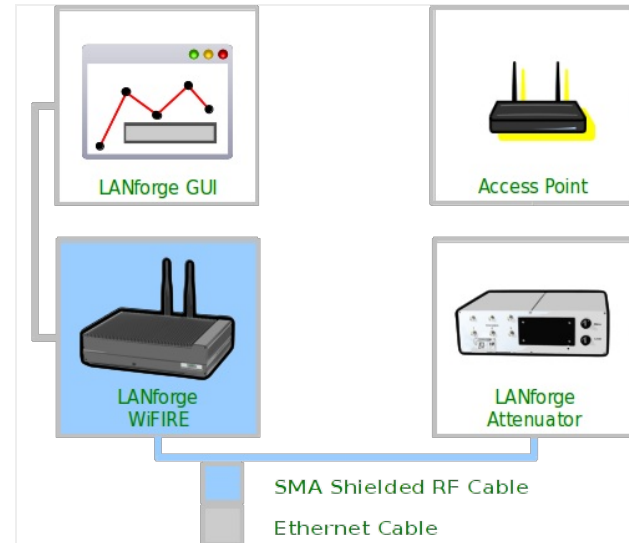
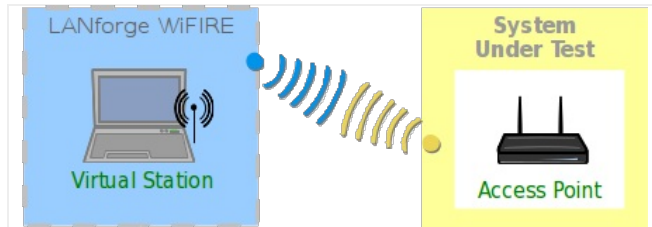


LANforge WiFi Rate v. Range Test

Goal: Compare WiFi performance for 'upload' traffic (client to AP) using a WiFi access point, a LANforge Attenuator and a LANforge Virtual Station. Traffic is generated by a RFC-2544 script on a Layer-3 UDP connection.

This demo consists of one WiFi access point and one CT523 LANforge WiFIRE machine connected to the LANforge Attenuator with coax SMA cables. (This is **not** over the air testing). This requires LANforge release 5.2.7 or higher.



1. Create Virtual Station

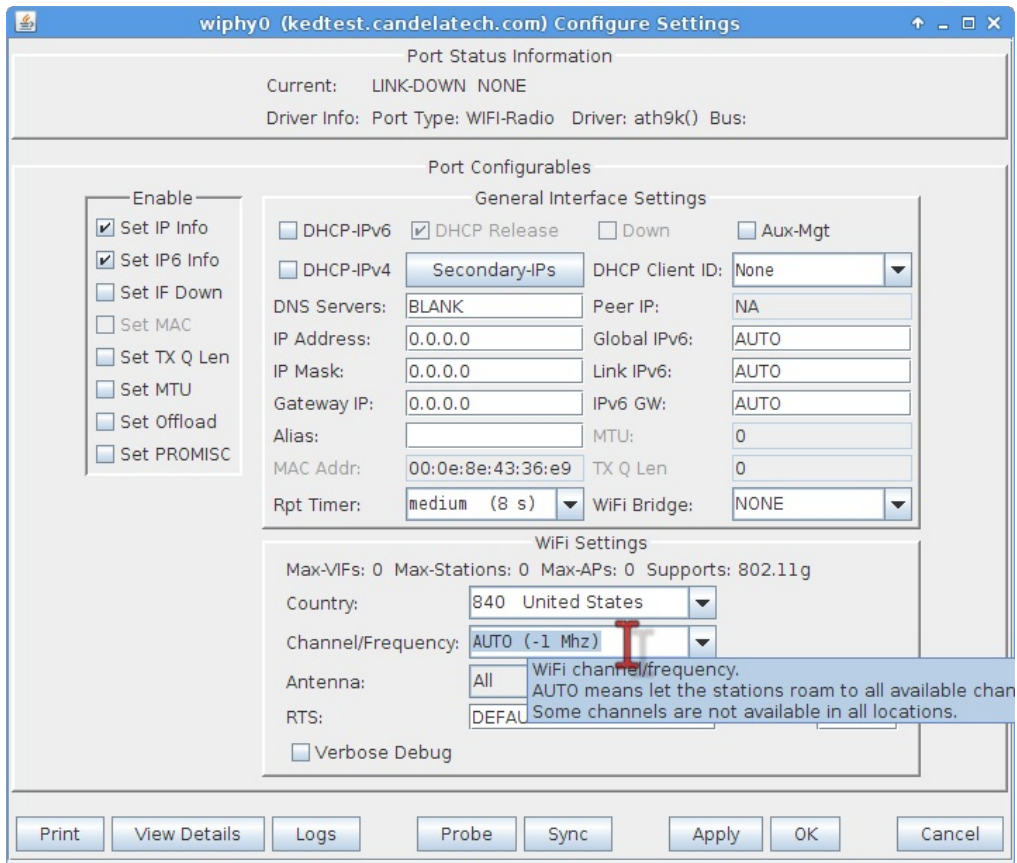
The screenshot shows the LANforge Manager interface (Version 5.2.11). The 'Port Mgr' tab is active, displaying a table of Ethernet interfaces. A red arrow points to the 'wiphy1' interface in the table.

