# WiFi Capacity Test with Layer 4

Goal: Use the WiFi Capacity Test plugin to emulate layer 4 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 endpoints in LANforge.

This example uses a LANforge CT523 system but the procedure should also work on a CT524, CT525 or similar system.
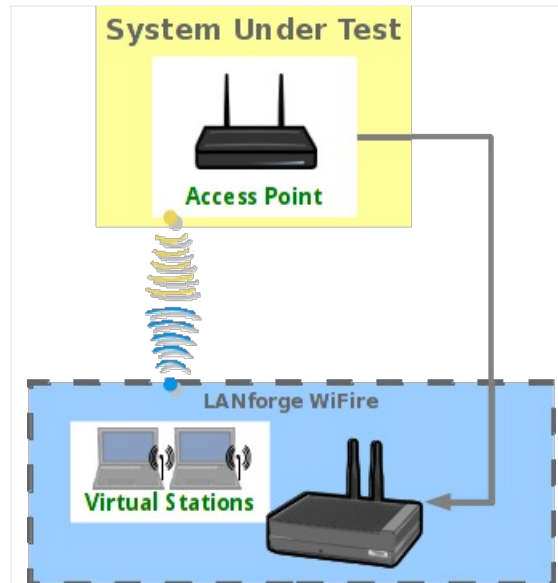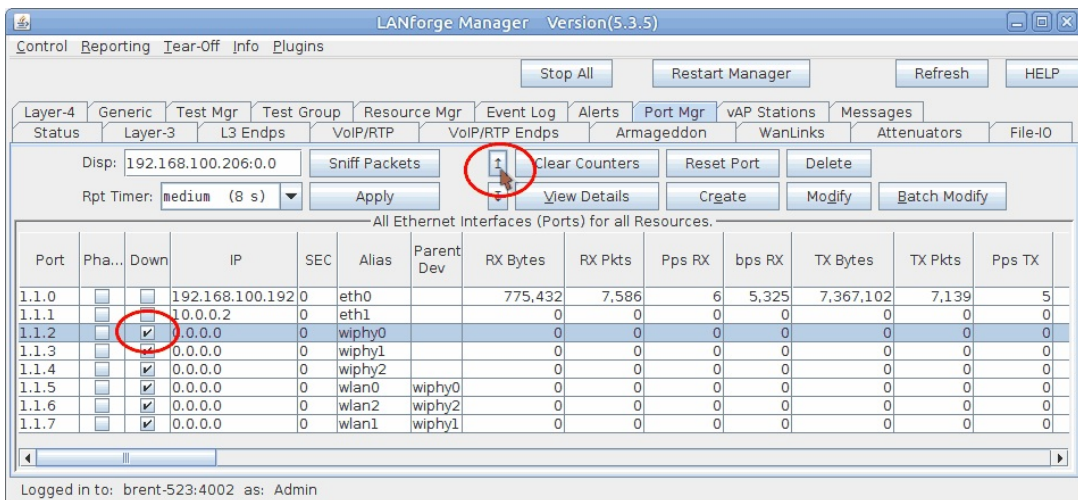

1. Create a VAP.
    A. Verify the wiphy device used for the VAP is on your preferred channel (this test will use channel 11).

