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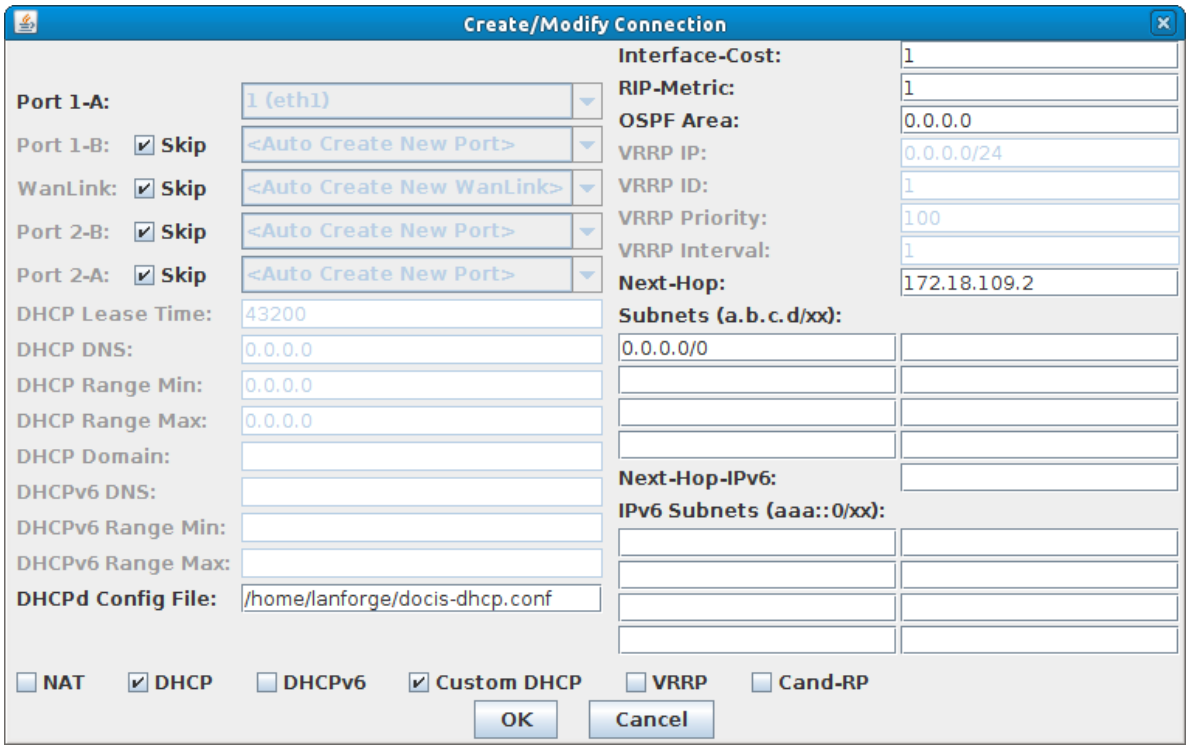
Scripted All-in-One Cable Modem Testing

Goal: Use LANforge to test CMTS and cable-modem network (DUT).
LANforge will serve DHCP and TFTP to the DUT, generate TCP traffic to measure upload and download speeds on each modem, and generate reports. In this example, eth0 is the management port, eth1 is the upstream network port (connects to CMTS), and ports eth2-eth9 are connected to cable modems. Eth2-9 are configured for DHCP, and eth1 is configured with static IP. Eth1 is also configured to serve DHCP requests to the cable modems and other LANforge ports.