Port	Pha...	Down	IP	SEC	Alias	RX Bytes	RX Pkts	Pps RX	bps RX	TX Bytes	TX Pkts	Pps TX	bps TX
1.1.15			10.26.10.1	0	ppp5	0	0	0	0	0	0	0	0
1.42.00			192.168.100.42	0	eth0	10,086	98	6	5,519	85,866	68	4	46,985
1.42.01			0.0.0.0	0	eth1	5,702	80	5	3,099	832	13	0	452
1.42.02			0.0.0.0	0	wiphy0	0	0	0	0	0	0	0	0
1.42.03			0.0.0.0	0	wiphy1	0	0	0	0	0	0	0	0
1.42.04			0.0.0.0	0	wiphy2	0	0	0	0	0	0	0	0
1.42.05			0.0.0.0	0	wlan0	0	0	0	0	0	0	0	0
1.42.06			0.0.0.0	0	wlan1	0	0	0	0	0	0	0	0

Logged in to: 192.168.100.26:4002 as: Admin

A. Select radio **wiphy1** and click **Modify**

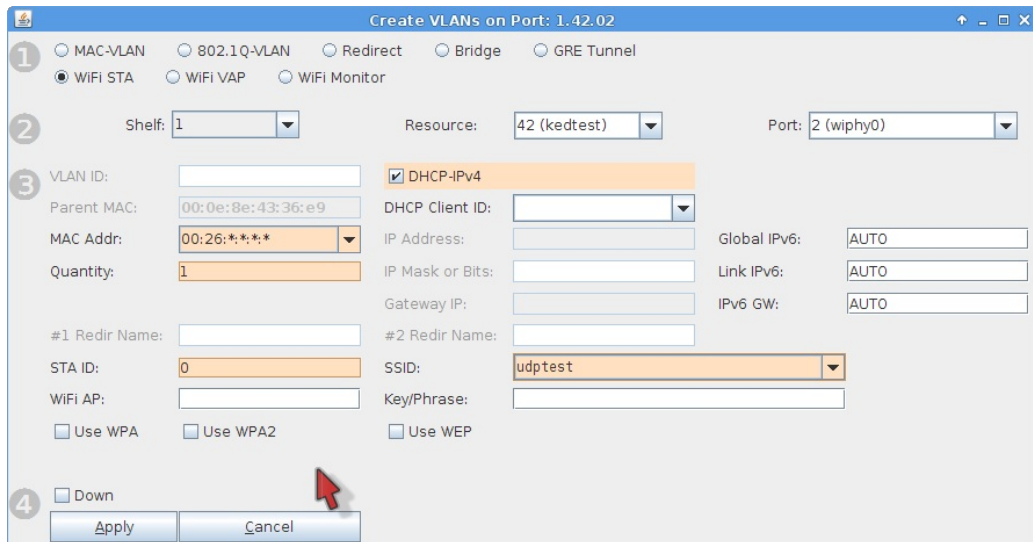
- B. Set the frequency of the radio to **Auto**



- A. Click **OK**

- C. On the Port Modify tab, click **Create**

- D. Create virtual station with these paramters:

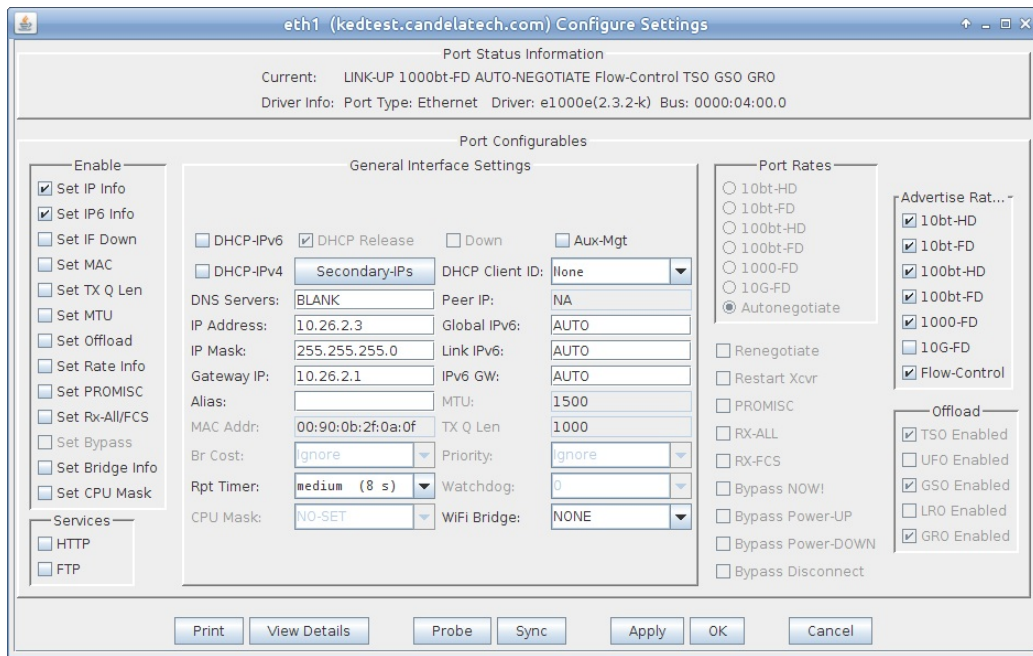


- A. Select **Wifi STA**
- B. Choose **DHCP-IPv4**
- C. Quantity **1**
- D. Station ID **0**
- E. SSID **'udptest'**
- F. Click **Apply**

- 2. Create upstream port wired to AP

- A. Wire the **eth1** port into the upstream connection of the AP under test.
- B. On the **Ports** tab, click on the **eth1** port

