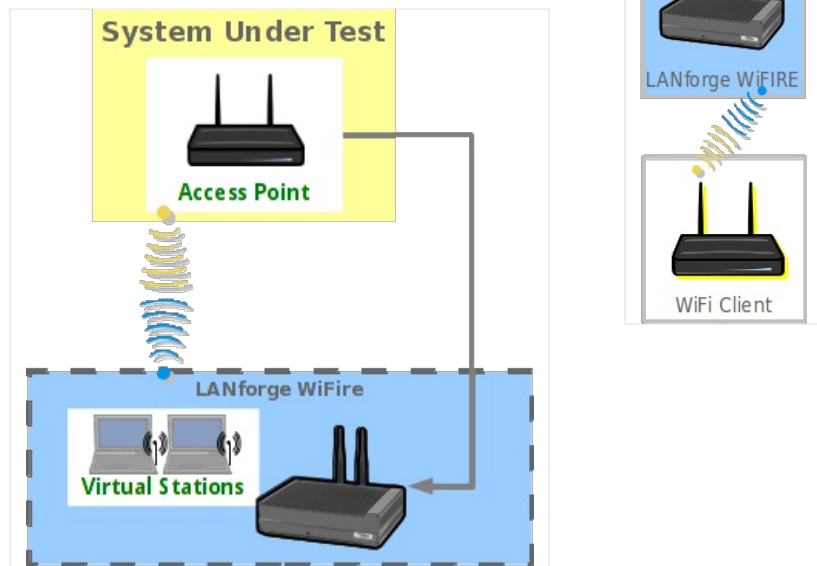


WiFi Capacity Test with Layer 4-7

Goal: Use the WiFi Capacity Test plugin to emulate layer 4-7 traffic from ten virtual stations across an access point and report the results.

Requires 5.2.13 or later. This cookbook will go through setting up a VAP (Virtual Access Point) as an HTTP server, and creating/configuring 10 virtual stations to communicate with the VAP. It will also go through the setup of the WiFi Capacity Test LANforge-GUI plugin to have the virtual stations emulate downloading a file using Layer 4-7 endpoints in LANforge.

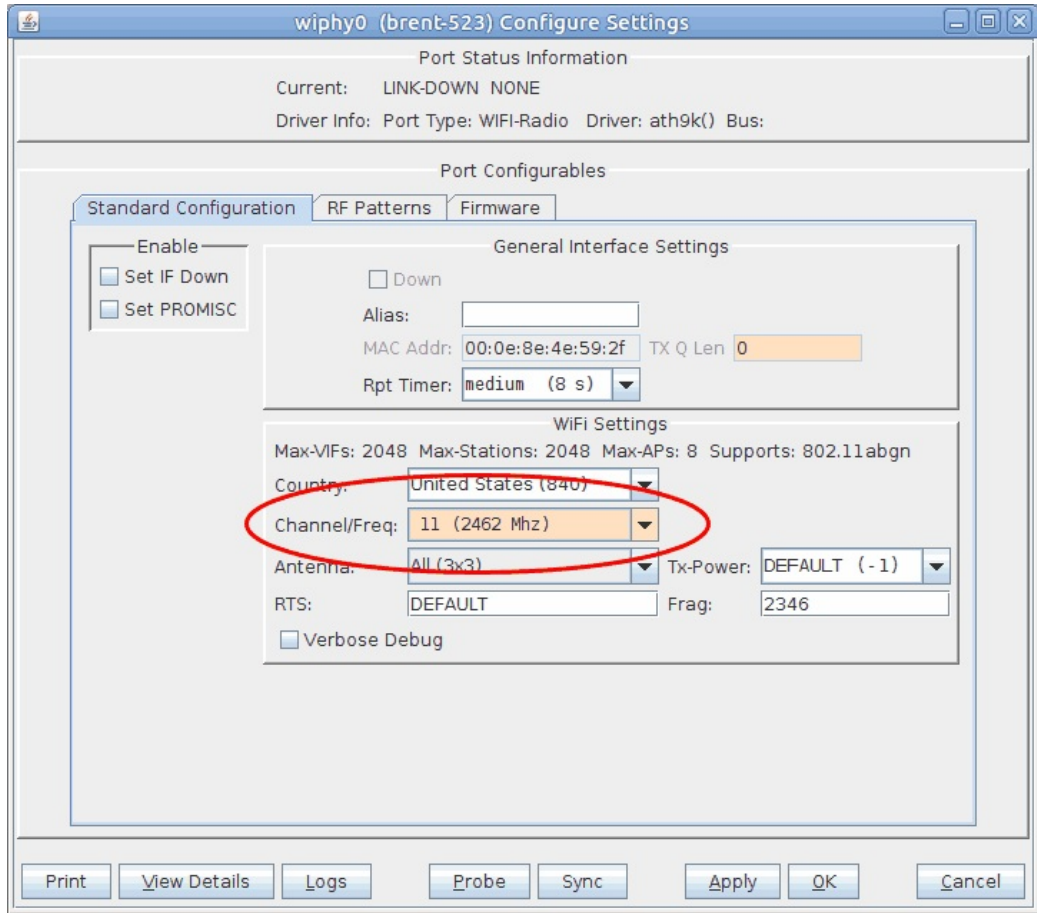
This example uses a LANforge CT523 system but the procedure should also work on a CT521, CT522, CT525 or similar system.