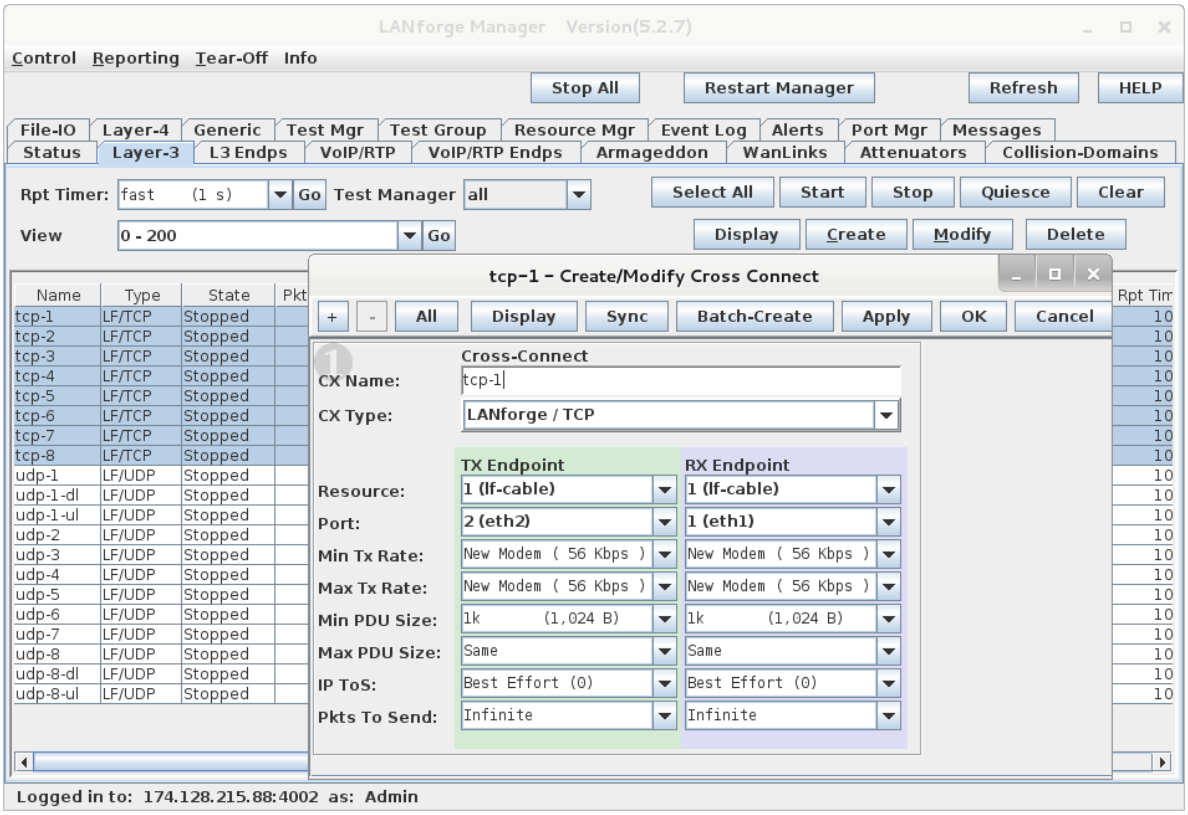
1. Set up the network interfaces.
2. Configure eth1 to serve DHCP and TFTP.
   A. Go to Status panel in LANforge GUI. Click 'Netsmith' button on the resource.
   B. Right-click in empty space and select **New Router**. Use default values and click **OK**.
   C. Drag eth1 into the virtual router. Then double-click the virtual eth1 icon to configure DHCP. DHCP files for CMTS setups must be hand-written by the user. Configure LANforge to use this custom-dhcp config file.



   D. When Netsmith setup is complete, click Apply on the main Netsmith window to start up the DHCP service, etc. This screenshot was taken after the Layer-3 connections were set up.

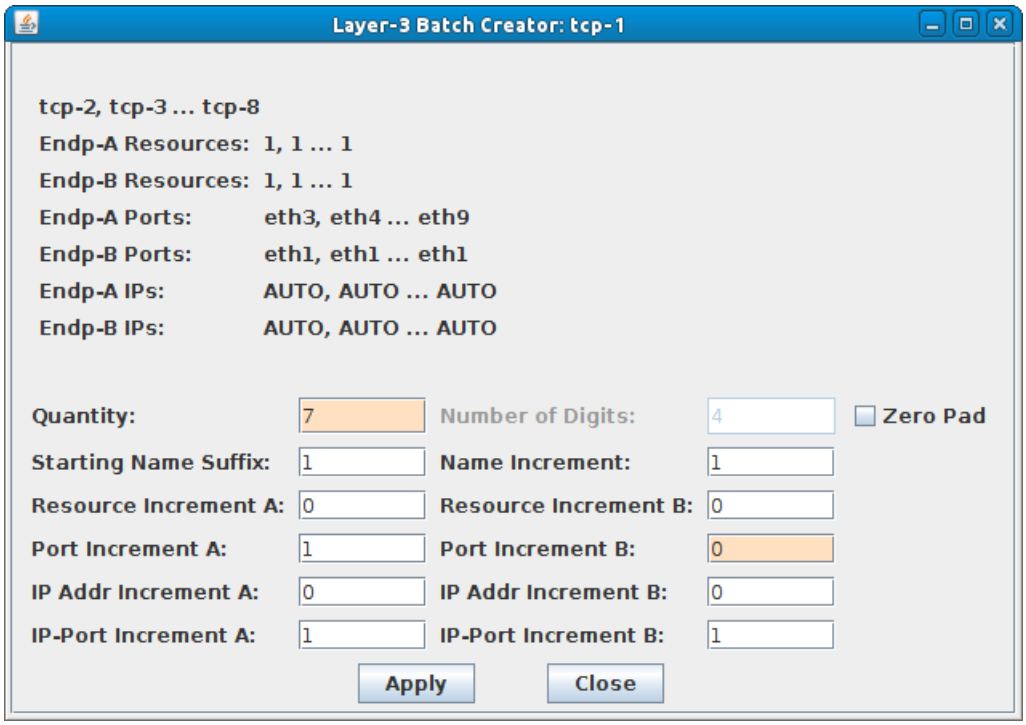
3. Configure eth2-9 to use DHCP.
   A. Go to Port-Mgr tab, double-click each port, and make sure the DHCP option is selected. Apply changes.
4. Set up Layer-3 connections to generate the throughput tests.