C. Configure **eth1** port with an upstream IP, like 10.26.2.3

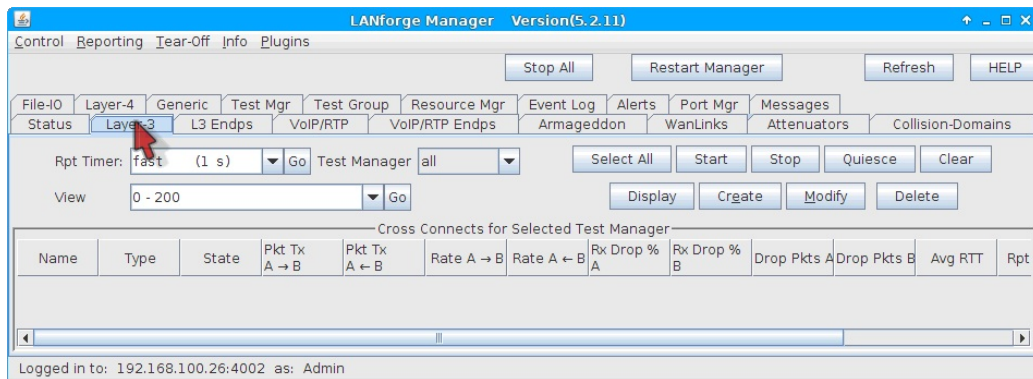


D. Set the **Gateway** to the AP wired interface IP.

E. Click **OK**

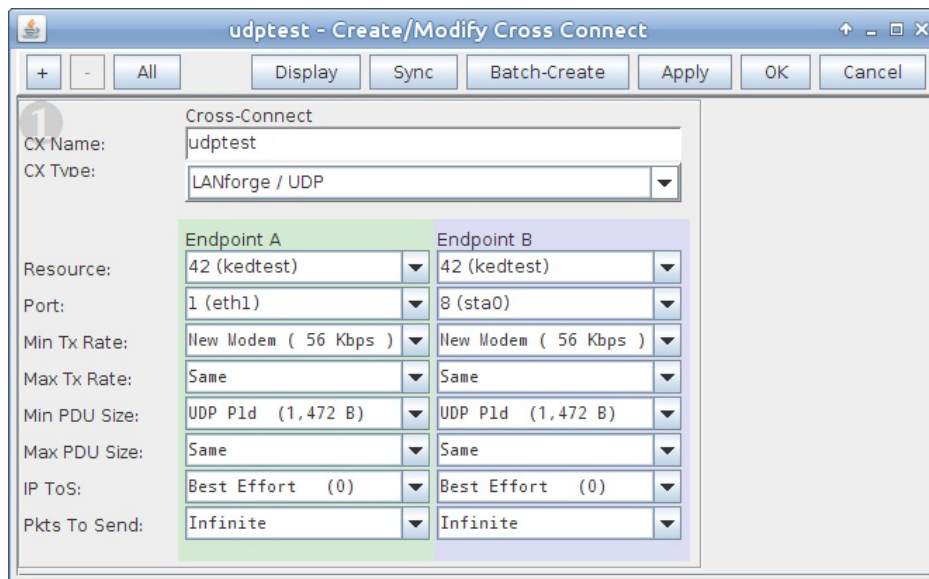
3. Create and Test Cross Connect

A. Go to the **Layer 3** tab



A. Click **Create**

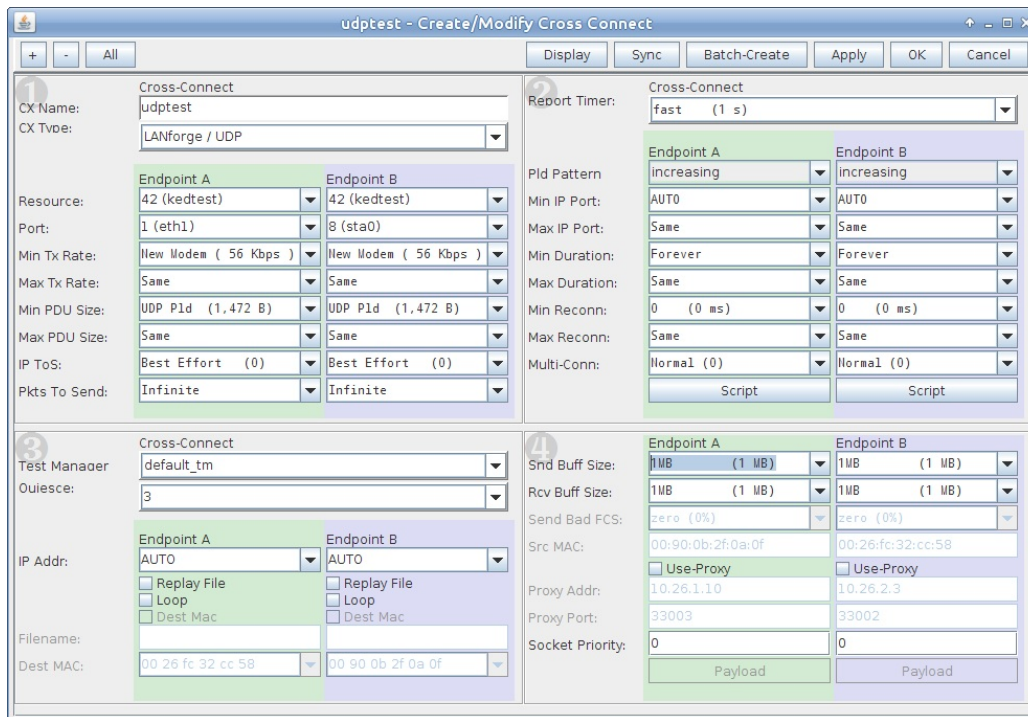
B. Create a cross connect with these qualities:



- A. Make sure Endpoint A is **eth1**
- B. Make sure Endpoint B is **sta0**
- C. Min PDU Size for both should be **1472**
- D. **NOTE:** These rate and PDU size settings will be manipulated by the script we setup later.