1. Create a VAP.

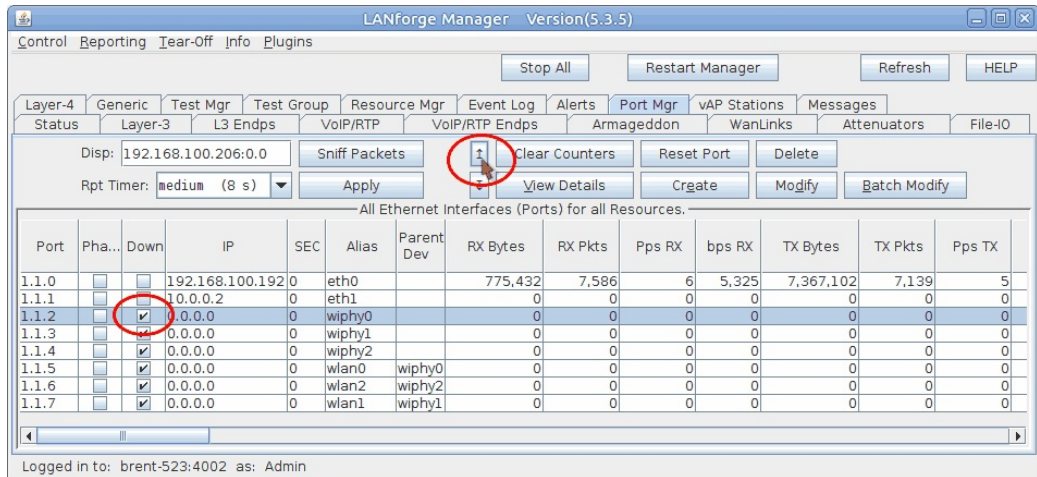
- A. Verify the wiphy device used for the VAP is on your preferred channel (this test will use channel 11).

- A. In the **Port Mgr** tab of the LANforge Manager, modify the wiphy device that'll be used for the VAP (wiphy0 in this test).



- I. Select your preferred channel here.

- B. Make sure the wiphy device is up.



- I. If the device is down like in the above screenshot, select it and click the **Admin UP** button (also indicated in the above screenshot).

B. In the **Port Mgr** tab, select a wiphy device (wiphy0 in this test) and click **Create**.

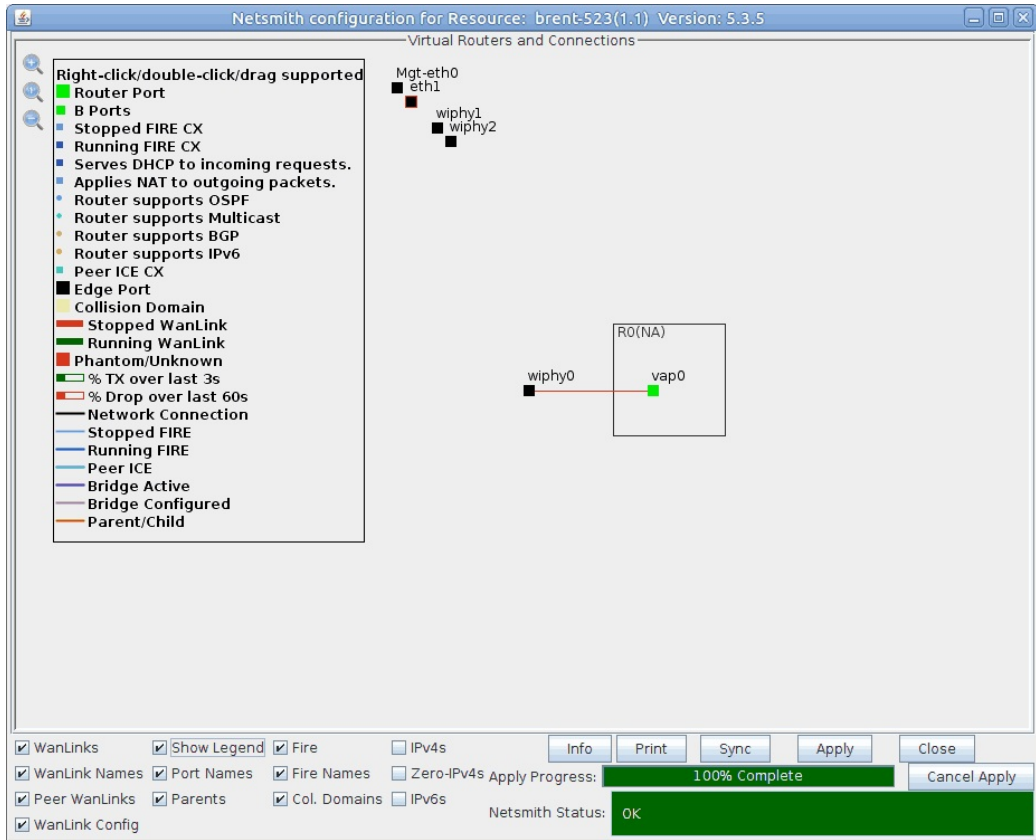
- A. Select the **WiFi VAP** radio button.
- B. Set **Quantity** to **1**.
- C. Set **STA ID** to **0**.
- D. Set **IP Address** to **10.0.0.1/24**.
- E. Set the **SSID** to **layer4test**.
- F. Click **Apply** and close the create port window.

C. Configure the VAP.

- A. Open **Netsmith** from the **Status** tab.

- B. In **Netsmith**, right click and select **New Router**.
- C. Click **OK**.