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).
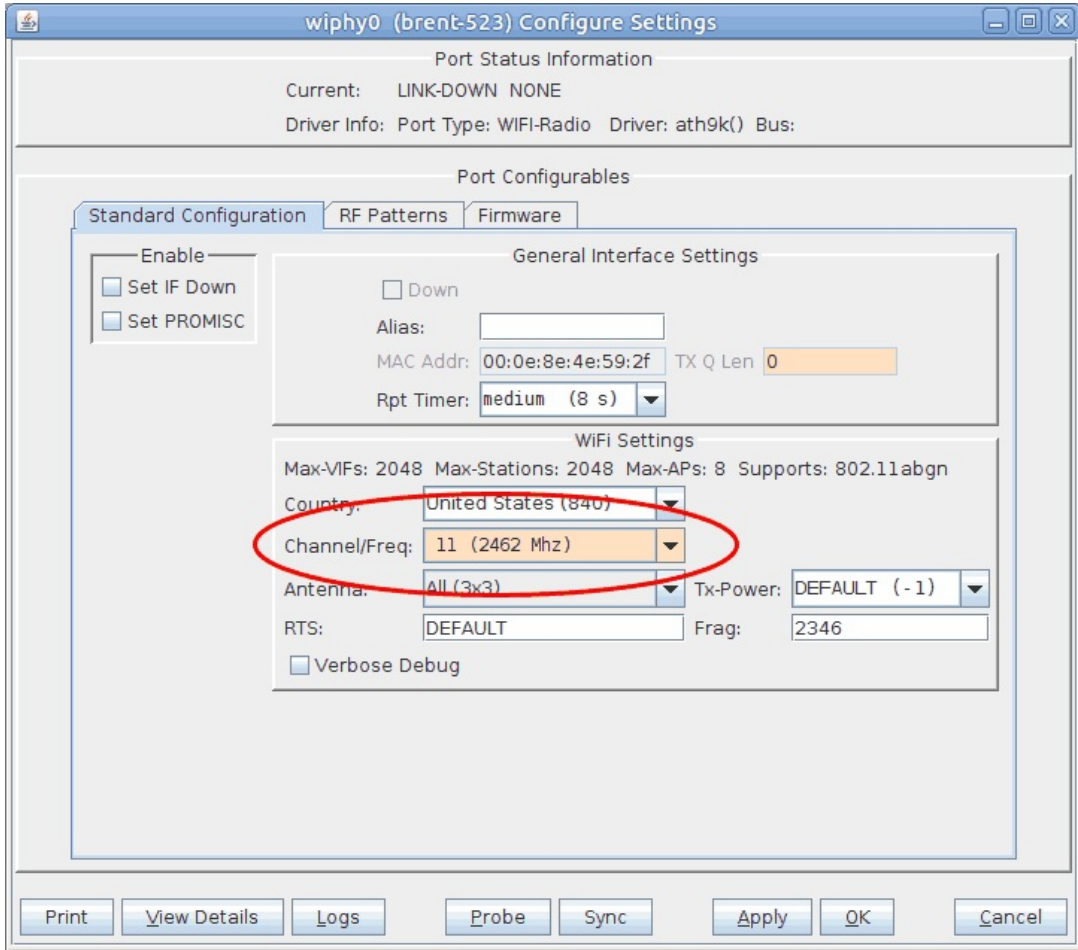
I. Select your preferred channel here.

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**.

Create VLANs on Port: 1.1.4

① ○ MAC-VLAN ○ 802.1Q-VLAN ○ Redirect ○ Bridge ○ GRE Tunnel
   ● WiFi STA ○ WiFi VAP ○ WiFi Monitor ○ WiFi Virtual Radio

