:8e:a8:ff:88	TX Q Len	1000	RX-ALL	Offload
DNS	Br Cost:	Ignore 🗸	Priority:	Ignore 💌	RX-FCS	TSO Enabled
IPSEC-Client	Rpt Timer:	medium (8 s) 🔻	WiFi Bridge:	NONE -	Bypass Rower-LIP	GSO Enabled
IPsec-Upstream	IPSec GW:	0.0.0.0	IPSec Password:		Bypass Power-DOWN	LRÓ Enabled
	IPSec Local ID.:		IPSec Remote ID.:		Bypass Disconnect	- GRO ENABLED

A. NOTE: In this example, rddVR3 has a Gateway IP of 20.20.20.1 and rddVR5 has a Gateway IP of 30.30.30.1

For more information see LANforge-GUI User Guide: Ports (Interfaces)

- 3. Move the Redirected Interfaces into their desired positions.
 - A. Drag rddVR0 into Router R0(2) and rddVR1 into Router R1(1)



B. Drag rddVR2 into Router R0(2) and rddVR4 into Router R1(1)



C. Click Netsmith Apply to commit the changes



- 4. Create a TCP connection and sniff traffic without NAT.
 - A. Go to the Layer-3 tab and click Create

C LANforge Manager Version(5.4.3)	\odot \sim \propto
Control Reporting Windows Info Tests	
Chamber View Stop All Restart Manager <u>R</u> efresh	HELP
Status Port Mgr Layer-3 L3 Endps Layer 4-7 WanLinks Resource Mgr Alerts Messages Warnings Wifi-Messages	+
Rpt Timer: fast (1 s) 🔻 Go Test Manager all 💌 Select All Start + Stop - Quiesce Clea	
View 0 - 500 Go Display Create Modify Delete	
Cross Connects for Selected Test Manager	
Name Type State Pkt Rx A Pkt Rx B Bps Rx A Bps Rx B Rx Drop % A Rx Drop % B Drop Pkts A	Drop Pkts
Logged in to: localhost:4002 as: Admin 2 statio	► s: 21 01 0Ø