D. Drag vap0 into the virtual router.



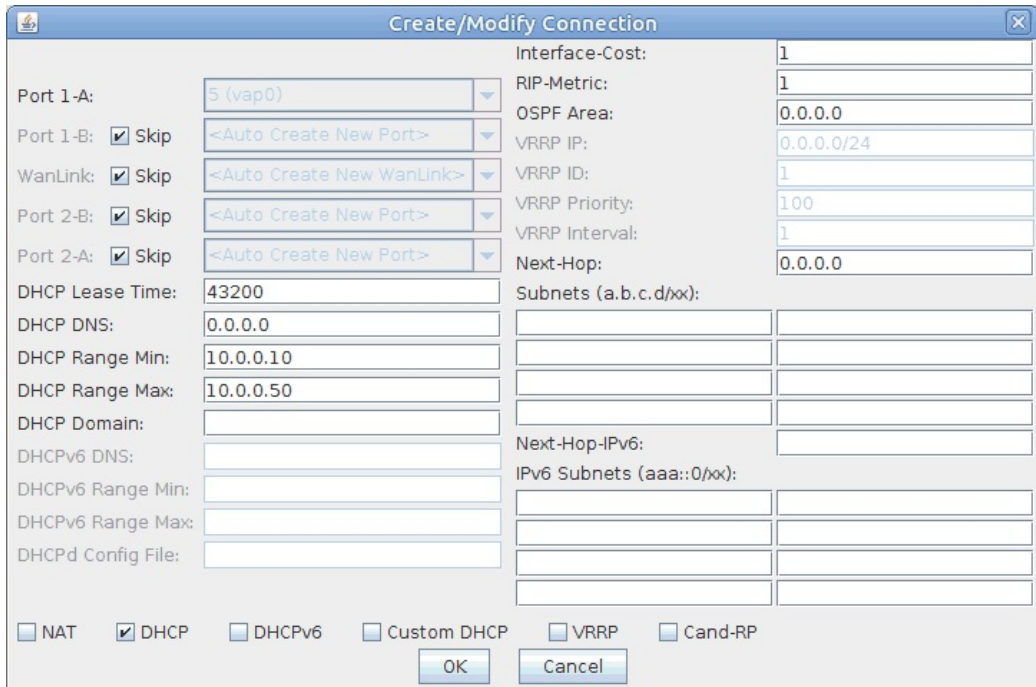
E. Right click vap0 and select **Modify**.

F. Check **DHCP**.

G. Change **DHCP Range Min** to **10.0.0.10**

H. Change **DHCP Range Max** to **10.0.0.50**

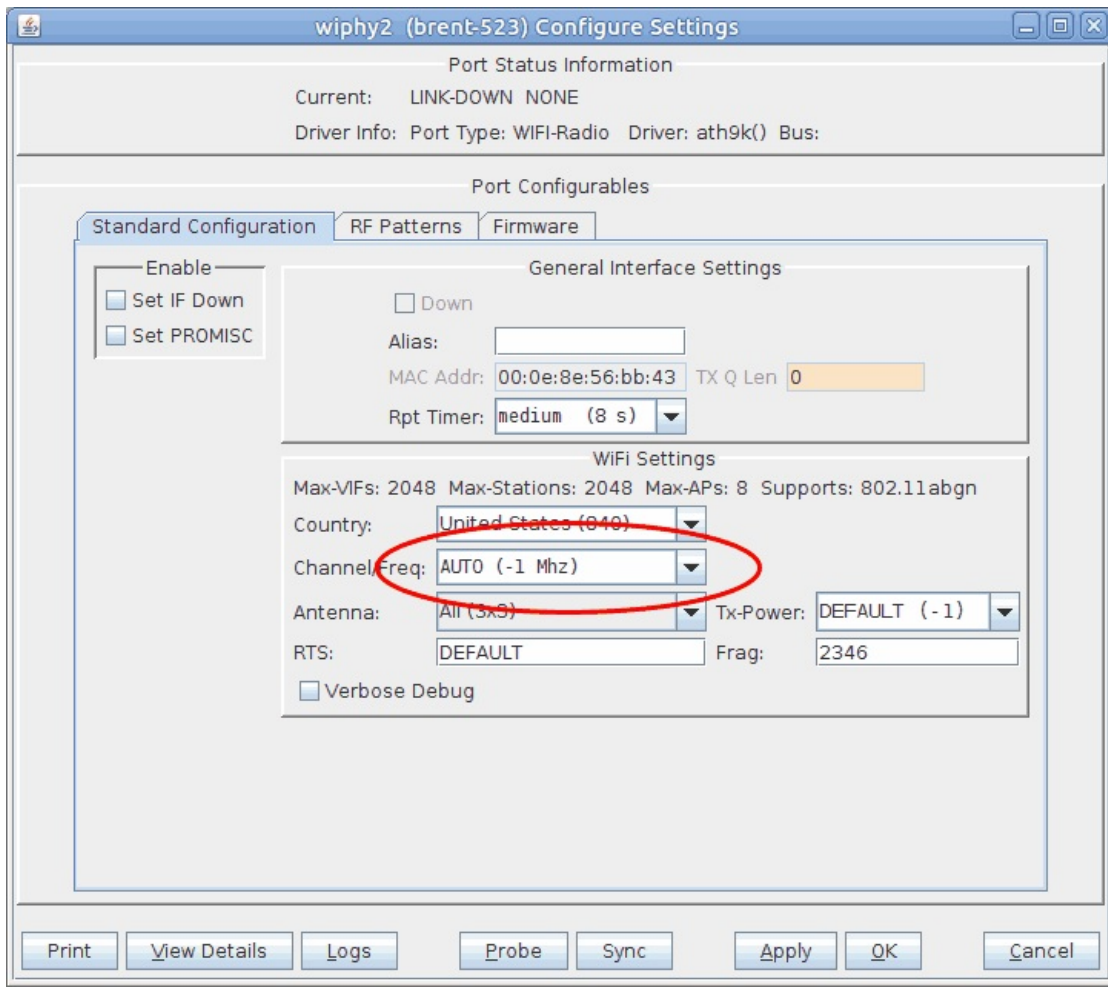
I. Click **OK**.