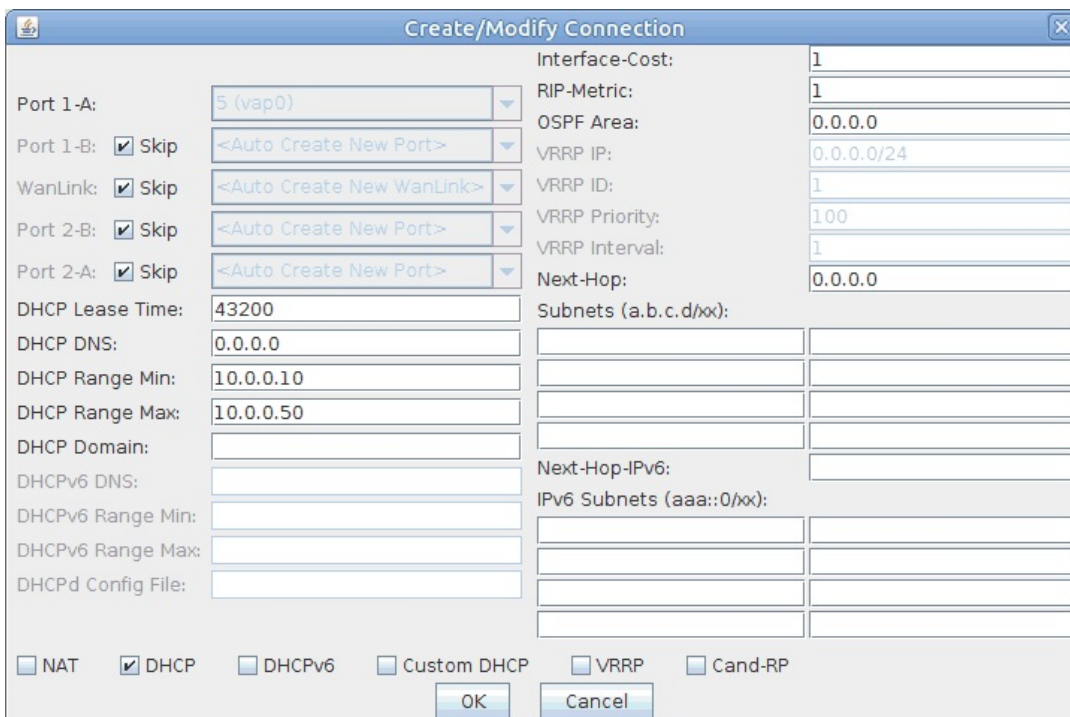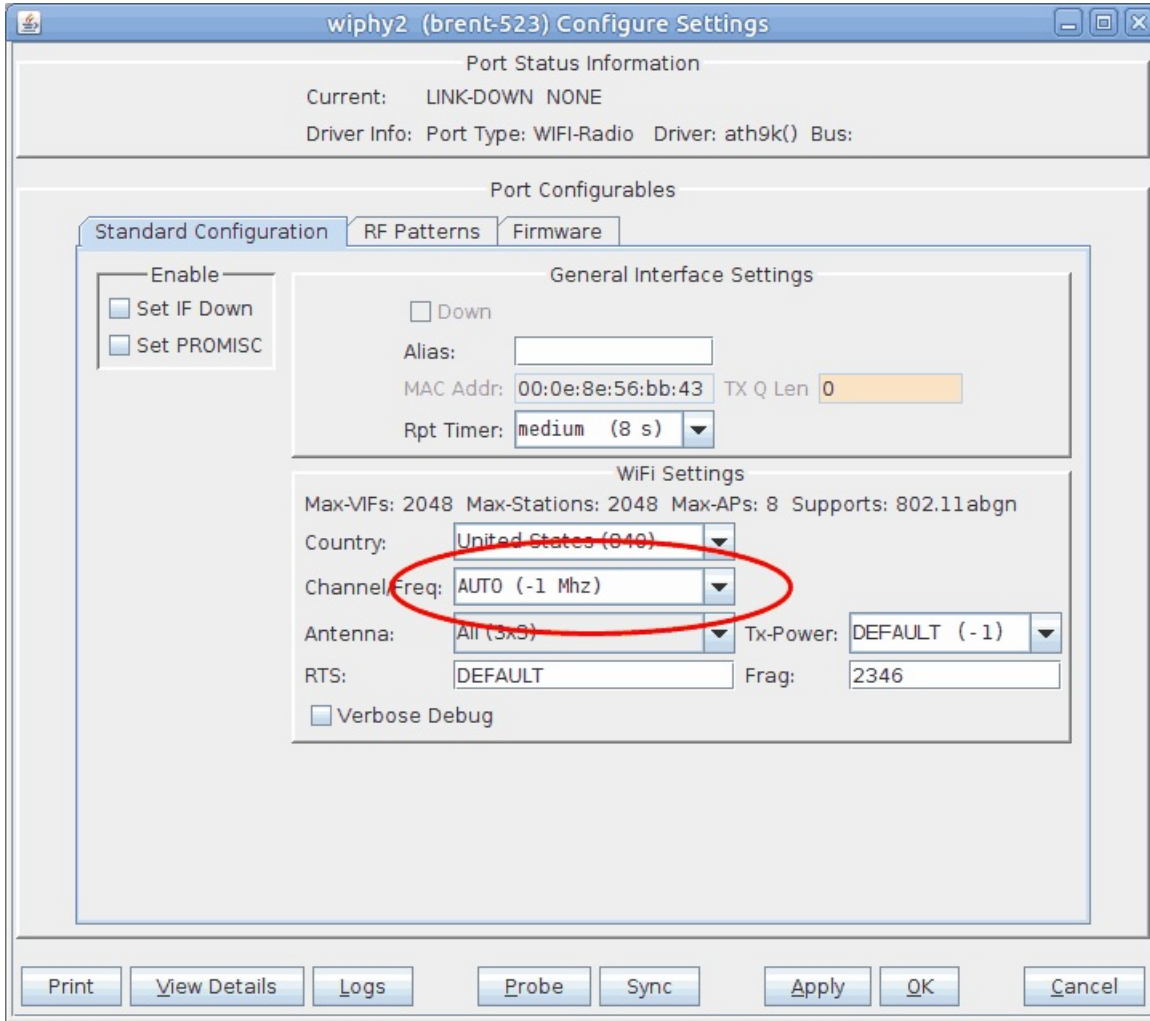