

Using Flent to Generate Traffic

Goal: Set up virtual stations using a LANforge system, connect them to an AP under test, set up Flent, and run tests.

In this test scenario a LANforge system is used to create both the wireless stations and Flent test setup. The tests can then be configured to use Flent to generate upload or download traffic.

FLENT - **FLE**xible **N**etwork **T**ester is a set of python scripts that use various open-source tools to generate traffic and collect test data. Flent is developed and maintained by **Toke Høiland-Jørgensen** One advantage to using Flent on LANforge is that a single LANforge box can send traffic to itself which eliminates the need for multiple systems to run client/server test traffic against a DUT.



- 1. Install packages required to run Flent on Fedora-39 (also works on Fedora-36).
 - A. Install flent installing flent will also install dependencies netperf, netserver, fping and irth sudo dnf install flent
- 2. Install packages from source when required to run Flent on Fedora-30.

Additional packages may need to be installed. See flent.org for more info.

- A. Install automake and texinfo
 sudo dnf install automake texinfo autoconf autotools-dev kernel-devel
- B. Flent git clone https://github.com/tohojo/flent.git cd flent git checkout v1.3.2 sudo python3 setup.py install
- C. Flent GUI only necessary to view flent output graphs sudo dnf install python3-matplotlib python3-matplotlib-qt5 sudo dnf install python3-qt5 python3-PyQt5 python3-QtPy
- D. Netperf/Netserver

git clone https://github.com/HewlettPackard/netperf.git
cd netperf
sudo ./autogen.sh
sudo ./configure --enable-demo=yes
sudo make
sudo make

- E. Fping git clone https://github.com/schweikert/fping.com cd fping git checkout 3.6 sudo ./autogen.sh sudo ./configure sudo make sudo make install
- F. Iperf2 Required for the --enhanced option which will display enhanced output in reports. dnf install iperf

3. To view a list of possible Flent tests, or run Flent by command line, open a terminal window.

```
[lanforge@ct523c-0b29 ~]$ flent --list-tests
                                                                       Available tests:
bursts
                        : Latency measurements under intermittent UDP bu
bursts 11e
                        : 802.11e Latency measurements under intermitten
cisco 5tcpup
                         : RTT Fair Realtime Response Under Load
cisco_5tcpup_2udpflood : Cisco 5TCP up + 2 6Mbit UDP
                        : Cubic VS BBR smackdown
cubic bbr
cubic cdg
                        : Cubic VS CDG smackdown
cubic dctcp
                        : Cubic VS DCTCP smackdown
                        : Cubic VS Ledbat smackdown
cubic ledbat
cubic ledbat 1
                         : Cubic vs LEDBAT upload streams w/ping
cubic reno
                         : Cubic VS Reno smackdown
cubic westwood
                        : Cubic VS Westwood
dslreports 8dn
                        : 8 down - dslreports dsl test equivalent
http
                        : HTTP latency test
http-1down
                        : HTTP get latency with competing TCP download s
http-lup
                        : HTTP get latency with competing TCP upload str
                         : HTTP get latency with competing RRUL test
http-rrul
iterated_bidirectional : Iterated TCP bidirectional transfers example
ledbat_cubic_1 : Cubic vs LEDBAT upload streams w/ping
•
```

4. Enter interface names to be used in Flent tests into the /etc/hosts file.

This is necessary for some of the Flent tools that can only use an interface name rather than IP address.

• Mate Terminal	\sim \sim \times
File Edit View Search Terminal Help	
<pre>[root@ct523c-0b29 ~]# cat /etc/hosts</pre>	<u>^</u>
::1 localnost localnost.localdomain localnoste localnoste.localdomaine	
192.168.50.37 wired	
192.168.50.191 sta00000	
192.168.50.207 sta00500	
192.168.50.82 sta01000	
192.168.50.223 sta01001	

- 5. To run Flent tests by command line:
 - A. Run netserver. This will start the netserver program which is the traffic server for the other Flent tools specifically netperf.

```
[lanforge@ct523c-0b29 ~]$ netserver
Starting netserver with host 'IN(6)ADDR_ANY' port '12865' and family AF_UNSPEC
```

B. Run one of the available tests. Because LANforge is using vrf, use the vrf_exec.bash script to specify which interface to run the test. The direction of the test is from the perspective of the wired interface. Use the -- swap-up-down option to change the direction to the host interface which is the wireless station sta00000 in this example.



6. To run Flent tests from the LANforge GUI, select the Generic tab from the main GUI window.

•		LANforg	je Manager Version(5	5.4.2)	\odot \odot \otimes
<u>Control</u> <u>R</u> ep	orting Tear <u>O</u> ff	<u>I</u> nfo <u>P</u> lugins			
Test Group	Resource Mar	Chamber <u>V</u> iew	Stop All Profiles Event Log Alert	Restart Manager	Refresh HELP
WanLinks	VolP/RTP	VoIP/RTP Endps	Attenuators	RF-Generator File-IO	Generic Test Mgr
Status	s Por	rt Mgr Layer-3	L3 Endps	Layer 4-7	Armageddon
	Rpt Timer: fast	t (1 s) 🗸 Go Test	Manager all	Select All Start +	Stop - Clear
Name	EID Status	Rpt#	Last Results	Tx E	vtes Rx Bvtes Tx Pkt
		11			
Logged in to:	localhost:4002 a	as: Admin			

7. Create the Flent netserver.

Here it is useful to create one Generic endpoint to start netserver and one to stop it because the netserver program runs in the background once it is started.