C. Next, expand the screen to **Level 4** using the [+] button.

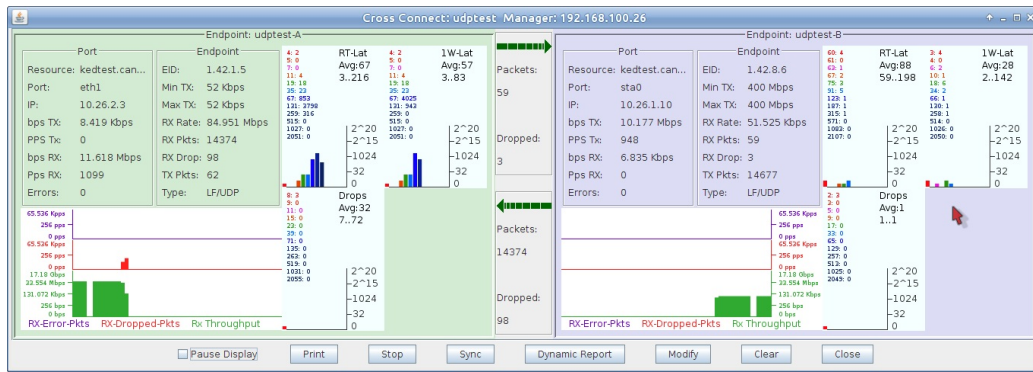
D. Configure the send buffer on **Endpoint B** to **1 MB**



A. Click **OK**

E. On the **Layer 3** tab, click **Start** to verify the AP and Station can connect

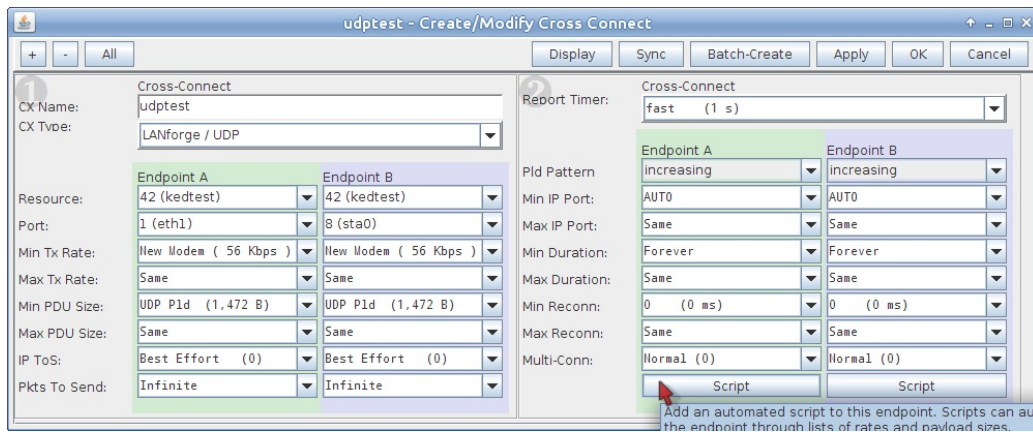
F. Click the **Display** button to monitor throughput



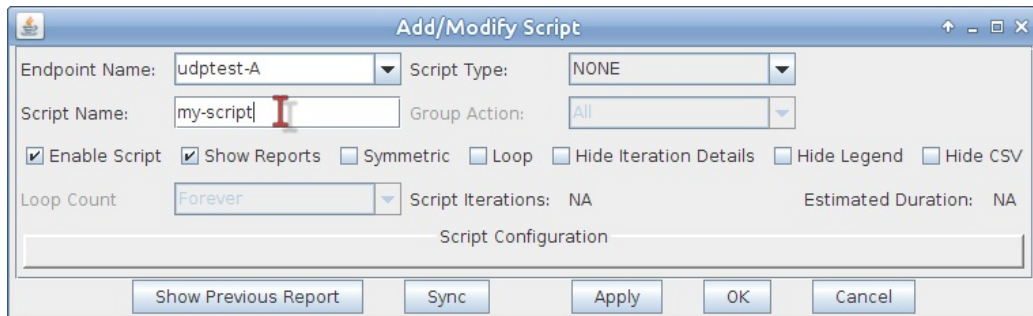
G. Only a short confirmation is necessary, click **Stop** on the Layer 3 tab