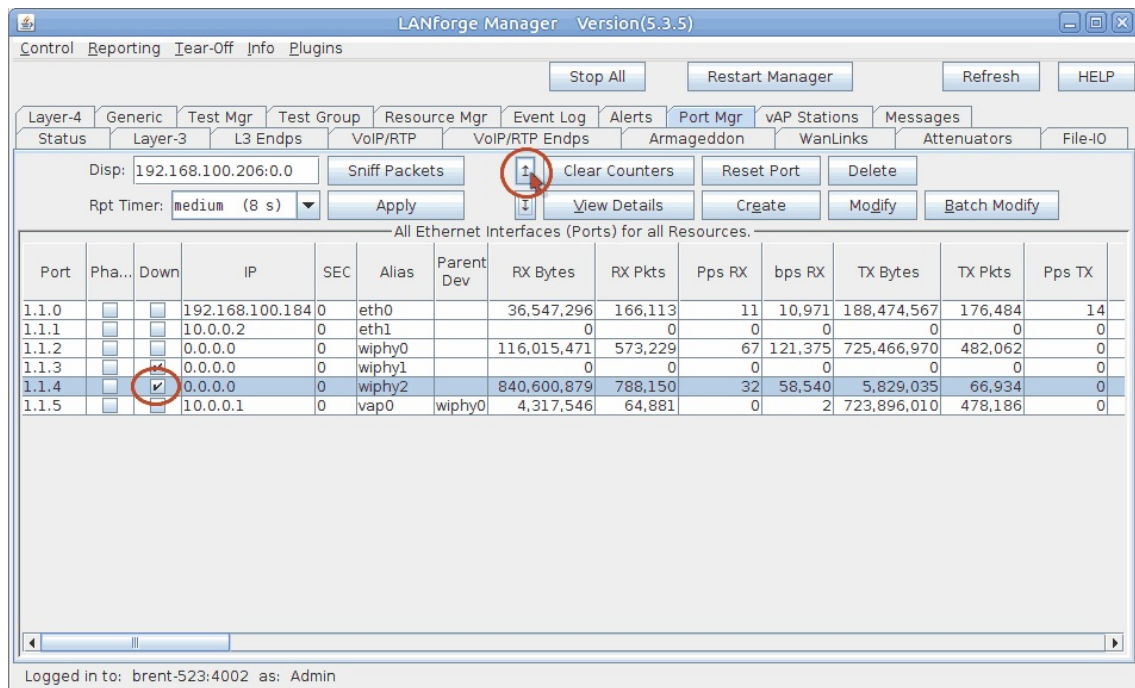
J. Click **Apply** in Netsmith then close the window.

2. Create 10 virtual stations.

A. Verify the wiphy device used for the stations (wiphy 2 in this test) is on the **AUTO** channel.



B. Make sure wiphy2 is up.



C. In the **Port Mgr** tab, select a wiphy device (wiphy2 in this test) and click **Create**.

1 MAC-VLAN 802.1Q-VLAN Redirect Bridge GRE Tunnel
 WIFI STA WIFI VAP WIFI Monitor WIFI Virtual Radio

2 Shelf: 1 Resource: 1 (brent-523) Port: 4 (wiphy2)

3 VLAN ID: DHCP-IPv4
 Parent MAC: 00:0e:8e:56:bb:43 DHCP Client ID: None
 MAC Addr: xx:xx:xx:*:*:xx IP Address: Global IPv6: AUTO
 Quantity: 10 IP Mask or Bits: Link IPv6: AUTO
 Gateway IP: IPv6 GW: AUTO
 #1 Redir Name: #2 Redir Name:
 STA ID: 0 SSID: layer4test
 WIFI AP: Key/Phrase:
 WPA WPA2 WEP

4 Down
 Ready

- A. Select the **WIFI STA** radio button.
- B. Set **Quantity** to 10.
- C. Set **STA ID** to 0.
- D. Select **DHCP-IPv4**.
- E. Set the **SSID** to **layer4test**.
- F. Click **Apply** and close the create port window.

D. Make sure the 10 staX ports get IP.

LANforge Manager Version(5.3.5)

Control Reporting Tear-Off Info Plugins

Stop All Restart Manager Refresh HELP

Layer-4 Generic Test Mgr Test Group Resource Mgr Event Log Alerts Port Mgr vAP Stations Messages

Status Layer-3 L3 Endps VoIP/RTP VoIP/RTP Endps Armageddon WanLinks Attenuators File-IO

Disp: 192.168.100.206:0.0 Sniff Packets Clear Counters Reset Port Delete

Rpt Timer: medium (8 s) Apply View Details Create Modify Batch Modify

All Ethernet Interfaces (Ports) for all Resources.