			tcp-cx -	Create/I	Modify Cross Connect 📀										
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1	Cross-Connect				9	Cross-Con	nect								
CX Name:	tcp-cx				Report Timer:	fast	(1 s)			-					
CX Type:	LANforge / TCP			-		Endpoint A	(Server)	0							
	Endpoint A (Client)	Endpoint B (Server)		Pld Pattern	increasing	(0)	-	increasing ((0)	-					
Resource:	1 (ct521b-11b4)	-	1 (ct521b-11b4)	-	Min IP Port	AUTO		-	AUTO		-				
Port:	14 (rddVR3)	-	16 (rddVR5)	-	Max IP Port	Same		-	Same		-				
Min Tx Rate:	Old Modem (9.6 Kbps)	-	Old Modem (9.6 Kbps)	-	Min Duration:	Forever		-	Forever		-				
Max Tx Rate:	Same	-	Same	-	Man Duration	Same		-	Same						
Min PDU Size:	Small (300 B)	-	Small (300 B)	-	Max Duration.	0 (0 m	ac.)	-	0 (0 m	(c)					
Max PDU Size:	Same	-	Same	-	Min Reconn:	Como	15)	-	e (em	5)					
IP ToS:	Best Effort (0)	-	Best Effort (0)	-	Max Reconn:	Same		-	Same		-				
Pkts To Send	Infinite	-	Infinite	Infinite Multi-Conn))	•	Normal (0)						
rites for serio.						Auto-He	lper	Auto-Hel	Helper						
							Script			Script					
						I	hresholds		1 <u>I</u>	hresholds					
2	Cross-Connect					Endpoint A	(Client)		Endpoint B	(Server)					
3 Test Manager	Cross-Connect default_tm				Snd Buff Size:	Endpoint A OS Defaul	(Client)	-	Endpoint B OS Defaul	(Server) t	•				
B Test Manager Quiesce:	Cross-Connect default_tm 3 (3 sec)			.	Snd Buff Size: Rcv Buff Size:	Endpoint A OS Defaul OS Defaul	(Client) Lt	•	Endpoint B OS Defaul OS Defaul	(Server) t	•				
3 Test Manager Quiesce:	Cross-Connect default_tm 3 (3 sec) Endroint & (Client)		Endopint B. (Server)	•	Snd Buff Size: Rcv Buff Size: Send Bad FCS:	Endpoint A OS Defaul OS Defaul Zero (0%)	(Client) Lt	•	Endpoint B OS Defaul OS Defaul Zero (0%)	(Server) t					
B Test Manager Quiesce: IP Addr:	Cross-Connect default_tm 3 (3 sec) Endpoint A (Client) AUTO		Endpoint B (Server) AUTO		Snd Buff Size: Rcv Buff Size: Send Bad FCS: Src MAC:	Endpoint A OS Defaul OS Defaul Zero (0%) D0:00:00:00	(Client) Lt Lt D:00:00	•	Endpoint B OS Defaul: OS Defaul: zero (0%) D0:00:00:00	(Server) t t :00:00	•				
Test Manager Quiesce: IP Addr:	Cross-Connect default_tm 3 (3 sec) Endpoint A (Client) AUTO Replay File		Endpoint B (Server) AUTO		Snd Buff Size: Rcv Buff Size: Send Bad FCS: Src MAC:	Endpoint A OS Defaul OS Defaul Zero (%) 00:00:00:00	(Client) Lt Lt L	-	Endpoint B OS Defaul OS Defaul zero (0%) O0:00:00:00	(Server) t t 0:00:00	 ▼ ▼ ▼ ▼ 				
Test Manager Quiesce: IP Addr:	Cross-Connect default_tm 3 (3 sec) Endpoint A (Client) AUTO Replay File Loop		Endpoint B (Server) AUTO Replay File Loop	•	Snd Buff Size: Rcv Buff Size: Send Bad FCS: Src MAC: Proxy Addr:	Endpoint A OS Defaul OS Defaul Zero (%) O0:00:00:00 Use-Pro: 0.0.00	(Client) Lt Lt D:00:00 Xy	 	Endpoint B OS Defaul OS Defaul 2ero (0%) 00:00:000 Use-Prop 0.0.0.0	(Server) t t ::00:00	•				
3 Test Manager Quiesce: IP Addr:	Cross-Connect default_tm 3 (3 sec) Endpoint A (Client) AUTO Replay File Loop Dest Mac		Endpoint B (Server) AUTO Replay File Loop Dest Mac	▼	Snd Buff Size: Rcv Buff Size: Send Bad FCS: Src MAC: Proxy Addr: Proxy Port:	Endpoint A OS Defaul OS Defaul Zero (%) 00:00:00:00 Use-Pro: 0.0.0 0	(Client) Lt Lt D:00:00 Xy	 <td>Endpoint B OS Defaul: 2ero (0%) 00:00:00:00 Use-Prov 0.0.0 0</td><td>(Server) t t ::00:00</td><td></td>	Endpoint B OS Defaul: 2ero (0%) 00:00:00:00 Use-Prov 0.0.0 0	(Server) t t ::00:00					
B Test Manager Quiesce: IP Addr: Filename:	Cross-Connect default_tm 3 (3 sec) Endpoint A (Client) AUTO Replay File Loop Dest Mac		Endpoint B (Server) AUTO Replay File Loop Dest Mac	•	Snd Buff Size: Rcv Buff Size: Send Bad FCS: Src MAC: Proxy Addr: Proxy Port: Socket Priority:	Endpoint A OS Defaul OS Defaul Zero (0%) 00:00:00:00 Use-Pro: 0.0.0.0 0 0	(Client) Lt		Endpoint B OS Defaul 2ero (0%) 00:00:00:00 Use-Prop 0.0.0 0 0	(Server) t t ::00:00 Qy					

B. Create a Layer-3 TCP connection between endpoints rddVR3 and rddVR5 then click \mathbf{OK}

C. In Netsmith, right-click the TCP connection and click Start



D. Right-click port rddVR1 and click Sniff Port



- A. NOTE: You must have Wireshark properly installed as described here: Installing Wireshark
- E. After Wireshark begins, notice that the source and destination IP addresses are from 20.20.20.20 (rddVR3) and 30.30.30.30 (rddVR5) as expected without NAT enabled