A. Go to the Layer-3 tab, and click Create. Many cable modems are configured to do NAT and/or some firewalling, so normally you will need the connections to be TCP and to originate out from the client-side port. So, choose the LANforge/TCP connection type, and make the 'B' side eth1. Everything else can stay at the default values because we will use a script to automate the settings.



B. Create 7 similar connections, always with B side port of eth1, and use A side ports eth2-eth9. In the Create/Modify window you can just change the name, change the port, and press apply. This will make copies of the connections.

A. You can also use **Batch-Create** (located in the Create/Modify window) to create these connections.

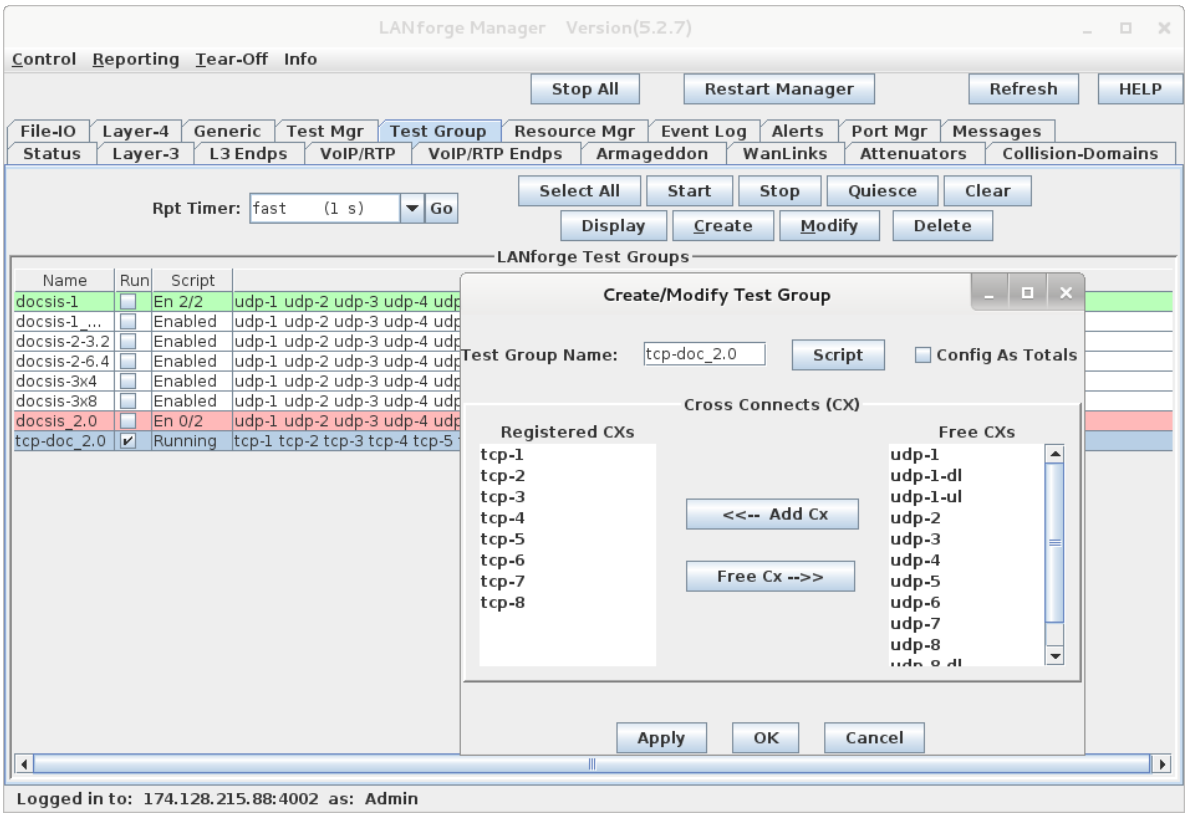


B. Set **Quantity** to 7, **Port Increment B** to 0, and deselect **Zero Pad**.

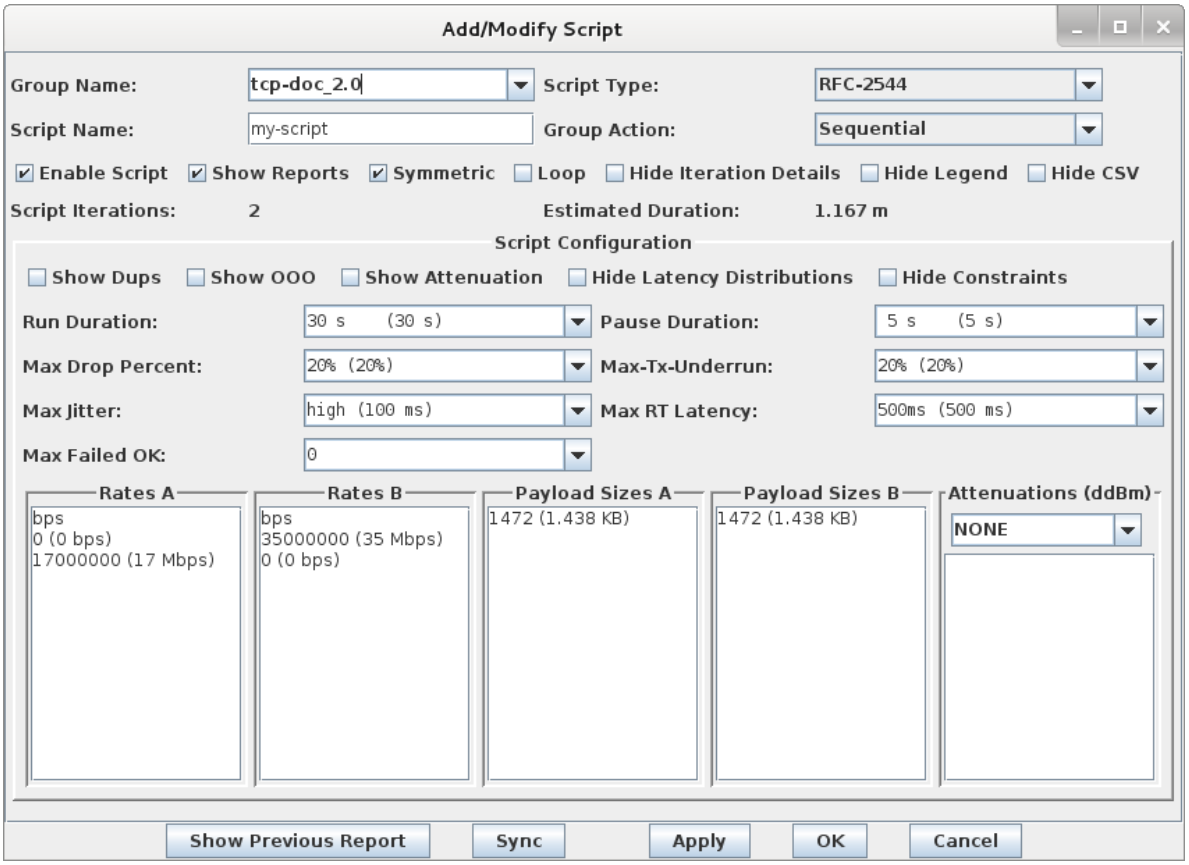
C. Click **Apply**.