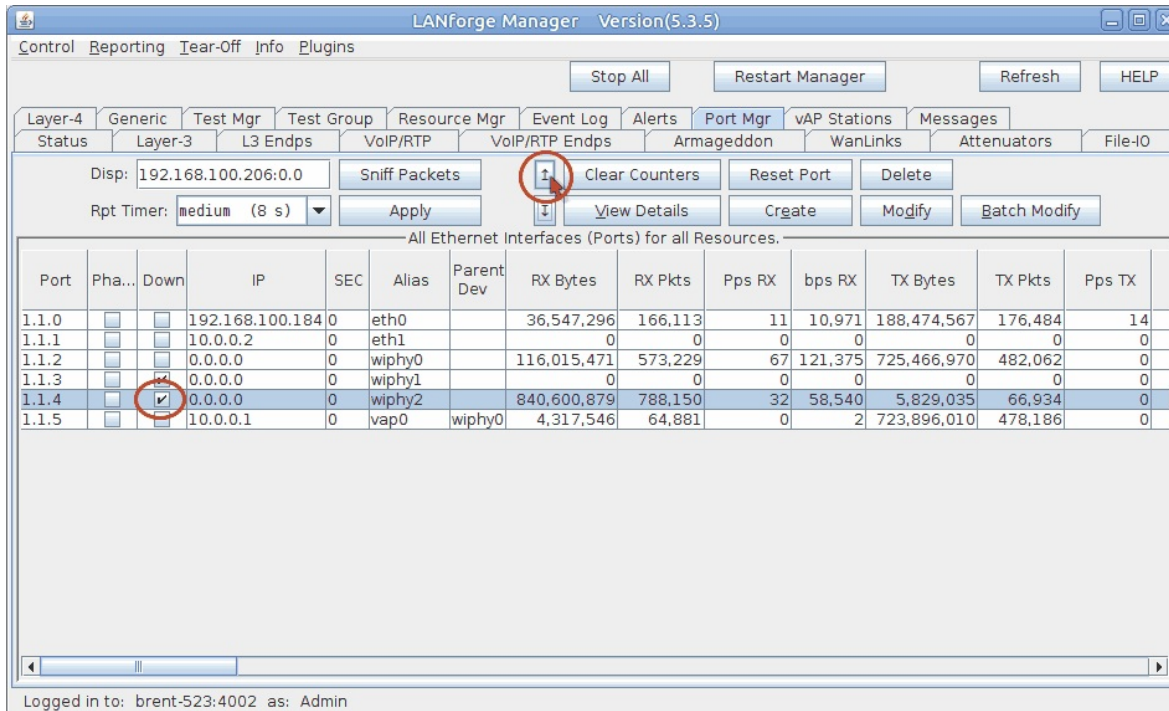② Shelf: 1   Resource: 1 (brent-523)   Port: 4 (wiphy2)