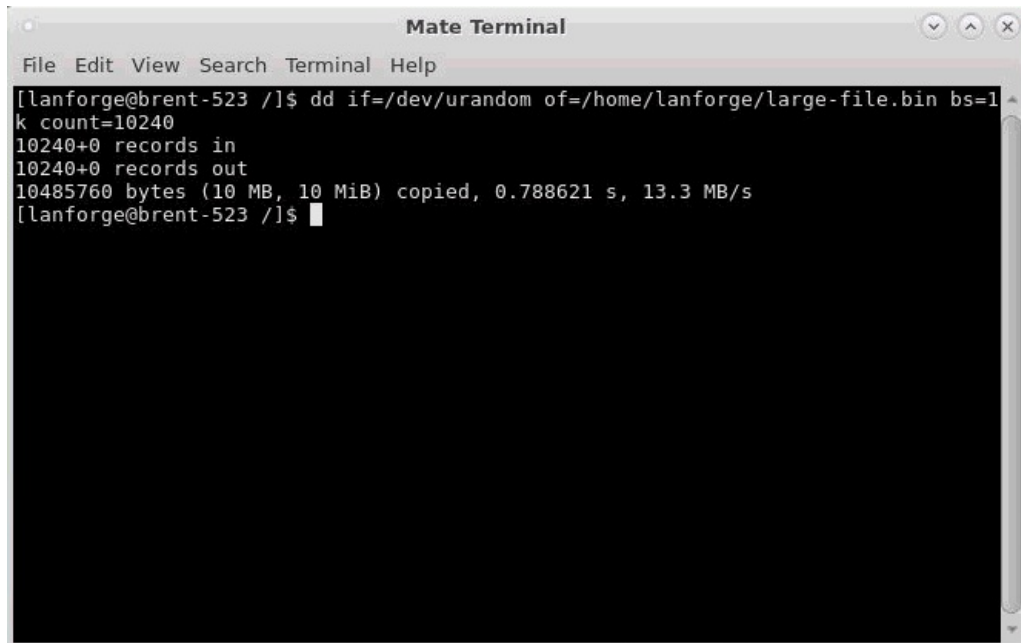
| Port | Pha... | Down | IP | SEC | Alias | Parent Dev | RX Bytes | RX Pkts | Pps RX | bps RX | TX Bytes | TX Pkts | Pps TX |
|--------|--------|------|-----------------|-----|--------|------------|------------|---------|--------|---------|------------|---------|--------|
| 1.1.00 | | | 192.168.100.192 | 0 | eth0 | | 46,812,745 | 95,852 | 8 | 7,049 | 64,012,518 | 76,741 | 14 |
| 1.1.01 | | | 0.0.0.0 | 0 | eth1 | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1.1.02 | | | 0.0.0.0 | 0 | wiphy0 | | 85,790,508 | 400,112 | 83 | 144,894 | 237,614 | 1,490 | 0 |
| 1.1.03 | | | 0.0.0.0 | 0 | wiphy1 | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1.1.04 | | | 0.0.0.0 | 0 | wiphy2 | | 2,315,229 | 10,998 | 78 | 133,398 | 19,313 | 214 | 0 |
| 1.1.05 | | | 10.0.0.1 | 0 | vap0 | wiphy0 | 11,030 | 73 | 0 | 0 | 27,134 | 140 | 0 |
| 1.1.06 | | | 10.0.0.13 | 0 | sta0 | wiphy2 | 9,944 | 64 | 0 | 0 | 1,622 | 9 | 0 |
| 1.1.07 | | | 10.0.0.16 | 0 | sta1 | wiphy2 | 10,622 | 71 | 0 | 0 | 1,198 | 7 | 0 |
| 1.1.08 | | | 10.0.0.14 | 0 | sta2 | wiphy2 | 10,532 | 70 | 0 | 0 | 1,198 | 7 | 0 |
| 1.1.09 | | | 10.0.0.10 | 0 | sta3 | wiphy2 | 10,532 | 70 | 0 | 0 | 1,198 | 7 | 0 |
| 1.1.10 | | | 10.0.0.17 | 0 | sta4 | wiphy2 | 10,364 | 68 | 0 | 0 | 1,296 | 8 | 0 |
| 1.1.11 | | | 10.0.0.19 | 0 | sta5 | wiphy2 | 10,694 | 69 | 0 | 0 | 1,560 | 8 | 0 |
| 1.1.12 | | | 10.0.0.12 | 0 | sta6 | wiphy2 | 10,352 | 68 | 0 | 0 | 1,198 | 7 | 0 |
| 1.1.13 | | | 10.0.0.15 | 0 | sta7 | wiphy2 | 10,172 | 66 | 0 | 0 | 1,198 | 7 | 0 |
| 1.1.14 | | | 10.0.0.18 | 0 | sta8 | wiphy2 | 10,082 | 65 | 0 | 0 | 1,198 | 7 | 0 |
| 1.1.15 | | | 10.0.0.11 | 0 | sta9 | wiphy2 | 9,914 | 63 | 0 | 0 | 1,296 | 8 | 0 |

Logged in to: brent-523:4002 as: Admin

3. Create a file for the layer 4-7 endpoint to use.

- A. In a terminal on the LANforge system, run the below command to generate a 10MB file in **/home/lanforge**.
Note: The smaller a file is, the harder it is to reach higher rates. Therefore it is recommended to use a larger file for these tests.