5. Create Test-Group to control the 8 Layer-3 TCP connections.

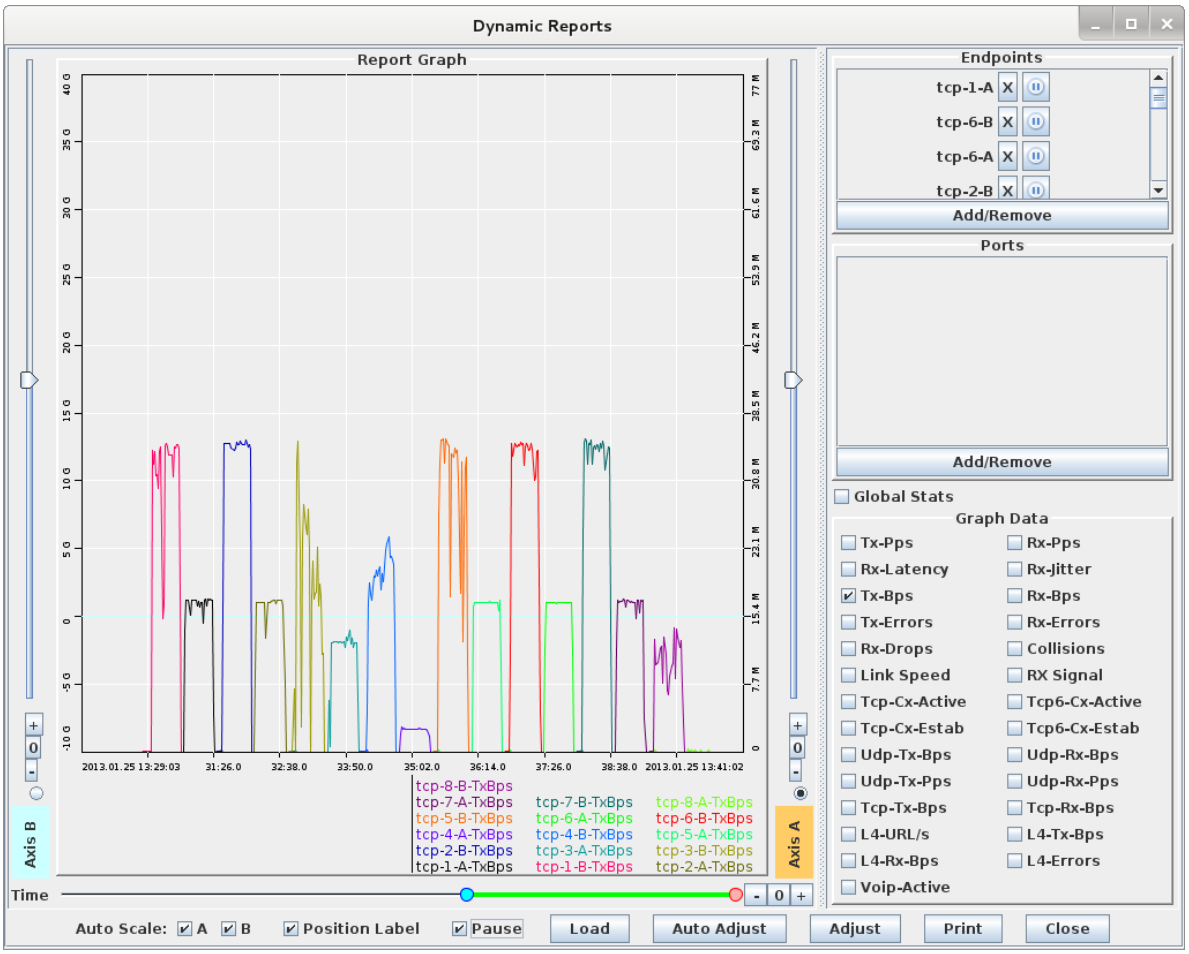
A. Go to the Test Group tab, and click Create. Give your test group a name. Select the 8 Layer-3 TCP connections you just created in the previous step and add those to the Test Group. Click Apply and make sure the new group shows up in the Test Group table.



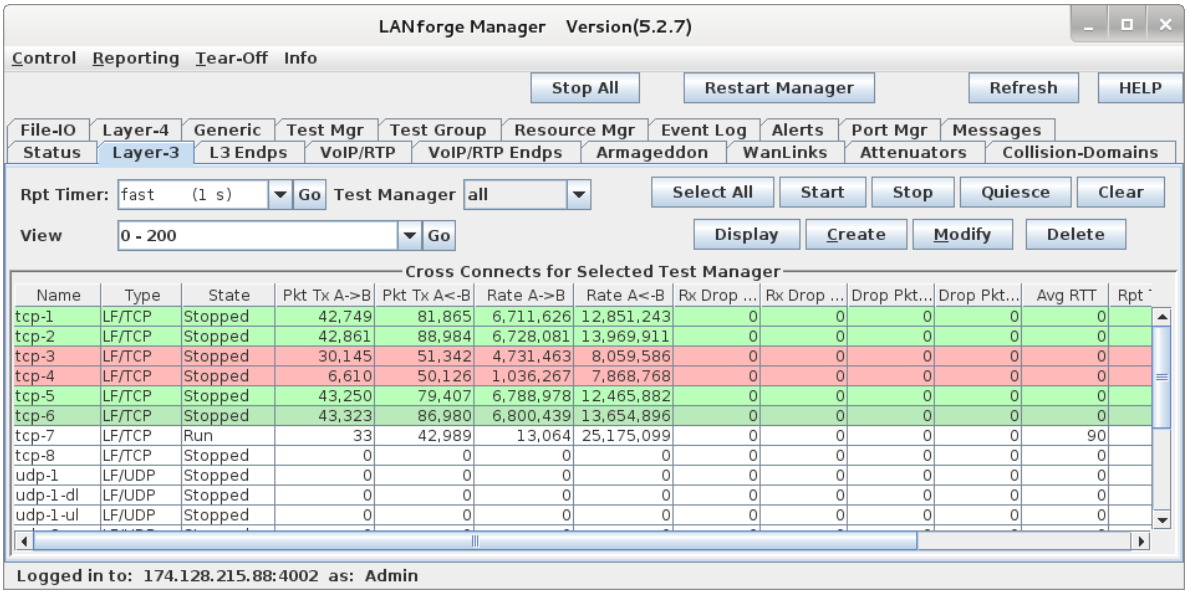
B. We need to add a script to automate the test. Click the Script button in the Test Group create/modify window. Choose RFC 2544 script type. In this scenario, we want to test each modem one at a time, so we select the Sequential option for Group Action. The rates sections determine the speeds for each iteration. In this case, the first iteration will send from B to A at 35Mbps. This is the download test. The next iteration will upload from A to B at 17Mbps. When the two iterations are complete, the script will repeat on the next Layer-3 connection.