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
   [Apply]   [Cancel]   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 IPs.

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.

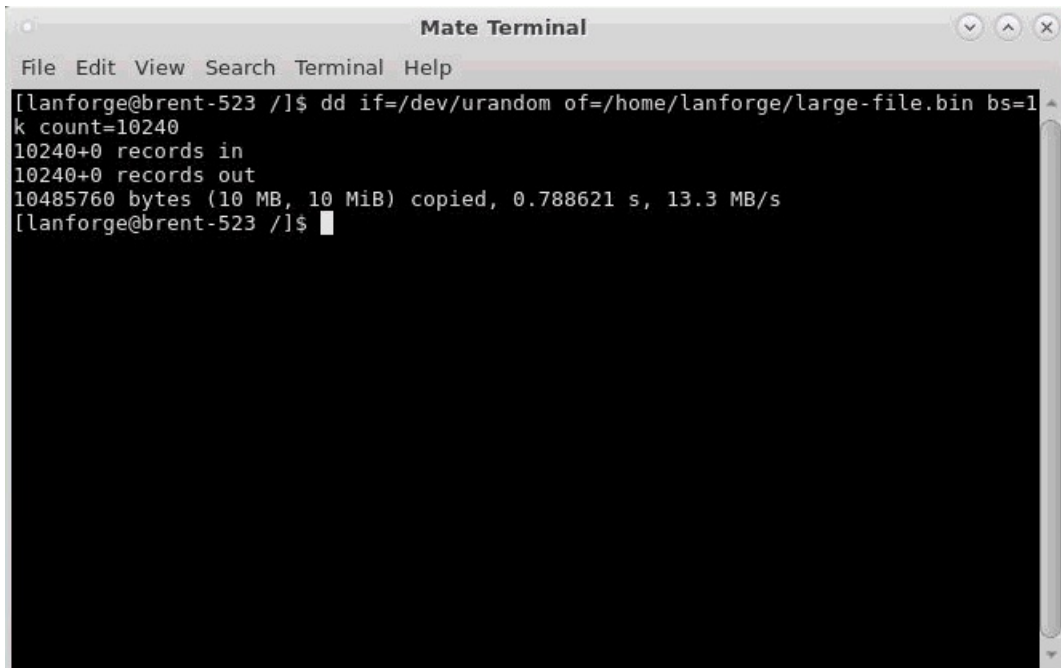| Port	Pha...	Down	IP	SEC	Alias	Parent Dev	RX Bytes	RX Pkts	Pps RX	bps RX	TX Bytes	TX Pkts	Pps TX
1.1.00	☐	☐	192.168.100.192	0	eth0		46,812,745	95,852	8	7,049	64,012,518	76,741	14
1.1.01	☐	☐	0.0.0.0	0	eth1		0	0	0	0	0	0	0
1.1.02	☐	☐	0.0.0.0	0	wiphy0		85,790,508	400,112	83	144,894	237,614	1,490	0
1.1.03	☐	✔	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 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.
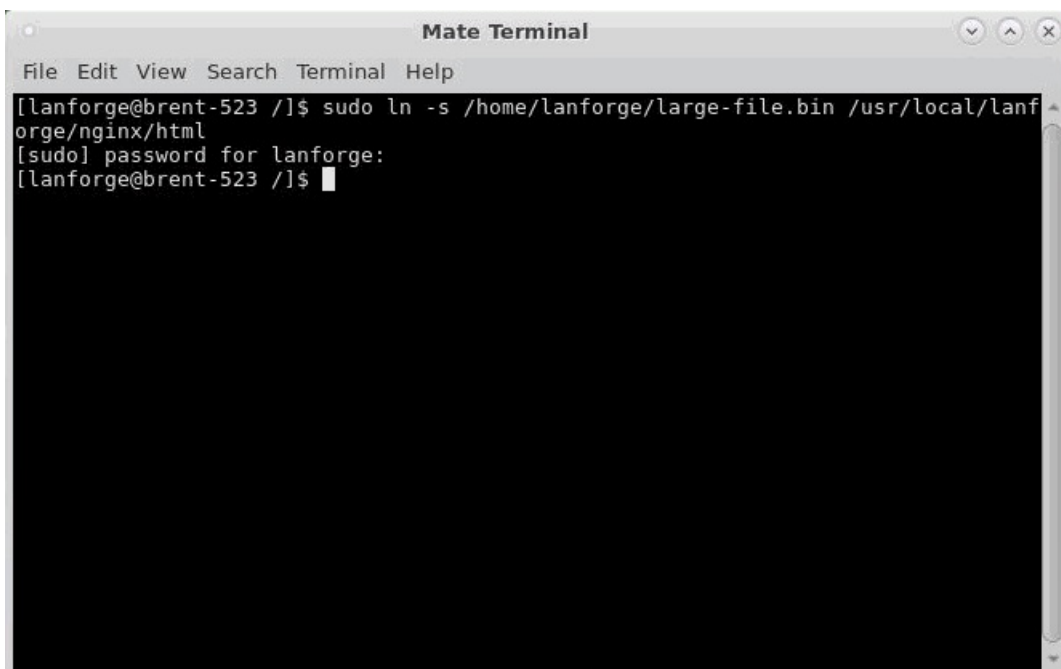
   ```
   dd if=/dev/urandom of=/home/lanforge/large-file.bin bs=1k count=10240
   ```

```
                              Mate Terminal                    ⌄  ^  ✕
 File  Edit  View  Search  Terminal  Help
 [lanforge@brent-523 /]$ dd if=/dev/urandom of=/home/lanforge/large-file.bin bs=1
 k 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/lanf
 orge/nginx/html
 [sudo] password for lanforge:
 [lanforge@brent-523 /]$ █
```
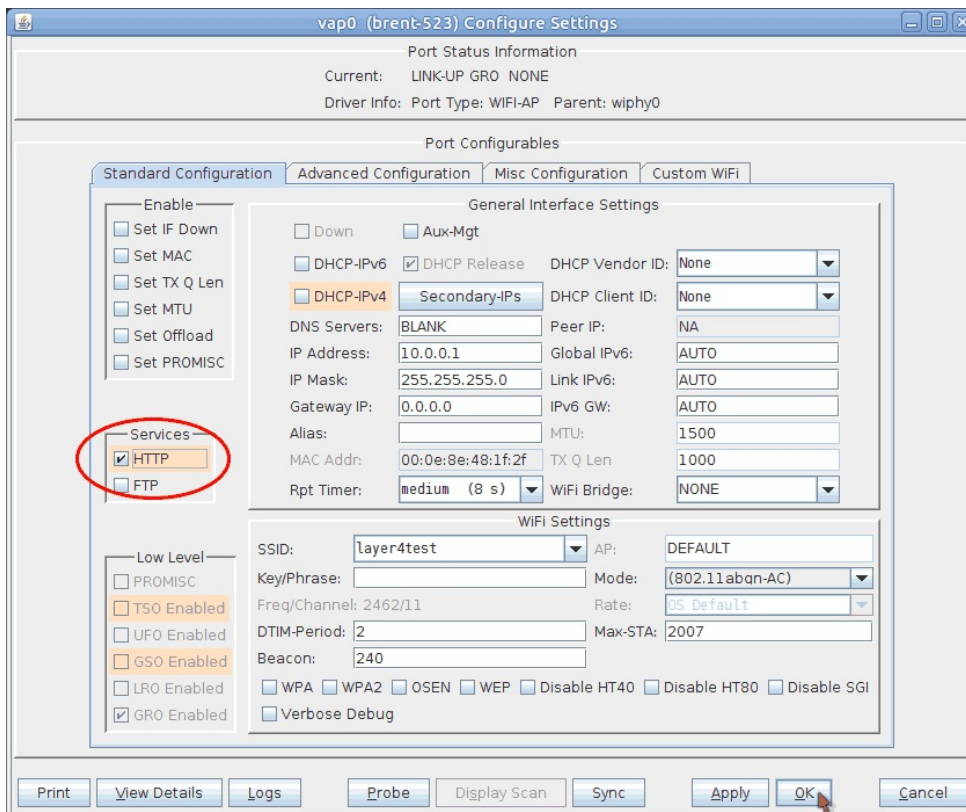
4. Set up the HTTP server on **vap0**.

