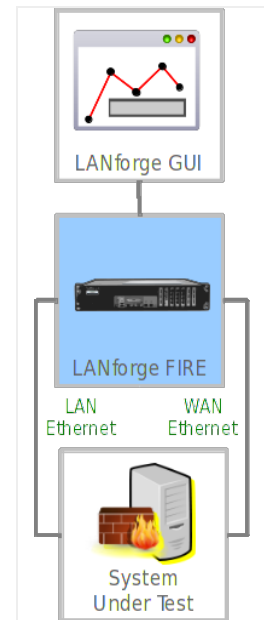
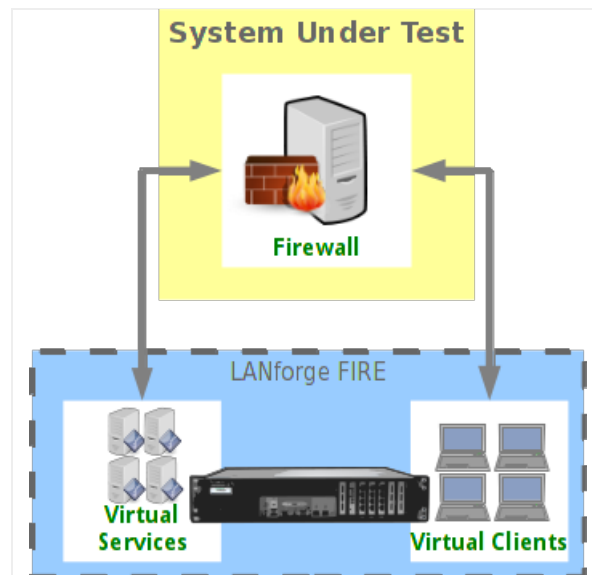


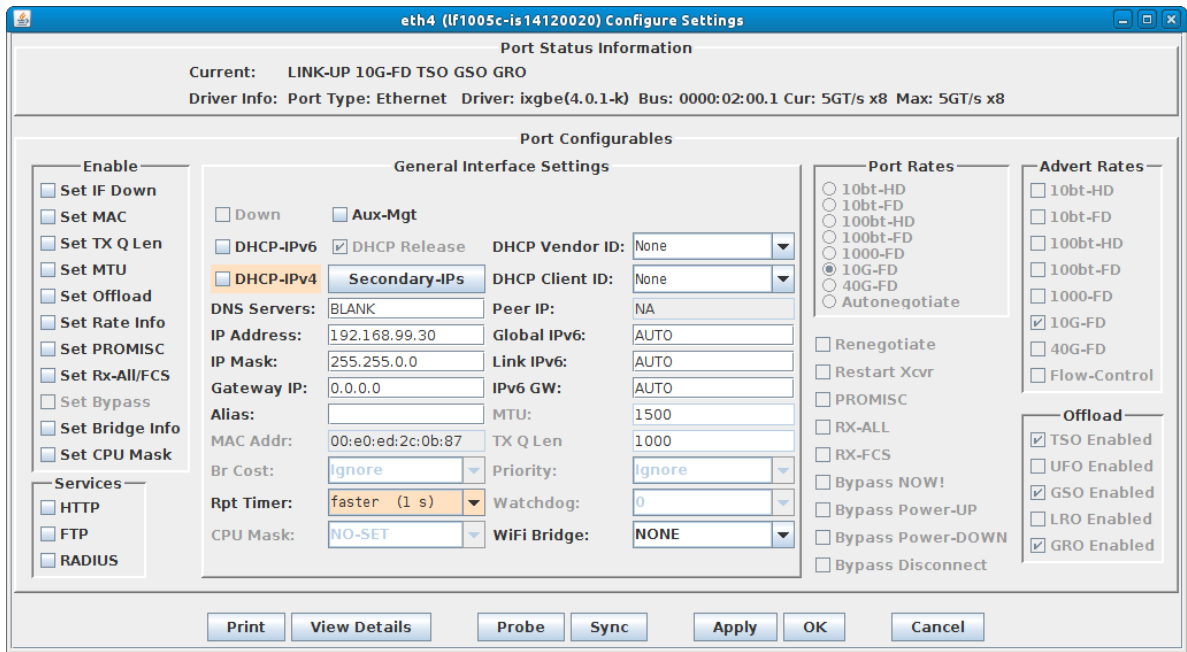
## 5000 concurrent TCP streams and IP addresses

**Goal:** Quickly set up 5000 TCP connections from 5000 different IP addresses. Requires LANforge 5.2.10 or later. Use the new feature in 5.2.10 that lets 'multi-conn' Layer-3 TCP connections use a range of secondary IPs to quickly create 5000 stateful TCP/IP connections on different IP addresses. This example uses two 10G ports on a system similar to the LANforge CT503-MIX systems but the procedure should work on all properly licensed higher-end systems. A standard LANforge license only supports 1000 concurrent connections, contact your sales representative for additional licenses. This cookbook assumes basic familiarity with LANforge.