6. Run the test.
   A. To start the test, select the Test Group in the table and click the Start button. You should see a script-report window pop up, and the state should go to running. To see a live report of throughput and other values, right-click on the Test Group table and select the Dynamic Report option.

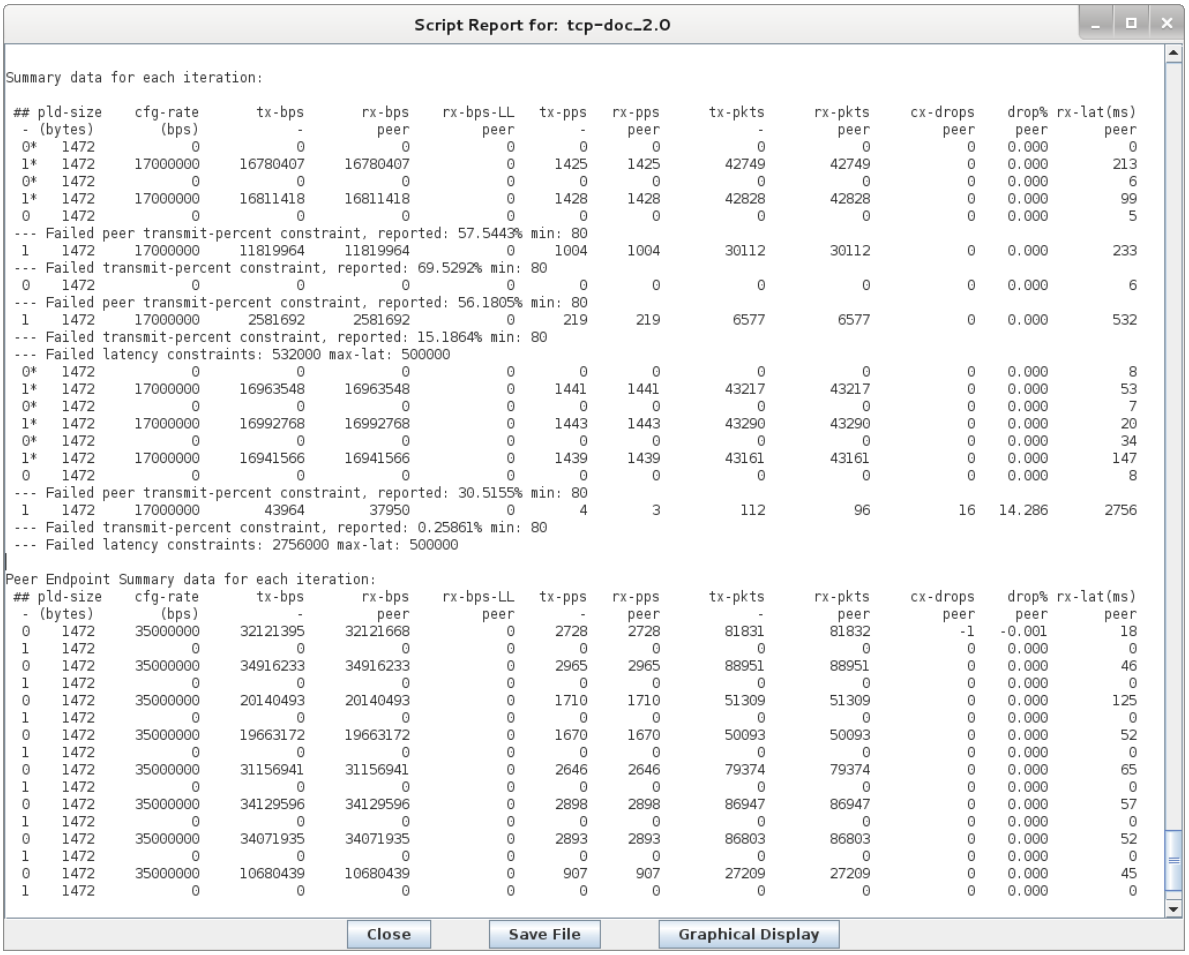


   B. View the individual connections from the Layer-3 tab.



7. Gather reports.

A. When the script completes, a summary of each iteration will be shown in the Script Report window. The text may be converted to HTML, but for this particular script, the graphs are not useful because we are using Sequential mode, so just saving the text to a file or printing it is probably the best option. Note that some of these tests failed the constraints configured in the script. In this case, it is because those modems were not capable of the requested speeds.