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`
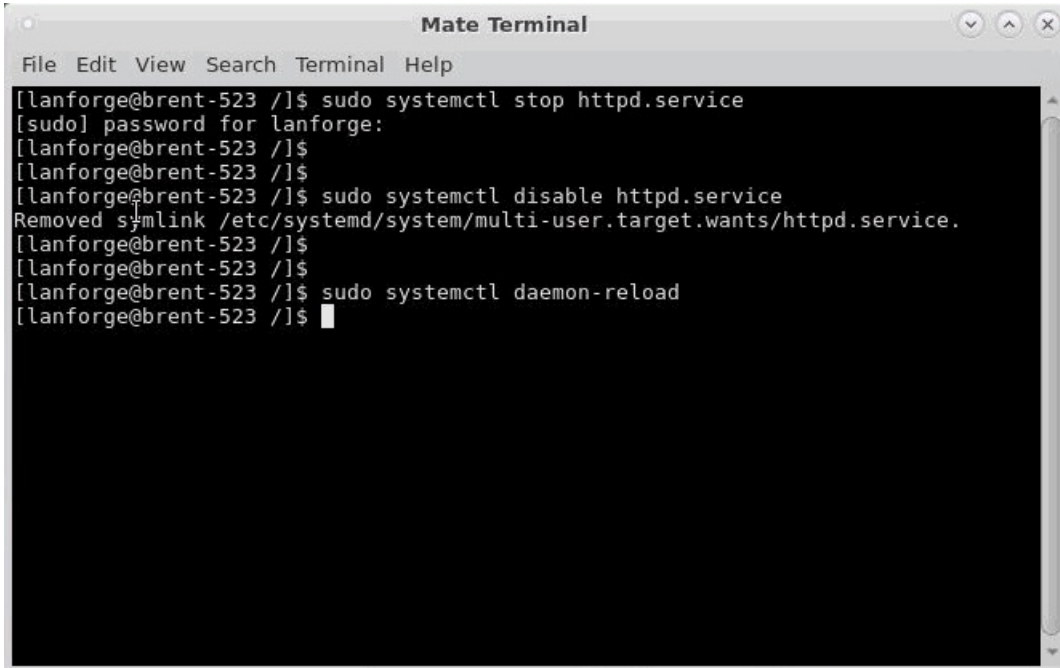
  B. Modify **vap0** in the LANforge **Port Mgr** tab.
    I. Enable the **HTTP** checkbox.

    II. Click **OK**.

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

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

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 protocols, for more information you can view a tooltip by hovering over the URL text box.