1. Create 5000 secondary IP addresses on an ethernet port. The IP address range should be on the same subnet as the primary IP address on this interface.

- A. Go to the Port Manager tab, select the client-side ethernet port and click Modify. Ensure subnet mask is 255.255.0.0 or similar so we have plenty of room to add the 5000 secondary IPs on the subnet. Apply if changes were made.

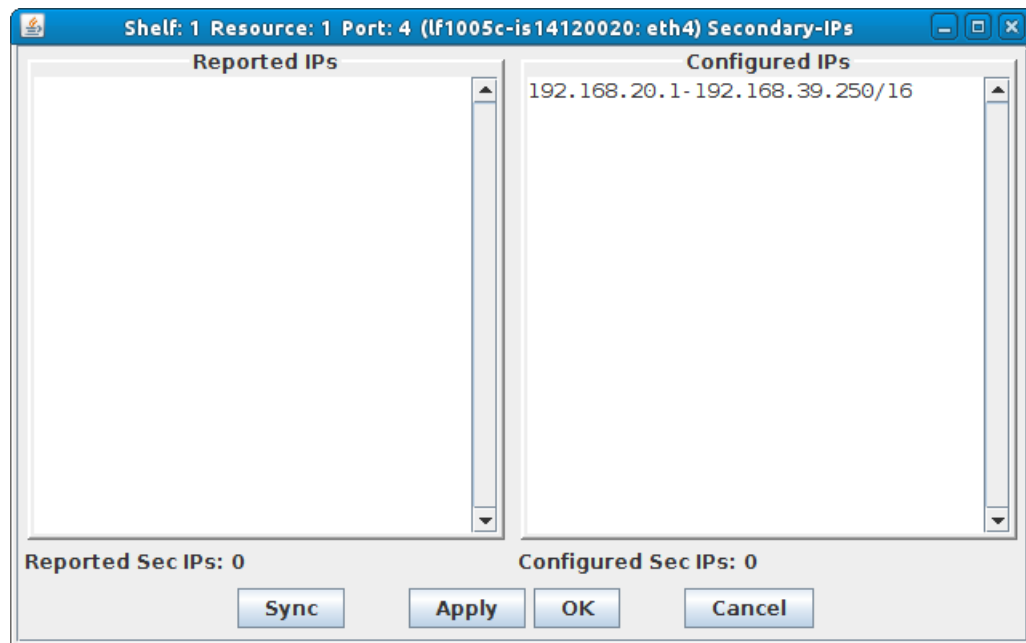


The image shows the 'eth4 (lf1005c-is14120020) Configure Settings' window. The title bar indicates the port name. The window is divided into several sections:

- Port Status Information:** Shows 'Current: LINK-UP 10G-FD TSO GSO GRO' and 'Driver Info: Port Type: Ethernet Driver: ixgbe(4.0.1-k) Bus: 0000:02:00.1 Cur: 5GT/s x8 Max: 5GT/s x8'.
- Port Configurables:**
  - General Interface Settings:** Includes checkboxes for 'Down', 'Aux-Mgt', 'DHCP-IPv6', and 'DHCP-IPv4'. The 'DHCP-IPv4' section is expanded, showing fields for 'Secondary-IPs', 'DNS Servers', 'IP Address' (192.168.99.30), 'IP Mask' (255.255.0.0), 'Gateway IP' (0.0.0.0), 'Alias', 'MAC Addr' (00:e0:ed:2c:0b:87), 'Br Cost' (ignore), 'Rpt Timer' (faster (1 s)), 'CPU Mask' (NO-SET), 'DHCP Vendor ID' (None), 'DHCP Client ID' (None), 'Peer IP' (NA), 'Global IPv6' (AUTO), 'Link IPv6' (AUTO), 'IPv6 GW' (AUTO), 'MTU' (1500), 'TX Q Len' (1000), 'Priority' (ignore), 'Watchdog' (0), and 'WiFi Bridge' (NONE).
  - Port Rates:** Includes radio buttons for '10bt-HD', '10bt-FD', '100bt-HD', '100bt-FD', '1000-FD', '10G-FD' (selected), '40G-FD', and 'Autonegotiate'. There are also checkboxes for 'Renegotiate', 'Restart Xcvr', 'PROMISC', 'RX-ALL', 'RX-FCS', 'Bypass NOW!', 'Bypass Power-UP', 'Bypass Power-DOWN', and 'Bypass Disconnect'.
  - Advert Rates:** Includes checkboxes for '10bt-HD', '10bt-FD', '100bt-HD', '100bt-FD', '1000-FD', '10G-FD' (checked), '40G-FD', and 'Flow-Control'.
  - Offload:** Includes checkboxes for 'TSO Enabled' (checked), 'UFO Enabled', 'GSO Enabled' (checked), 'LRO Enabled', and 'GRO Enabled' (checked).
- Services:** Includes checkboxes for 'HTTP', 'FTP', and 'RADIUS'.

At the bottom, there are buttons for 'Print', 'View Details', 'Probe', 'Sync', 'Apply', 'OK', and 'Cancel'.

- B. Click the **Secondary-IPs** button to bring up the Secondary IP address management window. Enter the IP address range similar to the image below and click **Apply**:



The image shows the 'Secondary-IPs' management window. The title bar indicates the port name and the window title is 'Secondary-IPs'. The window is divided into two main sections:

- Reported IPs:** A list box showing the currently reported secondary IP addresses. It is currently empty.
- Configured IPs:** A list box showing the configured secondary IP address range. It contains the text '192.168.20.1 - 192.168.39.250/16'.

At the bottom, there are buttons for 'Sync', 'Apply', 'OK', and 'Cancel'. Below the list boxes, it shows 'Reported Sec IPs: 0' and 'Configured Sec IPs: 0'.

C. Click 'Sync' after a few minutes to make sure all of the new IP addresses were properly created.

Shelf: 1 Resource: 1 Port: 4 (lf1005c-is14120020: eth4) Secondary-IPs

**Reported IPs**  
192.168.20.1 - 192.168.39.137/16

**Configured IPs**  
192.168.20.1 - 192.168.39.137/16

Reported Sec IPs: 5001      Configured Sec IPs: 5001

Sync    Apply    OK    Cancel

D. Make sure a second ethernet port on the LANforge is properly configured for the server-side of the network. In this case, we are using a network-emulator in bridge mode as device-under-test, so all IP addresses are on the same subnet.

eth5 (lf1005c-is14120020) Configure Settings

**Port Status Information**  
Current: LINK-UP 10G-FD Flow-Control TSO GSO GRO  
Driver Info: Port Type: Ethernet Driver: ixgbe(4.0.1-k) Bus: 0000:02:00.0 Cur: 5GT/s x8 Max: 5GT/s x8

**Port Configurables**

**General Interface Settings**

☐ Down    ☐ Aux-Mgt

☐ DHCP-IPv6    ☒ DHCP Release    DHCP Vendor ID: None

☒ DHCP-IPv4    **Secondary-IPs**    DHCP Client ID: None

DNS Servers: BLANK    Peer IP: NA

IP Address: 192.168.99.31    Global IPv6: AUTO

IP Mask: 255.255.0.0    Link IPv6: AUTO

Gateway IP: 0.0.0.0    IPv6 GW: AUTO

Alias:    MTU: 1500

MAC Addr: 00:e0:ed:2c:0b:86    TX Q Len: 1000

Br Cost: Ignore    Priority: Ignore

Rpt Timer: faster (1 s)    Watchdog: 0

CPU Mask: NO-SET    WiFi Bridge: NONE

**Port Rates**

☐ 10bt-HD  
☐ 10bt-FD  
☐ 100bt-HD  
☐ 100bt-FD  
☐ 1000-FD  
☒ 10G-FD  
☐ 40G-FD  
☐ Autonegotiate

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

**Advert Rates**

☐ 10bt-HD  
☐ 10bt-FD  
☐ 100bt-HD  
☐ 100bt-FD  
☐ 1000-FD  
☒ 10G-FD  
☐ 40G-FD  
☐ Flow-Control