Script Report for: tcp-doc_2.0

Summary data for each iteration:

##	pld-size (bytes)	cfg-rate (bps)	tx-bps -	rx-bps peer	rx-bps-LL peer	tx-pps -	rx-pps peer	tx-pkts -	rx-pkts peer	cx-drops peer	drop% peer	rx-lat(ms) peer
0*	1472	0	0	0	0	0	0	0	0	0	0.000	0
1*	1472	17000000	16780407	16780407	0	1425	1425	42749	42749	0	0.000	213
0*	1472	0	0	0	0	0	0	0	0	0	0.000	6
1*	1472	17000000	16811418	16811418	0	1428	1428	42828	42828	0	0.000	99
0	1472	0	0	0	0	0	0	0	0	0	0.000	5
--- Failed peer transmit-percent constraint, reported: 57.5443% min: 80												
1	1472	17000000	11819964	11819964	0	1004	1004	30112	30112	0	0.000	233
--- Failed transmit-percent constraint, reported: 69.5292% min: 80												
0	1472	0	0	0	0	0	0	0	0	0	0.000	6
--- Failed peer transmit-percent constraint, reported: 56.1805% min: 80												
1	1472	17000000	2581692	2581692	0	219	219	6577	6577	0	0.000	532
--- Failed transmit-percent constraint, reported: 15.1864% min: 80												
--- Failed latency constraints: 532000 max-lat: 500000												
0*	1472	0	0	0	0	0	0	0	0	0	0.000	8
1*	1472	17000000	16963548	16963548	0	1441	1441	43217	43217	0	0.000	53
0*	1472	0	0	0	0	0	0	0	0	0	0.000	7
1*	1472	17000000	16992768	16992768	0	1443	1443	43290	43290	0	0.000	20
0*	1472	0	0	0	0	0	0	0	0	0	0.000	34
1*	1472	17000000	16941566	16941566	0	1439	1439	43161	43161	0	0.000	147
0	1472	0	0	0	0	0	0	0	0	0	0.000	8
--- Failed peer transmit-percent constraint, reported: 30.5155% min: 80												
1	1472	17000000	43964	37950	0	4	3	112	96	16	14.286	2756
--- Failed transmit-percent constraint, reported: 0.25861% min: 80												
--- Failed latency constraints: 2756000 max-lat: 500000												

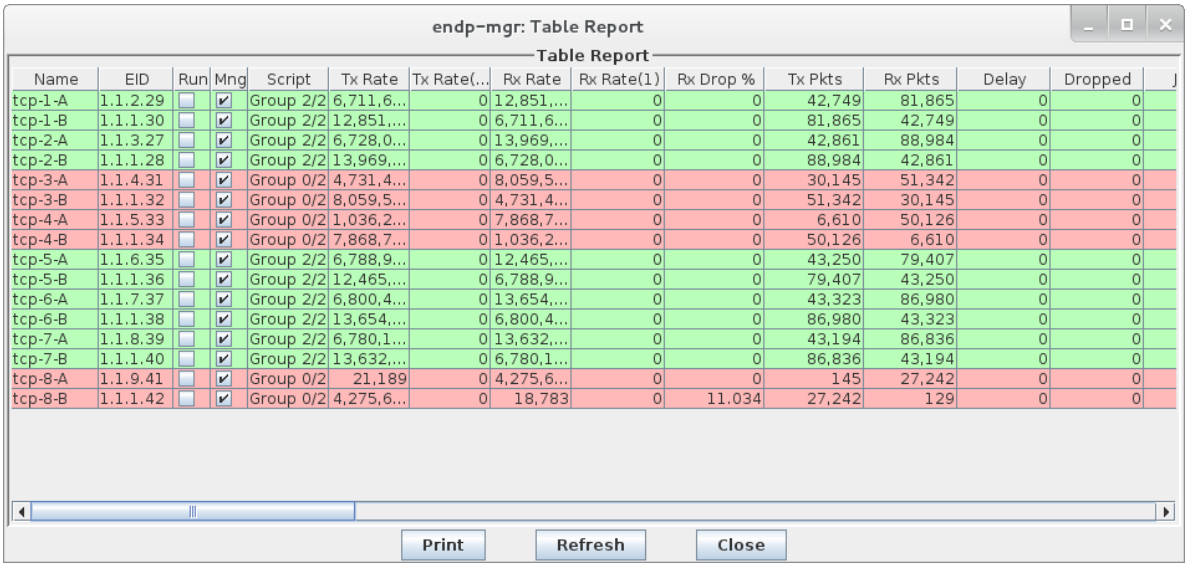
Peer Endpoint Summary data for each iteration:

##	pld-size (bytes)	cfg-rate (bps)	tx-bps -	rx-bps peer	rx-bps-LL peer	tx-pps -	rx-pps peer	tx-pkts -	rx-pkts peer	cx-drops peer	drop% peer	rx-lat(ms) peer
0	1472	35000000	32121395	32121668	0	2728	2728	81831	81832	-1	-0.001	18
1	1472	0	0	0	0	0	0	0	0	0	0.000	0
0	1472	35000000	34916233	34916233	0	2965	2965	88951	88951	0	0.000	46
1	1472	0	0	0	0	0	0	0	0	0	0.000	0
0	1472	35000000	20140493	20140493	0	1710	1710	51309	51309	0	0.000	125
1	1472	0	0	0	0	0	0	0	0	0	0.000	0
0	1472	35000000	19663172	19663172	0	1670	1670	50093	50093	0	0.000	52
1	1472	0	0	0	0	0	0	0	0	0	0.000	0
0	1472	35000000	31156941	31156941	0	2646	2646	79374	79374	0	0.000	65
1	1472	0	0	0	0	0	0	0	0	0	0.000	0
0	1472	35000000	34129596	34129596	0	2898	2898	86947	86947	0	0.000	57
1	1472	0	0	0	0	0	0	0	0	0	0.000	0
0	1472	35000000	34071935	34071935	0	2893	2893	86803	86803	0	0.000	52
1	1472	0	0	0	0	0	0	0	0	0	0.000	0
0	1472	35000000	10680439	10680439	0	907	907	27209	27209	0	0.000	45
1	1472	0	0	0	0	0	0	0	0	0	0.000	0

Close | Save File | Graphical Display

B. When the script completes, you could also pause the dynamic report and print it. For an electronic copy, use a PDF printer to create PDF files instead of printing to paper.

C. The Layer-3 tab will color-code the 8 connections, with red meaning fail, and green meaning pass. You can print the connections you are interested in by selecting them in the table and using right-click → Table Report. This report can be printed or otherwise saved.



endp-mgr: Table Report

Table Report

Name	EID	Run	Mng	Script	Tx Rate	Tx Rate(...	Rx Rate	Rx Rate(1)	Rx Drop %	Tx Pkts	Rx Pkts	Delay	Dropped	J
tcp-1-A	1.1.2.29	☐	☑	Group 2/2	6,711,6...	0	12,851,...	0	0	42,749	81,865	0	0	
tcp-1-B	1.1.1.30	☐	☑	Group 2/2	12,851,...	0	6,711,6...	0	0	81,865	42,749	0	0	
tcp-2-A	1.1.3.27	☐	☑	Group 2/2	6,728,0...	0	13,969,...	0	0	42,861	88,984	0	0	
tcp-2-B	1.1.1.28	☐	☑	Group 2/2	13,969,...	0	6,728,0...	0	0	88,984	42,861	0	0	
tcp-3-A	1.1.4.31	☐	☑	Group 0/2	4,731,4...	0	8,059,5...	0	0	30,145	51,342	0	0	
tcp-3-B	1.1.1.32	☐	☑	Group 0/2	8,059,5...	0	4,731,4...	0	0	51,342	30,145	0	0	
tcp-4-A	1.1.5.33	☐	☑	Group 0/2	1,036,2...	0	7,868,7...	0	0	6,610	50,126	0	0	
tcp-4-B	1.1.1.34	☐	☑	Group 0/2	7,868,7...	0	1,036,2...	0	0	50,126	6,610	0	0	
tcp-5-A	1.1.6.35	☐	☑	Group 2/2	6,788,9...	0	12,465,...	0	0	43,250	79,407	0	0	
tcp-5-B	1.1.1.36	☐	☑	Group 2/2	12,465,...	0	6,788,9...	0	0	79,407	43,250	0	0	
tcp-6-A	1.1.7.37	☐	☑	Group 2/2	6,800,4...	0	13,654,...	0	0	43,323	86,980	0	0	
tcp-6-B	1.1.1.38	☐	☑	Group 2/2	13,654,...	0	6,800,4...	0	0	86,980	43,323	0	0	
tcp-7-A	1.1.8.39	☐	☑	Group 2/2	6,780,1...	0	13,632,...	0	0	43,194	86,836	0	0	
tcp-7-B	1.1.1.40	☐	☑	Group 2/2	13,632,...	0	6,780,1...	0	0	86,836	43,194	0	0	
tcp-8-A	1.1.9.41	☐	☑	Group 0/2	21,189	0	4,275,6...	0	0	145	27,242	0	0	
tcp-8-B	1.1.1.42	☐	☑	Group 0/2	4,275,6...	0	18,783	0	11.034	27,242	129	0	0	

Print | Refresh | Close