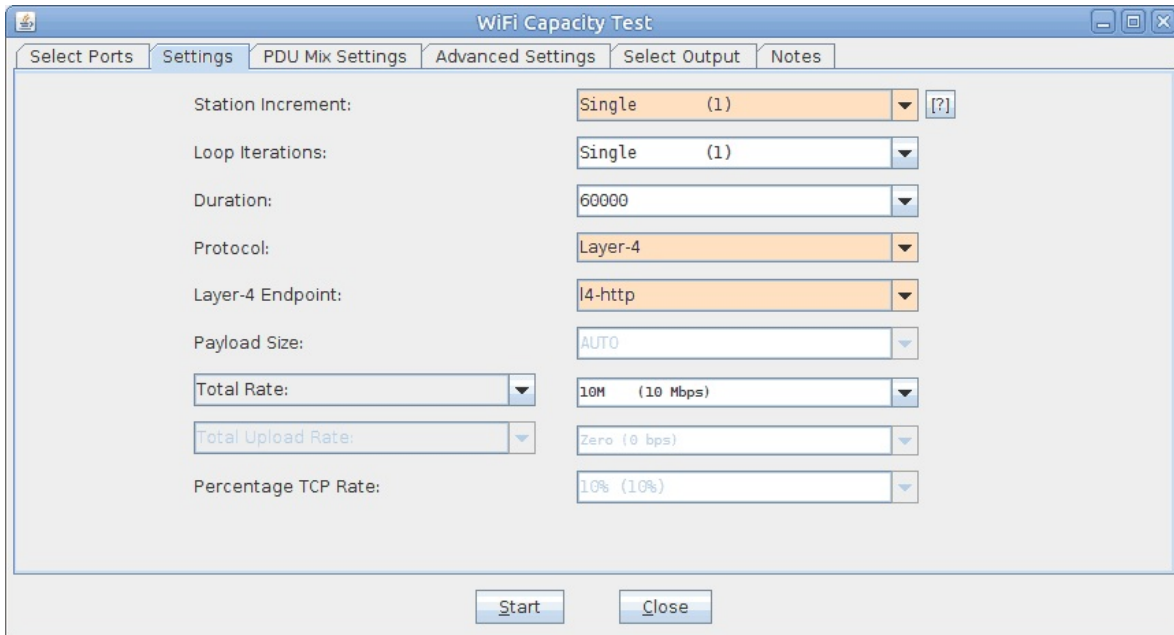D. Set the **Source/Dest File** to **/dev/null**

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.
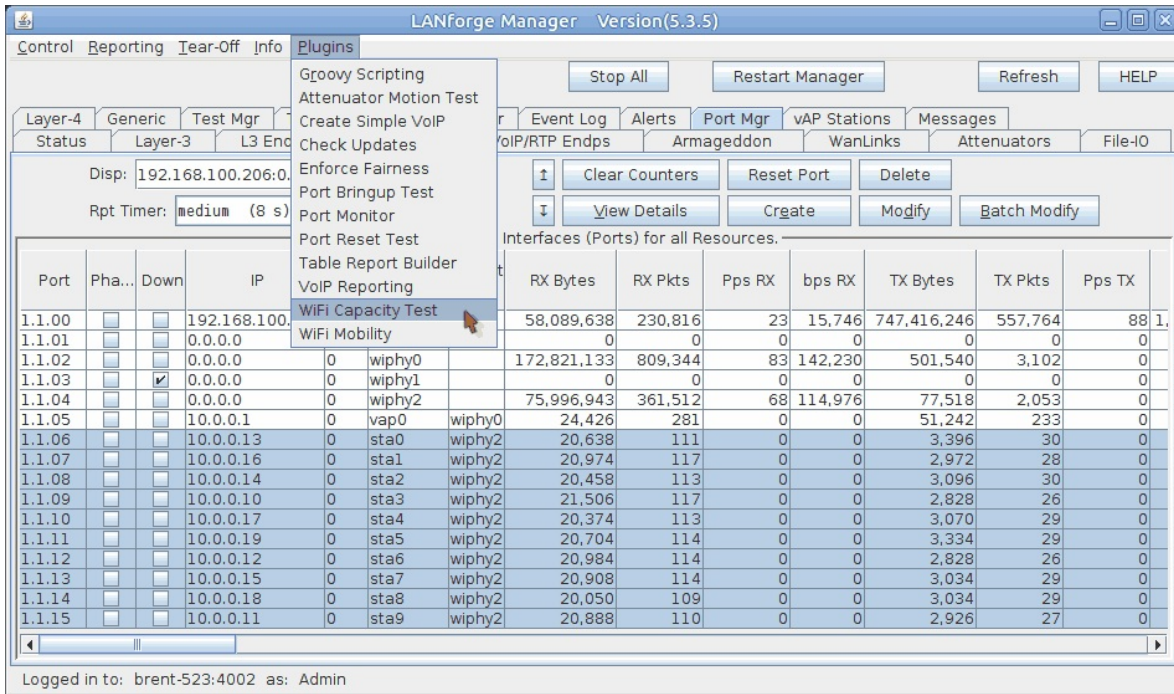