**Offload**

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

Print    View Details    Probe    Sync    Apply    OK    Cancel

For more information see [LANforge User's Guide: Ports \(Interfaces\)](#)

2. Create a Layer-3 TCP connection to utilize these 5000 secondary IPs and start the traffic.

- A. Go to the **Layer-3** tab and click Create. Configure the **CX Name**, **CX Type**, **Ports**, and **PDU Size** in section 1. The port in the green section should be the one with the secondary IP Addresses. In section 2, configure **Min IP Port** in the green section, and **Multi-Conn** in both. In section 3, select 'Linear' for the **IP Addr** selection box in the green section. In section 5, select the **Concurrent IP Adrrs** checkbox in the green section.

tcp-mcon-sec-ip - Create/Modify Cross Connect

Display Sync Batch-Create Apply OK Cancel

**1** Cross-Connect

CX Name: tcp-mcon-sec-ip

CX Type: LANforge / TCP

Endpoint A (Client)	Endpoint B (Server)
Resource: 1 (lf1005c-is14120020)	1 (lf1005c-is14120020)
Port: 4 (eth4)	5 (eth5)
Min Tx Rate: New Modem (56 Kbps)	New Modem (56 Kbps)
Max Tx Rate: Same	Same
Min PDU Size: 9000 (9,000 B)	9000 (9,000 B)
Max PDU Size: Same	Same
IP ToS: Best Effort (0)	Best Effort (0)
Pkts To Send: Infinite	Infinite

**2** Cross-Connect

Report Timer: fast (1 s)

Endpoint A (Client)	Endpoint B (Server)
Pld Pattern: increasing	increasing
Min IP Port: Any (0)	AUTO
Max IP Port: Same	Same
Min Duration: Forever	Forever
Max Duration: Same	Same
Min Reconn: 0 (0 ms)	0 (0 ms)
Max Reconn: Same	Same
Multi-Conn: 5000 (5,000)	One (1)

Script Thresholds Script Thresholds

**3** Cross-Connect

Test Manager: default\_tm

Quiesce: 3 (3 sec)

Endpoint A (Client)	Endpoint B (Server)
IP Addr: Linear	AUTO
<input type="checkbox"/> Replay File	<input type="checkbox"/> Replay File
<input type="checkbox"/> Loop	<input type="checkbox"/> Loop
<input type="checkbox"/> Dest Mac	<input type="checkbox"/> Dest Mac
Filename:	
Dest MAC: 00:e0:ed:2c:0b:86	00:e0:ed:2c:0b:87

**4** Cross-Connect

Endpoint A (Client)	Endpoint B (Server)
Snd Buff Size: OS Default	OS Default
Rcv Buff Size: OS Default	OS Default
Send Bad FCS: zero (0%)	zero (0%)
Src MAC: 00:e0:ed:2c:0b:87	00:e0:ed:2c:0b:86
<input type="checkbox"/> Use-Proxy	<input type="checkbox"/> Use-Proxy
Proxy Addr: 192.168.99.31	0.0.0.0
Proxy Port: 0	0
Socket Priority: 0	0

Payload Payload

**5** Cross-Connect

Endpoint A (Client)	Endpoint B (Server)
Conn Timeout: 10s (10 s)	10s (10 s)
TCP MSS: OS Default	OS Default

Endpoint A (Client)	Endpoint B (Server)
<input type="checkbox"/> Do Checksum	<input type="checkbox"/> Do Checksum
<input type="checkbox"/> UnManaged	<input type="checkbox"/> UnManaged
<input type="checkbox"/> Duration Quiesce	<input type="checkbox"/> Duration Quiesce
<input type="checkbox"/> Quiesce-After-Range	<input type="checkbox"/> Quiesce-After-Range
<input type="checkbox"/> TCP_NODELAY	<input type="checkbox"/> TCP_NODELAY
<input checked="" type="checkbox"/> Concurrent IP Adrrs	<input type="checkbox"/> Concurrent IP Adrrs
<input type="checkbox"/> Clear-Port-On-Start	<input type="checkbox"/> Clear-Port-On-Start
<input type="checkbox"/> Linear-IP-Ports	<input type="checkbox"/> Linear-IP-Ports

