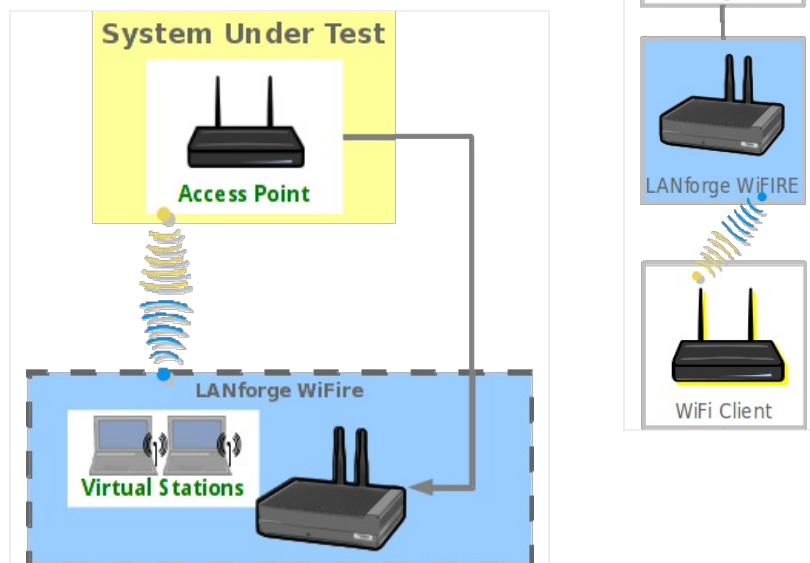


Using LANforge python script to test QoS on WiFi Networks

Goal: Create data connections with different QoS settings and report on throughput and latency

This script automates creating data connections with BK, BE, VI, VO and/or other QoS settings. It then runs the tests for a specified amount of time and reports on latency and throughput. The report is an xlsx spreadsheet that can be opened in your favorite spread-sheet tool. This script requires LANforge 5.4.2 or higher.



1. Create and configure stations to talk to your DUT. You may create these through Chamber View scenarios or other methods. Please refer to introductory cookbooks for more information on this if you have questions.
2. Run lf_tos_test.py script.
 - A. Change directory to the /home/lanforge/scripts directory (or other location if you have installed scripts elsewhere), and run the lf_tos_tst.py script with the --help argument to understand your options..

```

greearb@ben-home:~/btbits/x64_btbits/server/lf_scripts
File Edit View Search Terminal Help
[greearb@ben-home lf_scripts]$ ./lf_tos_test.py --help
usage: lf_tos_test.py [-h] [--upstream_port UPSTREAM_PORT] [--station STATION]
                    [--lfmgr LFMGR] [--outfile OUTFILE] [--tos TOS]
                    [--speed_mbps SPEED_MBPS] [--duration DURATION]
                    [--proto PROTO]

ToS report Script
optional arguments:
  -h, --help            show this help message and exit
  --upstream_port UPSTREAM_PORT
                        LANforge upstera-port to use (1.eth1, etc)
  --station STATION     LANforge stations to use (1.wlan0 1.wlan1 etc)
  --lfmgr LFMGR         LANforge Manager IP address
  --outfile OUTFILE     Output file for csv data
  --tos TOS             IP Type of Service: BK BE VI VO
  --speed_mbps SPEED_MBPS
                        Total requested transmit speed, in Mbps
  --duration DURATION   Duration to run traffic, in minutes
  --proto PROTO         List of protocols (udp tcp)
[greearb@ben-home lf_scripts]$

```

- B. Run the script with arguments for your test case. The basic idea is to provide a list of stations you wish to use for traffic generation, the upstream port, the type of service settings to use, requested bandwidth, etc.