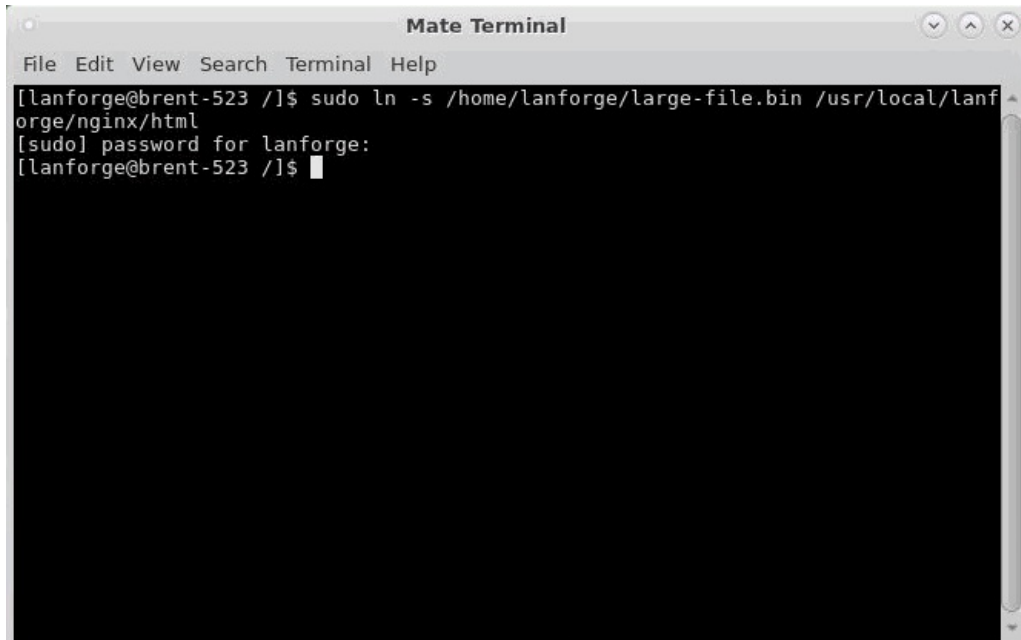
```
dd if=/dev/urandom of=/home/lanforge/large-file.bin bs=1k count=10240
```



```
Mate Terminal
File Edit View Search Terminal Help
[lanforge@brent-523 ~]$ dd if=/dev/urandom of=/home/lanforge/large-file.bin bs=1k count=10240
10240+0 records in
10240+0 records out
10485760 bytes (10 MB, 10 MiB) copied, 0.788621 s, 13.3 MB/s
[lanforge@brent-523 ~]$
```

- B. For the webserver to serve the file we created, it needs to know where to find it. Run the below command in a terminal on the LANforge system to link the file.

```
ln -s /home/lanforge/large-file.bin /usr/local/lanforge/nginx/html
```



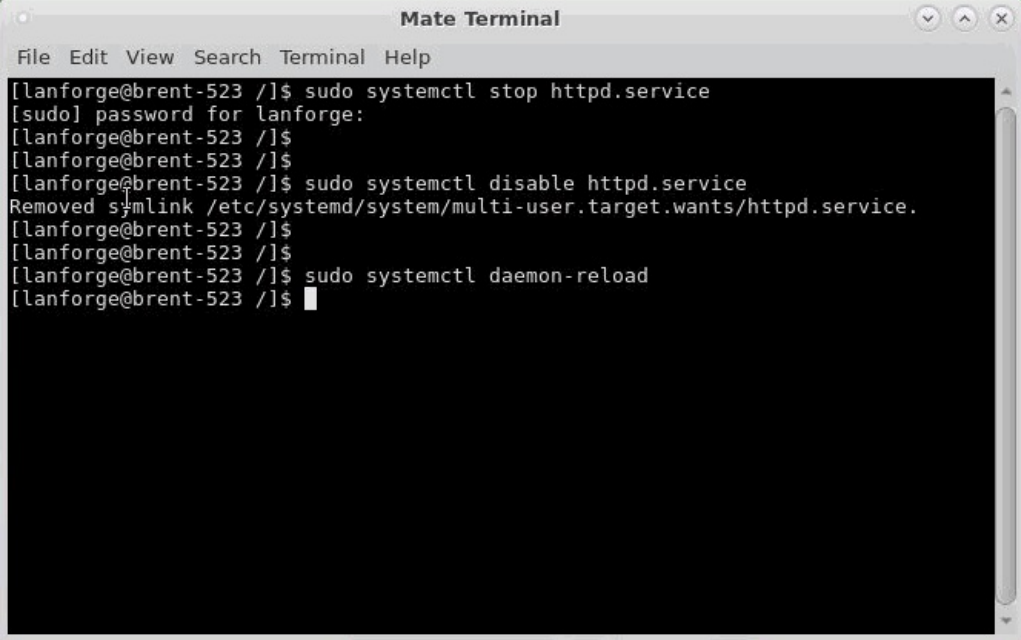
```
Mate Terminal
File Edit View Search Terminal Help
[lanforge@brent-523 ~]$ sudo ln -s /home/lanforge/large-file.bin /usr/local/lanforge/nginx/html
[sudo] password for lanforge:
[lanforge@brent-523 ~]$
```

4. Set up the HTTP server on **vap0**.

A. Before starting HTTP on vap0, the Apache service may need to be disabled.

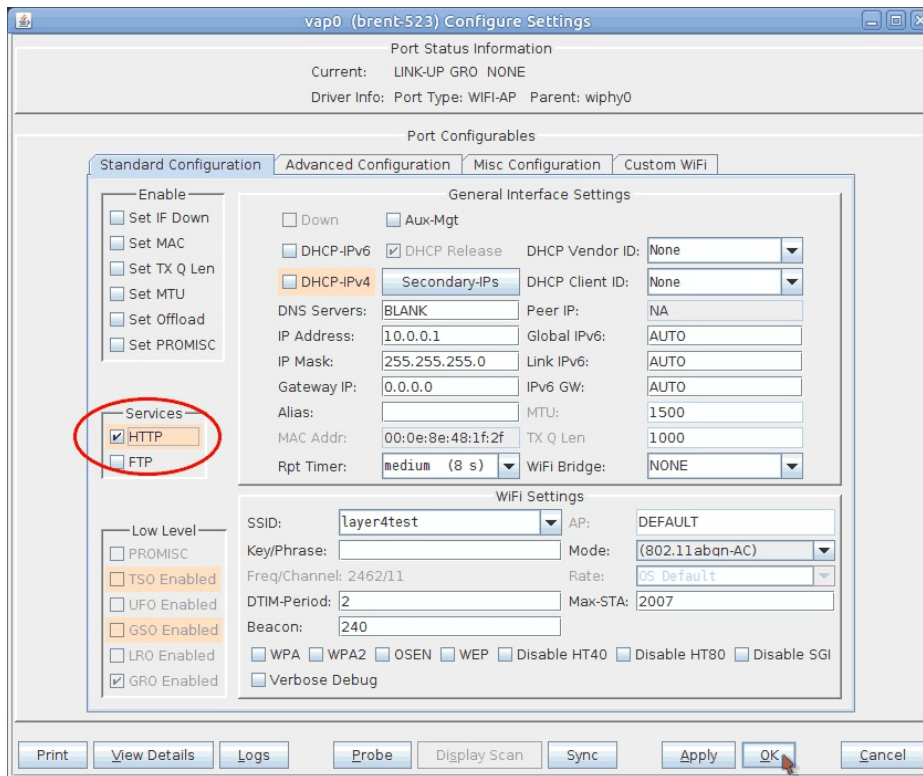
A. Stop and disable httpd (Apache) in the LANforge terminal with the below commands.

```
sudo systemctl stop httpd.service
sudo systemctl disable httpd.service
sudo systemctl daemon-reload
```