Endp Name: tcp-mcon-sec-ip-A tcp-mcon-sec-ip-B

- B. Start the connection, and then go to the **Port Mgr** tab, select one of the ethernet ports, and sniff the traffic (or use third-party tools) to verify the IP address range is as expected:

The screenshot displays the Wireshark 1.10.14 interface. The top menu bar includes File, Edit, View, Go, Capture, Analyze, Statistics, Telephony, Tools, Internals, and Help. The toolbar contains various icons for file operations, capture control, and analysis. The filter bar is empty. The packet list pane shows a table of captured packets:

No.	Time	Source	Destination	Protocol	Length	Info
261527	25.53439700	192.168.99.31	192.168.33.222	LANforge	9066	Seq: 80
261528	25.53440000	192.168.35.145	192.168.99.31	TCP	66	42891 > 33001 [ACK] Seq=180001 Ack=180001 Win=175 Len=0 TSval=347053:
261529	25.53440600	192.168.33.222	192.168.99.31	TCP	66	14769 > 33001 [ACK] Seq=180001 Ack=180001 Win=175 Len=0 TSval=347053:
261530	25.53441100	192.168.99.31	192.168.35.153	LANforge	9066	Seq: 80
261531	25.54076600	192.168.99.31	192.168.24.150	LANforge	9066	Seq: 81
261532	25.54078000	192.168.24.150	192.168.99.31	TCP	66	49449 > 33001 [ACK] Seq=180001 Ack=180001 Win=175 Len=0 TSval=347053:
261533	25.54078300	192.168.99.31	192.168.24.169	LANforge	9066	[TCP ACKed unseen segment] Seq: 81
261534	25.54078900	192.168.24.169	192.168.99.31	TCP	66	[TCP Previous segment not captured] 55075 > 33001 [ACK] Seq=180001 A
261535	25.54079000	192.168.99.31	192.168.24.154	LANforge	9066	[TCP ACKed unseen segment] Seq: 81
261536	25.54079100	192.168.99.31	192.168.24.175	LANforge	4410	Seq: 81
261537	25.54079300	192.168.99.31	192.168.24.173	LANforge	9066	Seq: 81
261538	25.54084100	192.168.99.31	192.168.24.172	LANforge	7306	[TCP ACKed unseen segment] Seq: 81
261539	25.54084400	192.168.24.172	192.168.99.31	TCP	66	[TCP Previous segment not captured] 56654 > 33001 [ACK] Seq=180001 A
261540	25.54085200	192.168.99.31	192.168.24.157	LANforge	9066	Seq: 81
261541	25.54085500	192.168.24.157	192.168.99.31	TCP	66	54088 > 33001 [ACK] Seq=180001 Ack=180001 Win=175 Len=0 TSval=347053:
261542	25.54085800	192.168.99.31	192.168.24.181	LANforge	9066	Seq: 81
261543	25.54086100	192.168.24.181	192.168.99.31	TCP	66	[TCP ACKed unseen segment] 30859 > 33001 [ACK] Seq=171001 Ack=180001

The packet details pane shows the structure of the first packet (Frame 1):

- Frame 1: 66 bytes on wire (528 bits), 66 bytes captured (528 bits) on interface 0
- Ethernet II, Src: Silicom\_2c:0b:87 (00:e0:ed:2c:0b:87), Dst: Silicom\_2c:0b:86 (00:e0:ed:2c:0b:86)
- Internet Protocol Version 4, Src: 192.168.38.55 (192.168.38.55), Dst: 192.168.99.31 (192.168.99.31)
- Transmission Control Protocol, Src Port: 24160 (24160), Dst Port: 33001 (33001), Seq: 1, Ack: 1, Len: 0

The packet bytes pane shows the raw data in hexadecimal and ASCII:

```
0000 00 e0 ed 2c 0b 86 00 e0 ed 2c 0b 87 08 00 45 00  ....E.
0010 00 34 75 1f 40 00 40 06 ba fd c0 a8 26 37 c0 a8  .4u.@.@. ....&7..
0020 63 1f 5e 60 80 e9 c0 23 8c 03 c8 29 72 02 80 10  c.^...# ...r...
0030 00 af 0a ce 00 00 01 01 08 0a 00 34 91 05 00 34  .....4...4
0040 91 04  ..
```

The status bar at the bottom shows: File: /var/tmp/wireshark\_pcapng\_et... Packets: 261810 · Displayed: 261810 (100.0%) · Dropped: 198802 (75.9%) Profile: Default