4. Configure Scripting for Cross Connect

- A. On the **Layer-3** tab, click **Modify**
- B. In the Level 2 box, click Endpoint A **Script** button



C. The Cross Connect Script window displays with no parameters



D. Select Script Type: **RFC-2544**. Set the following parameters:

- A. Select **Symmetric**. This will increment both the A and B rates and payload sizes. (Instead of just side A).
- B. Select **Show Attenuation**. This displays attenuation levels in the report.
- C. Run Duration: **10 sec**. This is how long each rate setting will be held.
- D. Pause Duration: **2 sec**. We give it some time to transition.
- E. Max Drop Percent **10%**
- F. Max Jitter **200ms**
- G. Max RT Latency **200ms**
- H. Rates A: **56kbps**. This sets the client upload target rate.
- I. Rates B: **400Mbps**. This sets the client download target rate.
- J. Pld A: **1472** This sets the client (sta0) MTU. This is a 1500 byte wire packet.
- K. Pld B: **9000** This sets the upstream (eth1) MTU.
- L. Attenuator Resource: **1.1.2**. You can find your attenuator resources in the **Attenuator** tab.
- M. Attenuation: **0..+5..955**. This is shorthand for: Begin at zero dB attenuation, increase in 0.5dB steps, until 955 dB of attenuation. Individual dB steps could also be specified.
- N. Click **OK**

E. On the **Create/Modify Cross Connect** window, click **OK**

5. Run the Cross Connect and Generate a Report

A. On the **Layer-3** tab, click **Start**

```

Script Report for: udptest-A
Constraints: 100000,200000,200000,100000,0
Steps-Completed: 0 Steps-Failed: 0
Estimated total script duration: 2880 seconds

Started At: Fri Nov 22 13:18:05 2013

Script on: udptest-A
Script: Script2544 Name: my-script
Flags: ACTIVE SHOW_REPORT SYMMETRIC SHOW_ATTENUATION
Group-Action: ALL
Loop-Count: 0
Max-Iterations: 192
Run-Duration: 10000ms Pause-Duration: 5000ms
Rates-A: bps,56000
Payload-Size-A: 1472
Rates-B: bps,400000000
Payload-Size-B: 9000
Attenuator: 1.1.2 Attenuations: 0..+.955
Constraints: 100000,200000,200000,100000,0
Steps-Completed: 0 Steps-Failed: 0
Estimated total script duration: 2880 seconds

Started At: Fri Nov 22 13:18:05 2013

# iteration: 0/192 Endpoint: udptest-A now: 1385155105395ms duration: 10001ms paused: 5000ms
# payload-size: 1472 cfg-rate: 56000
# tx-pkts: 47 tx-bytes: 69184 tx-bytes-low-level: 71158 tx-pps: 5
# tx-bps: 55342 tx-bps-low-level: 56921
# rx-pkts: 5941 rx-bytes: 53469000 rx-bytes-low-level: 55215654
# rx-pps: 594 rx-bps: 42770923 rx-bps-low-level: 44168106
# rx-drops: 45 rx-dups: 0 rx-ooo: 0 machine-load: 0.00
# peer: rx-pkts: 42 rx-bytes: 61824 rx-pps: 4
# rx-bps: 49454 rx-bps-low-level: 50865
# dropped: 5 drop percent: 10.6383 avg-rx-latency(us): 24000 avg-rt-latency(us): 143000 peer-machine-load: 0.00
# rx-signal: -9 tx-link-speed: 108000000 rx-link-speed: 162000000 attenuation: 0 peer-rx-signal: -9 peer-tx-link-speed: 162000000
peer-rx-link-speed: 108000000
# peer-dropped: 45 peer drop percent: 0.7518
# * Failed peer transmit-percent constraint, reported: 10.7737% min: 90
# * Failed drop-percent constraint, reported: 10.6383% max: 10