0		Create/M	odify Ge	eneric End	ooint		\sim \times \times	0		Create/M	1odify Generic	Endpoint		\sim \times
Name:	netserver-start	Rpt Timer:	fast	(1 s) 🔻	Test Manager:	default_tm	-	Name:	netserver-stop	Rpt Timer:	fast (1 s)	▼ Test Manager	default_tm	•
Shelf:	1	Resource:	1 (ct523c	-6b29) 👻	Port:	0 (eth0)(MGT)	Endp ID: 47	Shelf:	1	Resource:	1 (ct523c-0b29)	▼ Port:	0 (eth0)(MGT)	Endp ID: 49
Command E	uilders	generic		•				Command	Builders	generic		•		
								J						
Command:	netserver							Command:	pkill netserver]
			Command	Output							Command Output			[
	Sync	Ар	ply	QK	<u>C</u> ancel				Sync	Ap	oply QI	C Cancel		

8. Create the Flent test or tests.

0		Create/Modify Generic E	ndpoint	\odot \otimes \otimes	LANforge Manager Version(5.4.2)	$\sim \propto$
Name:	sta00000-tcp-down	Rpt Timer: fast (1 s)	▼ Test Manager: default tm	-	Control Reporting Tear Off Info Plugins	
Shelf:	1	 Resource: 1 (ct523c-0629) 	▼ Port: 2 (eth2)	Endp ID: 87	Chamber View Stop All Restart Manager Refresh Generic Test Mgr Resource Mgr DUT Profiles Traffic-Profiles Alerts Warnings + Writ-Messages	HELP
Command	Builders	generic	-		Status Port Mgr Layer-3 L3 Endps Layer 4-7 Armageddon WanLinks VolP/RTP VolP/RTP Endps	File-IO
					Rpt Timer: fast (1 s) V Go Test Manager all V Create Modify Delete	
					Generic Endpoints for Selected Test Manager	
					Name EID Status Rpt# Command	
					netserver-start 1.1.0.83 Stopped 0 netserver	
					netserver-stop I.1.0.85 (stopped 0 pkill netserver stap0000.rr.il 1 1 2 3 (stopped 0 krf aver bash etb2 flant x_H stap0000 rr.ilswap.up.down	
					sta00000-rtt-fair-var 1.1.2.91 Stopped 0 //rf exec.bash eth2 flert x H sta00000 H sta00500 rtt fair varswap-up-down	
					sta00000-tcp-down 1.1.2.87 Stopped 0 ./vrf exec.bash eth2 flent -x -H sta00000 tcp downloadswap-up-down	
					sta00500-tcp-down 1.1.2.89 Stopped 0 ./vrf_exec.bash eth2 flent -x -H sta00500 tcp_downloadswap-up-down	
Command	k: [.Arf_exec.bash eth2 flent + H s	sta00000 tcp_download —swap-uj Command Output	>down			
	0.00	Analy OK				,
	Sync	Δρριγ <u>Ο</u> Κ	Cancel		Logged in to: localhost:4002 as: Admin	

9. To start any Flent test, start the netserver first, then start the tests one at a time.

LANforge Manager Version(5.4.2)	\sim \times \times
<u>C</u> ontrol <u>R</u> eporting Tear <u>O</u> ff <u>I</u> nfo <u>P</u> lugins	
Chamber View Stop All Restart Manager	HELP
Generic Test Mgr Resource Mgr DUT Profiles Traffic-Profiles Alerts Warnings + Wifi-Messages Status Port Mgr Layer-3 L3 Endps Layer 4-7 Armageddon WanLinks VolP/RTP VolP/RTP Endps	File-I0
Rpt Timer: fast (1 s) Go Test Manager all Select All Start + Stop - Clear Create Modify Delete	
Generic Endpoints for Selected Test Manager	
Name ElD Status Rpt# Command	
netserver-start 1.1.0.83 Stopped 1 netserver 5t	tarting netse
netserver-stop 1.1.0.85 Stopped 0 pkill netserver	
sta00000-rtt.fai.cr.2.1.2.3 Stopped 0 .//ri_exec.bash.et/2.lient x +n sta00000 rtt.fai.cr.2.svap-up-down	Start
sta000001tcp.down 112.27 [Stopped 0 Arr exclass etc2 fient x + sta00000 tcp.download -swap-up-down	Start
sta00500-tcp-down 11.12.89 Stopped 0 ///r_ckec.bash eth2 flent + H sta00500 tcp_download -swap-up-down	
	•

Logged in to: localhost:4002 as: Admin

10. Use the Flent GUI to view Flent test results.



11. Use the Flent GUI to compare Flent test results.

[lanforge@ct523c-0b29 ~]\$ flent-gui tcp_download-2020-04-15T112442.452934.flent.gz tcp_c



12. Flent batch files can be setup to run consecutive and repeated tests.



•			Create/M	lodify	Generic E	ndp	oint		(\odot	×
Name:	sta00000-batch		Rpt Timer:	fast	(1 s)	-	Test Manager:	default_tm			-
Shelf:	1	•	Resource:	1 (ct52	23c - 0b29)	-	Port:	2 (eth2)	T E	ndp ID:	95
Command I	Builders		generic			-					
											_
Command:	./vrf_exec.bash eth2 fle	ent -x -H sta	a00000 -b t	cp-down	-b tcp-up -	b rru	l -B flent-batch.t	xtswap-up-dowr	1		
				Commai	nd Output						-1
		Svnc	An	ply	OK		Cancel				

13. Flent batch results for rrul.

The **rrul** test is the **Realtime Response Under Load** test which attempts to completely use up the link with four upstream TCP connections and four downstream TCP connections each with a different IP ToS setting plus ping and UDP to measure latency all running simultaneously for the purpose of exposing bufferbloat in the network under test.



14. Flent batch results for five rrul repetitions.



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