B. Modify vap0 in the LANforge Port Mgr tab.

I. Enable the HTTP checkbox.



II. Click OK.

5. Create a layer 4-7 endpoint. WiFi Capacity will be using this as a template to copy from.

A. In the Layer 4-7 tab, click **Create**.

Create/Modify L4Endpoint

Name: Rpt Timer: Test Manager:

Shelf: Resource: Port: IP Addr:

Endp Name: URLs per 10m: Max Speed:

Quiesce: URL Timeout: DNS Cache Timeout:

TFTP Block Size:

Proxy Port: Proxy Server:

Proxy Auth:

Proxy Auth Types: Basic Digest NTLM

HTTP Compression: Gzip Deflate

HTTP Auth Types: Basic Digest GSS-Negotiate NTLM

SSL Cert:

SMTP-From:

Agent/RCPT-TO:

UL/DL: IPv4 IPv6

URL:

Source/Dest File:

Get-URLs-From-File Authenticate Server Use-Proxy Allow-Reuse Allow-Cache Enable 4XX Show Headers

Bind DNS FTP PASV FTP EPSV

- A. Set the **Name** to **l4-http**
- B. Set the **Port** to **sta0**.
- C. The **URL** will point to the VAP's IP: **http://10.0.0.1/large-file.bin**
Note: This is where you can specify an IP of an AP you wish to test. LANforge also supports other layer 4-7 protocols, for more information you can view a tooltip by hovering over the URL text box.
- D. Set the **Source/Dest File** to **/dev/null**
- E. Click **OK**.

6. Set up and run a WiFi Capacity test.

A. Select the 10 created stations, then open WiFi Capacity Test from the Plugins menu.

LANforge Manager Version(5.3.5)

Control Reporting Tear-Off Info **Plugins**

Stop All Restart Manager Refresh HELP

Event Log Alerts Port Mgr vAP Stations Messages

VoIP/RTP Endps Armageddon WanLinks Attenuators File-IO

Clear Counters Reset Port Delete

View Details Create Modify Batch Modify

Interfaces (Ports) for all Resources.

| Port | Pha... | Down | IP | | RX Bytes | RX Pkts | Pps RX | bps RX | TX Bytes | TX Pkts | Pps TX |
|--------|--------|-------------------------------------|---------------|---------------|-------------|---------|--------|---------|-------------|---------|--------|
| 1.1.00 | | | 192.168.100.0 | | 58,089,638 | 230,816 | 23 | 15,746 | 747,416,246 | 557,764 | 88 |
| 1.1.01 | | | 0.0.0.0 | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1.1.02 | | | 0.0.0.0 | 0 wiphy0 | 172,821,133 | 809,344 | 83 | 142,230 | 501,540 | 3,102 | 0 |
| 1.1.03 | | <input checked="" type="checkbox"/> | 0.0.0.0 | 0 wiphy1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1.1.04 | | | 0.0.0.0 | 0 wiphy2 | 75,996,943 | 361,512 | 68 | 114,976 | 77,518 | 2,053 | 0 |
| 1.1.05 | | | 10.0.0.1 | 0 vap0 wiphy0 | 24,426 | 281 | 0 | 0 | 51,242 | 233 | 0 |
| 1.1.06 | | | 10.0.0.13 | 0 sta0 wiphy2 | 20,638 | 111 | 0 | 0 | 3,396 | 30 | 0 |
| 1.1.07 | | | 10.0.0.16 | 0 sta1 wiphy2 | 20,974 | 117 | 0 | 0 | 2,972 | 28 | 0 |
| 1.1.08 | | | 10.0.0.14 | 0 sta2 wiphy2 | 20,458 | 113 | 0 | 0 | 3,096 | 30 | 0 |
| 1.1.09 | | | 10.0.0.10 | 0 sta3 wiphy2 | 21,506 | 117 | 0 | 0 | 2,828 | 26 | 0 |
| 1.1.10 | | | 10.0.0.17 | 0 sta4 wiphy2 | 20,374 | 113 | 0 | 0 | 3,070 | 29 | 0 |
| 1.1.11 | | | 10.0.0.19 | 0 sta5 wiphy2 | 20,704 | 114 | 0 | 0 | 3,334 | 29 | 0 |
| 1.1.12 | | | 10.0.0.12 | 0 sta6 wiphy2 | 20,984 | 114 | 0 | 0 | 2,828 | 26 | 0 |
| 1.1.13 | | | 10.0.0.15 | 0 sta7 wiphy2 | 20,908 | 114 | 0 | 0 | 3,034 | 29 | 0 |
| 1.1.14 | | | 10.0.0.18 | 0 sta8 wiphy2 | 20,050 | 109 | 0 | 0 | 3,034 | 29 | 0 |
| 1.1.15 | | | 10.0.0.11 | 0 sta9 wiphy2 | 20,888 | 110 | 0 | 0 | 2,926 | 27 | 0 |