Examples

Run BE, BK, VI VO traffic between eth1 and sta0000, 500Mbps total traffic requested, with 15 second duration:

```
./lf_tos_test.py --upstream 1.eth1 --lfmgr 192.168.100.156 --station "1.sta00000" \
--tos "BK BE VI VO" --speed_mbps 500 --duration 0.25 --proto "udp"
```

```

greearb@ben-home:~/btbits/x64_btbits/server/lf_scripts
File Edit View Search Terminal Help

[greearb@ben-home lf_scripts]$ ./lf_tos_test.py --upstream 1.eth1 --lfmgr 192.168.100.156 --station "1.s
ta00000" --tos "BK BE VI VO" --speed_mbps 500 --duration 0.25 --proto "udp"
[set_port 1 1 sta00000 NA NA NA NA 0 NA NA NA NA 8388610 ]
[set_port 1 1 sta00000 NA NA NA NA 0 NA NA NA NA 8388610]
Station is associated with IP address.
[add_endp scr-tos-0-A 1 1 sta00000 lf_udp -1 NA 56000 56000 NA -1 -1 increasing NO NA 0 0 ]
[add_endp scr-tos-0-A 1 1 sta00000 lf_udp -1 NA 56000 56000 NA -1 -1 increasing NO NA 0 0]
[add_endp scr-tos-0-B 1 1 eth1 lf_udp -1 NA 125000000 125000000 NA -1 -1 increasing NO NA 0 0 ]
[add_endp scr-tos-0-B 1 1 eth1 lf_udp -1 NA 125000000 125000000 NA -1 -1 increasing NO NA 0 0]
Cross-connect: scr-tos-0 added to Test-Manager: default_tm.
>>RSLT: 0 Cmd: 'add_cx' 'scr-tos-0' 'default_tm' 'scr-tos-0-A' 'scr-tos-0-B'

default@
btbits>>
default_tm: Setting state on CX: scr-tos-0 to RUNNING.
>>RSLT: 0 Cmd: 'set_cx_state' 'all' 'scr-tos-0' 'RUNNING'

default@
btbits>>
[add_endp scr-tos-1-A 1 1 sta00000 lf_udp -1 NA 56000 56000 NA -1 -1 increasing NO NA 0 0 ]
[add_endp scr-tos-1-A 1 1 sta00000 lf_udp -1 NA 56000 56000 NA -1 -1 increasing NO NA 0 0]
[add_endp scr-tos-1-B 1 1 eth1 lf_udp -1 NA 125000000 125000000 NA -1 -1 increasing NO NA 0 0 ]
[add_endp scr-tos-1-B 1 1 eth1 lf_udp -1 NA 125000000 125000000 NA -1 -1 increasing NO NA 0 0]
Cross-connect: scr-tos-1 added to Test-Manager: default_tm.
>>RSLT: 0 Cmd: 'add_cx' 'scr-tos-1' 'default_tm' 'scr-tos-1-A' 'scr-tos-1-B'

default@
btbits>>
default_tm: Setting state on CX: scr-tos-1 to RUNNING.
>>RSLT: 0 Cmd: 'set_cx_state' 'all' 'scr-tos-1' 'RUNNING'

default@

```

- C. The auto-created data connections can be found in the Layer-3 tab in the LANforge GUI.

LANforge Manager Version(5.4.2)

Control Reporting Tear Off Info Plugins

Chamber View Stop All Restart Manager Refresh HELP

Resource Mgr vAP Stations DUT Profiles Traffic-Profiles Event Log Alerts Messages Warnings +

VoIP/RTP Endps Attenuators RF-Generator File-IO Generic Test Mgr Test Group Collision-Domains

Status Port Mgr Layer-3 L3 Endps Layer 4-7 Armageddon WanLinks VoIP/RTP

Rpt Timer: fast (1 s) Go Test Manager all Select All Start + Stop - Quiesce Clear

View 0 - 500 Go Display Create Modify Delete

Cross Connects for Selected Test Manager

Name	Type	State	Pkt Rx A	Pkt Rx B	Bps Rx B	Bps Rx A	Rx Drop % A	Rx Drop % B	Drop Pkts A	Drop Pkts B	Avg RTT	Rx
scr-tos-0	LF/UDP	Run	184,419	86	55,788	121,938,...	1.212	0	2,334	0	40	
scr-tos-1	LF/UDP	Run	191,625	81	55,748	124,886,...	0	0	0	0	28	
scr-tos-2	LF/UDP	Run	182,942	82	55,784	124,881,...	0	0	0	0	17	
scr-tos-3	LF/UDP	Run	185,055	82	55,346	124,904,...	0	0	0	0	15	

Logged in to: 192.168.100.156:4002 as: Admin

D. Here are the details of one of the connections.

scr-tos-0 - Create/Modify Cross Connect

Buttons: +, -, All, Display, Sync, Batch-Create, Apply, OK, Cancel

Cross-Connect

CX Name: scr-tos-0
CX Type: LANforge / UDP

Endpoint A

Resource: 1 (TR-398)
Port: 18 (sta00000)
Min Tx Rate: New Modem (56 Kbps)
Max Tx Rate: Same
Min PDU Size: AUTO
Max PDU Size: AUTO
IP ToS: BK (WiFi) (64)
Pkts To Send: Infinite

Endpoint B

Resource: 1 (TR-398)
Port: 1 (eth1)
Min Tx Rate: 125000000 (125 Mbps)
Max Tx Rate: Same
Min PDU Size: AUTO
Max PDU Size: AUTO
IP ToS: BK (WiFi) (64)
Pkts To Send: Infinite

Cross-Connect Settings

Report Timer: default (5 s)
Pld Pattern: Increasing
Min IP Port: AUTO
Max IP Port: Same
Min Duration: Forever
Max Duration: Same
Min Recon: 0 (0 ms)
Max Recon: Same
Multi-Conn: Normal (0)