B. Go to the Settings tab.

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

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

C. Select your Layer-4 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 endpoint configured.

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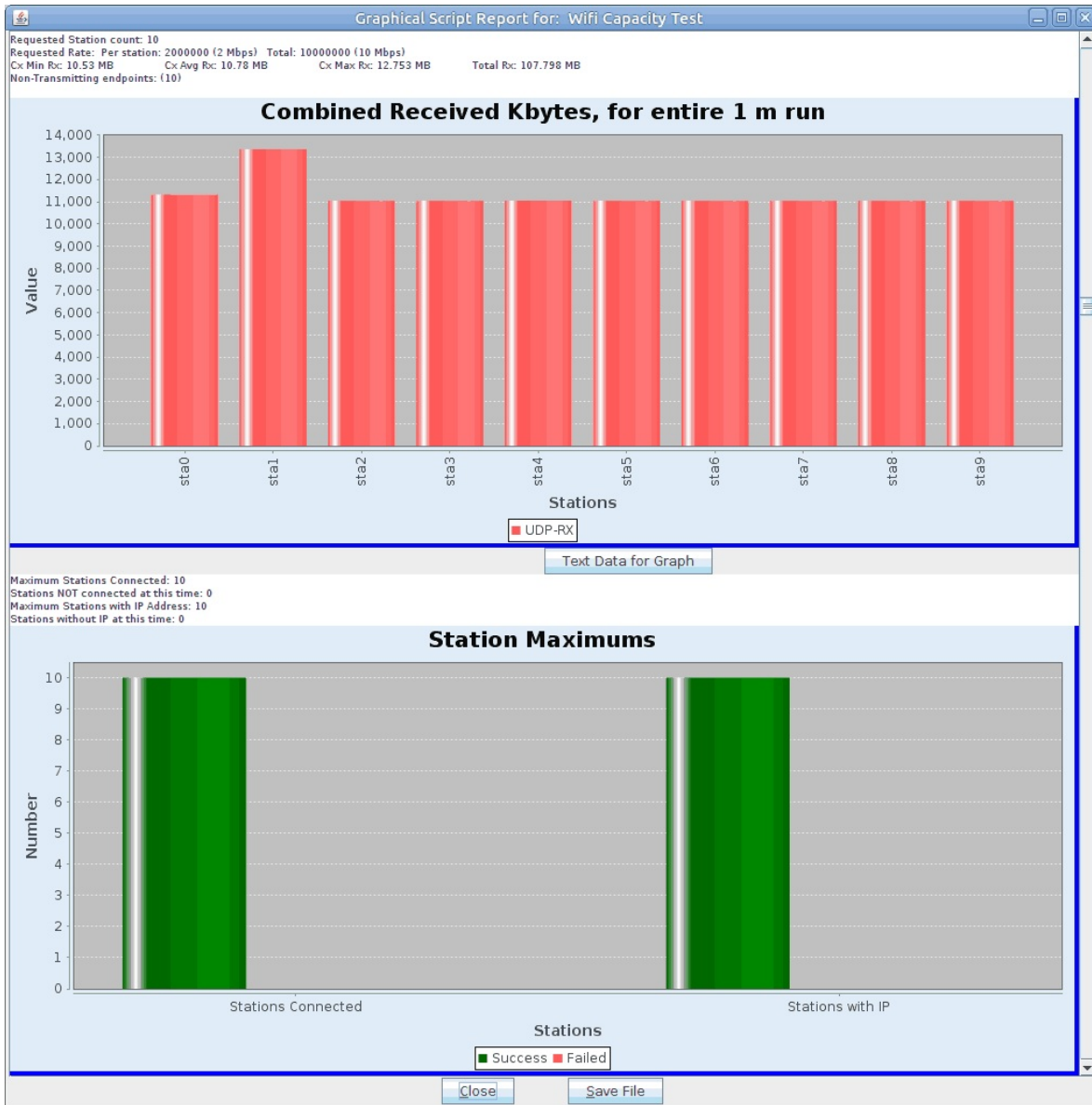
A. The test will now make a copy of the selected layer-4 endpoint for each station. **Note:** You may notice that URLs per 10m is set to a high rate, this is to ensure the maximum amount of URLs are processed as WiFi Capacity adjusts the Max Speed.