Logged in to: brent-523:4002 as: Admin

B. Go to the Settings tab.

The screenshot shows the 'WiFi Capacity Test' application window with the 'Settings' tab selected. The window contains several configuration options:

- Station Increment: Single (1)
- Loop Iterations: Single (1)
- Duration: 60000
- Protocol: Layer-4
- Layer-4 Endpoint: l4-http
- Payload Size: AUTO
- Total Rate: 10M (10 Mbps)
- Total Upload Rate: Zero (0 bps)
- Percentage TCP Rate: 10% (10%)

At the bottom of the window are two buttons: 'Start' and 'Close'.

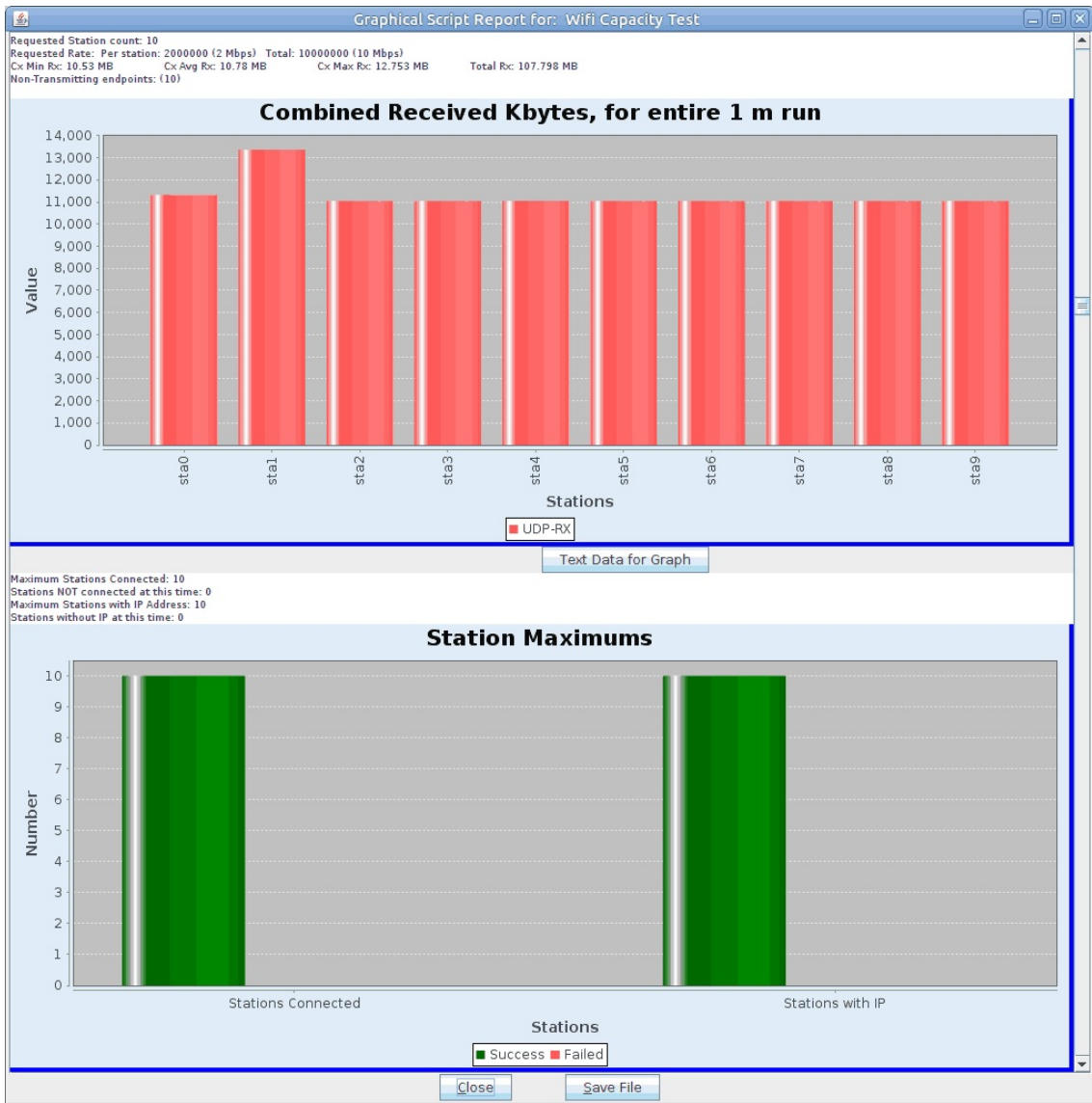
A. Set **Station Increment** to 1.

B. Set the Protocol to **Layer 4-7**. **Note:** This should automatically be set if you first select a Layer 4-7 Endpoint.

C. Select your Layer 4-7 Endpoint (**l4-http** in this test). The capacity test will use this as a template for each of the ten stations.

D. **Total Rate** can stay at 10Mbps. **Note:** This rate can represent either upload or download traffic depending on how you have your layer 4-7 endpoint configured.

C. Run the Capacity test by clicking **Start**.



A. The test will now make a copy of the selected layer 4-7 endpoint for each station. **Note:** You may notice that URLs per 10m is set to a high rate, this is to ensure the maximum amount of URLs are processed as WiFi Capacity adjusts the Max Speed.