```

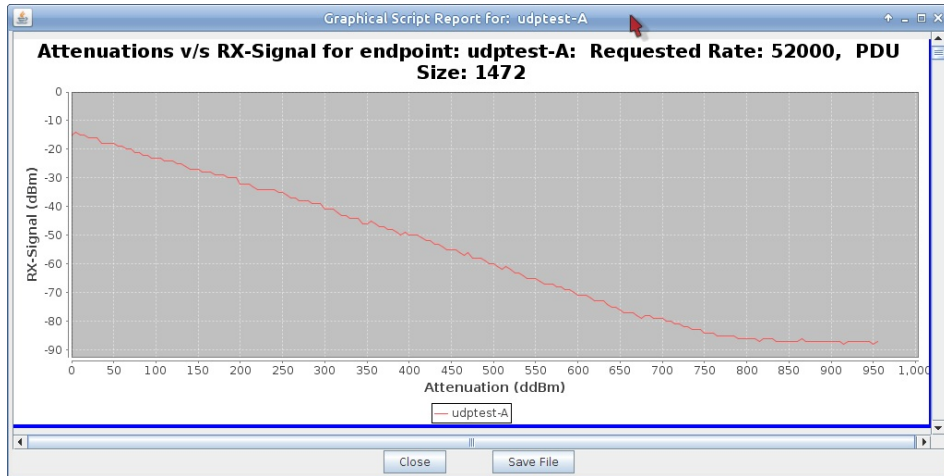
B. The Scripting Report window will appear

Script Report for: udptest-A										
187	0	0	0	40	10	0	0	0	0	0
188	0	0	0	25	33	0	0	0	0	0
189	0	0	0	82	0	0	0	0	0	0
190	0	0	43	60	0	0	0	0	0	0
191	234	26	60	22	0	0	0	0	0	0