Buttons: Script, Thresholds

E. The script will run for the requested duration and then stop the traffic and generate the xlsx report.

```

greearb@ben-home:~/btbits/x64_btbits/server/lf_scripts
File Edit View Search Terminal Help

default@
btbits>>
default_tm: Setting state on CX: scr-tos-3 to RUNNING.
>>RSLT: 0 Cmd: 'set_cx_state' 'all' 'scr-tos-3' 'RUNNING'

default@
btbits>>
Waiting 15.0 seconds to let traffic run for a bit
default_tm: Setting state on CX: scr-tos-0 to STOPPED.
>>RSLT: 0 Cmd: 'set_cx_state' 'all' 'scr-tos-0' 'STOPPED'

default@
btbits>>
default_tm: Setting state on CX: scr-tos-1 to STOPPED.
>>RSLT: 0 Cmd: 'set_cx_state' 'all' 'scr-tos-1' 'STOPPED'

default@
btbits>>
default_tm: Setting state on CX: scr-tos-2 to STOPPED.
>>RSLT: 0 Cmd: 'set_cx_state' 'all' 'scr-tos-2' 'STOPPED'

default@
btbits>>
default_tm: Setting state on CX: scr-tos-3 to STOPPED.
>>RSLT: 0 Cmd: 'set_cx_state' 'all' 'scr-tos-3' 'STOPPED'

default@
btbits>>
Xlsx results stored in tos_results.xlsx
[greearb@ben-home lf_scripts]$
  
```

F. You can open the xlsx report in your favorite spread sheet tool. Here is the first part of the document.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
	CX Name	Endp-Name	Port	Protocol	ToS	AP BSSID	Band width	Mode	Last MCS Rx	Combined RSSI	Endpoint Offered Load	Endpoint Rx Throughput	Cx Offered Load	Cx Rx Throughput
2	scr-tos-0	scr-tos-0-A	1.sta00000	udp	BK	78:d2:94:4f:21:78	80	802.11an-AC	650000kbps	-63dBm	0.02	46.46	47.69	46.48
3	scr-tos-0	scr-tos-0-B	1.eth1	udp	BK	78:d2:94:4f:21:78	80	802.11an-AC	650000kbps	-63dBm	47.67	0.02	47.69	46.48
4	scr-tos-1	scr-tos-1-A	1.sta00000	udp	BE	78:d2:94:4f:21:78	80	802.11an-AC	650000kbps	-63dBm	0.02	44.82	45.70	44.84
5	scr-tos-1	scr-tos-1-B	1.eth1	udp	BE	78:d2:94:4f:21:78	80	802.11an-AC	650000kbps	-63dBm	45.68	0.02	45.70	44.84
6	scr-tos-2	scr-tos-2-A	1.sta00000	udp	VI	78:d2:94:4f:21:78	80	802.11an-AC	650000kbps	-63dBm	0.02	42.77	43.33	42.79
7	scr-tos-2	scr-tos-2-B	1.eth1	udp	VI	78:d2:94:4f:21:78	80	802.11an-AC	650000kbps	-63dBm	43.31	0.02	43.33	42.79
8	scr-tos-3	scr-tos-3-A	1.sta00000	udp	VO	78:d2:94:4f:21:78	80	802.11an-AC	650000kbps	-63dBm	0.02	40.46	41.34	40.48
9	scr-tos-3	scr-tos-3-B	1.eth1	udp	VO	78:d2:94:4f:21:78	80	802.11an-AC	650000kbps	-63dBm	41.32	0.02	41.34	40.48

- G. The more interesting part of the report is the throughput and latency results. The latency-range columns show the amount of packets received in certain latency ranges. This gives you an idea of jitter and other latency related information. The average latency is a good way to get a quick idea of the latency.

	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB
1	Cx Rx Throughput	Avg Latency	Min Latency	Max Latency	Latency Range 0	Latency Range 1	Latency Range 2-3	Latency Range 4-7	Latency Range 8-15	Latency Range 16-31	Latency Range 32-63	Latency Range 64-127	Latency Range 128-255	Latency Range 256-511	Latency Range 512-1
2	46.48	81	0	525	3540	6010	13747	27668	21381	3720	7526	34040	32674	85409	15
3	46.48	39	1	223	0	9	3	7	11	16	16	20	18	5	0
4	44.84	14	0	149	2537	3982	10384	29199	54870	68519	48288	12679	863	0	0
5	44.84	22	1	156	0	6	3	10	20	21	27	10	3	3	0
6	42.79	19	0	56	781	1961	9172	39919	90797	68661	7558	0	0	0	0
7	42.79	10	1	54	0	11	11	22	18	24	9	3	0	0	0
8	40.48	6	1	41	0	377	3071	24264	82920	87847	8397	91	0	0	0
9	40.48	8	2	27	0	0	19	21	24	23	5	0	0	0	0
10															
11															
12															

- H. For more details, see the [spread-sheet result from this test](#).
There is also a more advanced script that does similar work, see: `./lf_tos_plus_test.py --help`, [example output](#).