• Capturing from rddVR1 [Wireshark 2.1.1	(Git Rev Unknown from unknown)] (on lf0350-1 📀 🔿 🗙
File Edit View Go Capture Analyze Statisti	ics Telephony Tools Internals Help
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Filter:	▼ Expression Clear Apply
No. Time Source 99 8.00100995 20.20.20.20 100 8.249724778 20.20.20.20 101 8.249845941 30.30.30.30 102 8.249902666 20.20.20.20 103 8.499655313 20.20.20.20 Frame 1: 366 bytes on wire (2928 bits), Ethernet II, Src: 12:e2:26:fd:47:d7 (12) Internet Protocol Version 4, Src: 20.20 Transmission Control Protocol, Src Port	Destination Protocol Length Info 30.30.30.30 TCP 66 33005-3300 30.30.30.30 LANForge 366 Seq: 121 20.20.20.20 LANForge 366 Seq: 121 20.20.20.20 LANForge 366 Seq: 121 30.30.30.30 TCP 66 33005-3300 30.30.30.30.30 TCP 66 33005-3300 30.30.30.30.30 LANForge 366 Seq: 121 30.30.30.30.30 TCP 66 33005-3300 * 30.30.30.30.30 LANForge 366 Seq: 121 30.20.20,0.30 LANForge 366 Seq: 122 , 366 bytes captured (2928 bits) on interface 0 2:e2:26:fd:47:d7), Dst: da:bc:e5:ef:bd:e9 (da:bc:e5:ef 2:20.20, Dst: 30.30.30 30 1 3006 Seq: 1, Ack: 1, Len: 300
> LANforge Traffic Generator	\$
0000 da bc e5 ef bd e9 12 e2 26 fd 47 0010 01 60 b1 06 40 00 3f 06 25 2e 14 0020 1e 1e 80 ed 80 ee c0 bd a5 e9 92 0030 00 79 65 b6 00 00 01 01 08 0a 0a 0040 e4 8e 00 00 00 00 1a 2b 3c 4d 00 0050 00 00 00 00 58 59 9f 3e a0 1e 0000 ca c	d7 08 00 45 00

5. Enable NAT and sniff traffic on the same port.

NOTE It is important that Endpoint-A of the connection is **behind** the NAT port because it is the side that initiates the connection. Reversing the endpoint ports will cause the connection to fail.

A. Right-click on the TCP connection and select **Stop**



B. Right-click rddVR0 and select Modify



C. Select the 'NAT' checkbox and click **OK**, then click the Netsmith **Apply** button

	•	Create/Mo	dify Connection	$\overline{\mathbf{x}}$						
	Port 1 A	2 (rdd/20)	Interface-Cost: RIP-Metric:	1						
		S (records)	OSPF Area:	0.0.0.0						
	Port 1-B: V Skip	<auto create="" new="" port=""></auto>	VRRP IP:	0.0.0/24						
	WanLink: 🗹 Skip	<auto create="" new="" wanlink=""> 💌</auto>	VRRP ID:	1						
	Port 2-B: 🗹 Skip	<auto create="" new="" port=""></auto>	VRRP Interval:	1						
	Port 2-A: 🔲 Skip	4 (rddVR1)	Next-Hop:	0.0.0.0						
	DHCP Lease Time:		Subnets (a.b.c.d/xx):							
Mgt-eth 192.16	DHCP DNS:									
eth1	DHCP Range Min:]							
eth2	DHCP Range Max:									
-	DHCP Domain:		Next-Hop-IPv6:							
	DHCPv6 DNS:		IPv6 Subnets (aaa::0/xx):							
	DHCPv6 Range Min:									
	DHCPV6 Range Max:									
	DHCPd Coning File:									
	NAT DHCP	DHCPv6 Custom DHC	P VRRP Cand-RF							
		٥ <u>۲</u>	Cancel							
WanLinks	Show Legend	Fire IPv4s	Info Print	Sync Apply Clos	se					

D. Right-click on the TCP connection and select Start



E. Right-click port rddVR1 and select Sniff Port



F. After Wireshark begins, notice that any source or destination IP address from or to 20.20.20.20 (rddVR3) has been NAT'd to be 10.10.10.10 because rddVR0 is now performing NAT on all outgoing traffic

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For more information see LANforge-GUI User Guide

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