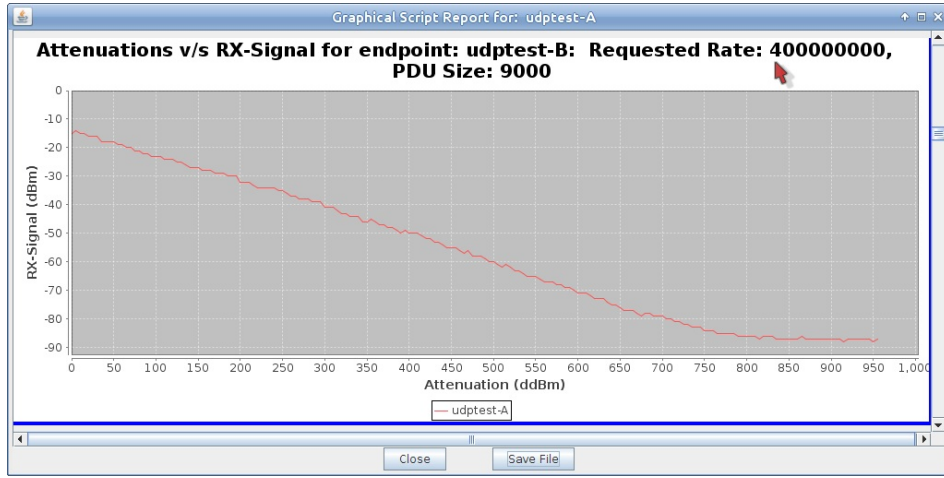
System Load at end of test: 0.05

End of Report, date: Mon Dec 9 18:30:09 2013

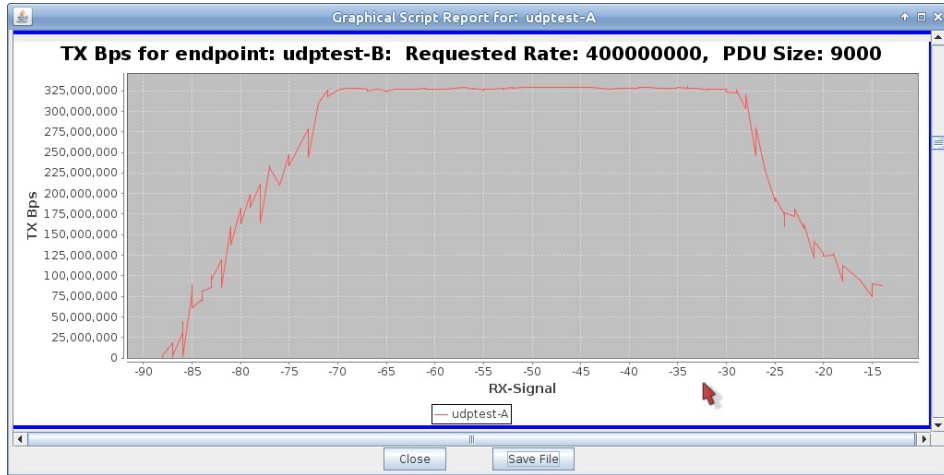
- When the script completes, you can view the graphed results.
- Click on **Graphical Display** and a window with the graphical report will display
- Scroll to the top of the window to view the graphs. Highlights are shown below.
- Attenuation v. RX signal, endpoint A



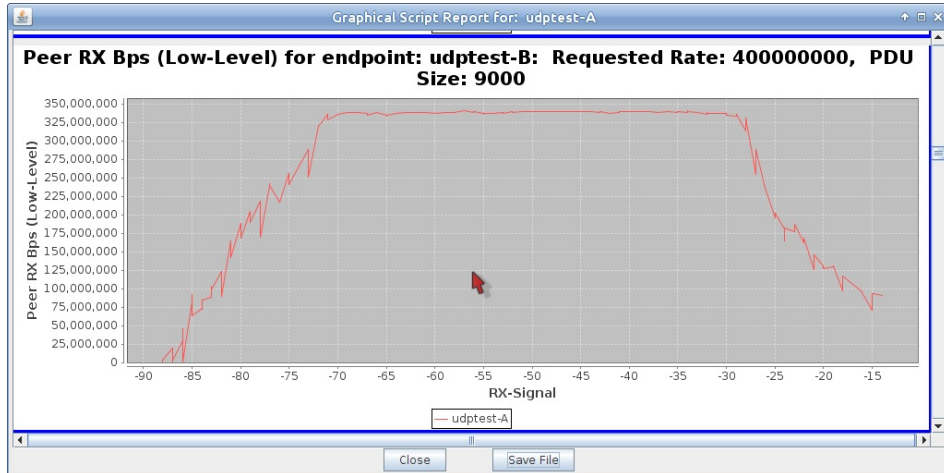
E. Attenuation v. RX signal, endpoint B



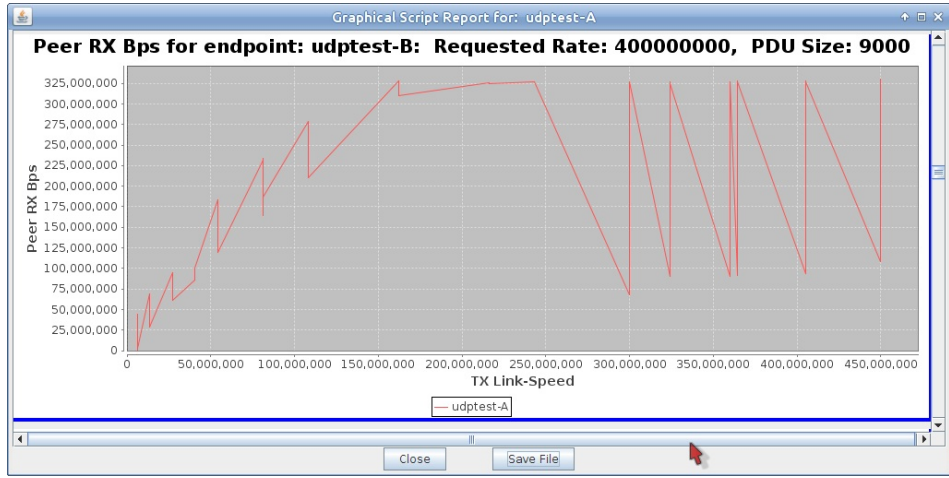
F. TX rate (UDP payload) v. RX signal, endpoint B



G. RX rate including frame headers (UDP payload with frame headers) v. RX signal, endpoint B



H. RX rate v. TX link speed. You see a sawtooth pattern because all attenuations are included.



I. Click on **Save File** and your browser will appear the the HTML copy of the report.

