

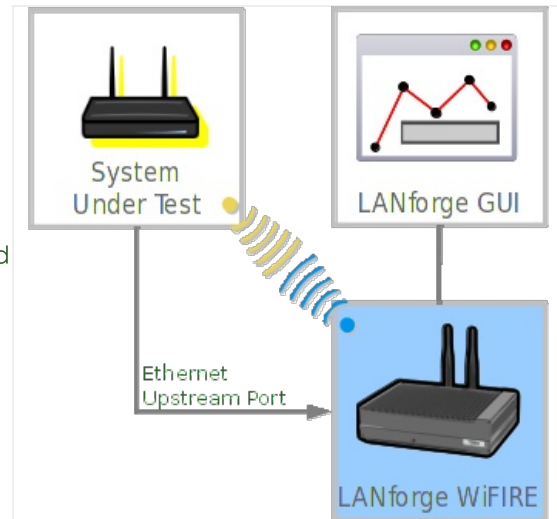
Using Flent to Generate Traffic

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 - FLExible Network Tester 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 \(@toke_dk\)](#)

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-30 (also works on Fedora-36).

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 install
```

- 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
```

2. 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_5tcpcup         : RTT Fair Realtime Response Under Load
cisco_5tcpcup_2udpfflood : Cisco 5TCP up + 2 6Mbit UDP
cubic_bbr             : Cubic VS BBR smackdown
cubic_cdg             : Cubic VS CDG smackdown
cubic_dctcp           : Cubic VS DCTCP smackdown
cubic_ledbat          : Cubic VS Ledbat smackdown
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-1up              : HTTP get latency with competing TCP upload str
http-rrul             : HTTP get latency with competing RRUL test
iterated_bidirectional : Iterated TCP bidirectional transfers example
ledbat_cubic_1        : Cubic vs LEDBAT upload streams w/ping
```

3. 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.

```
File Edit View Search Terminal Help
[root@ct523c-0b29 ~]# cat /etc/hosts
::1          localhost localhost.localdomain localhost6 localhost6.localdomain6
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
```

4. 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
```

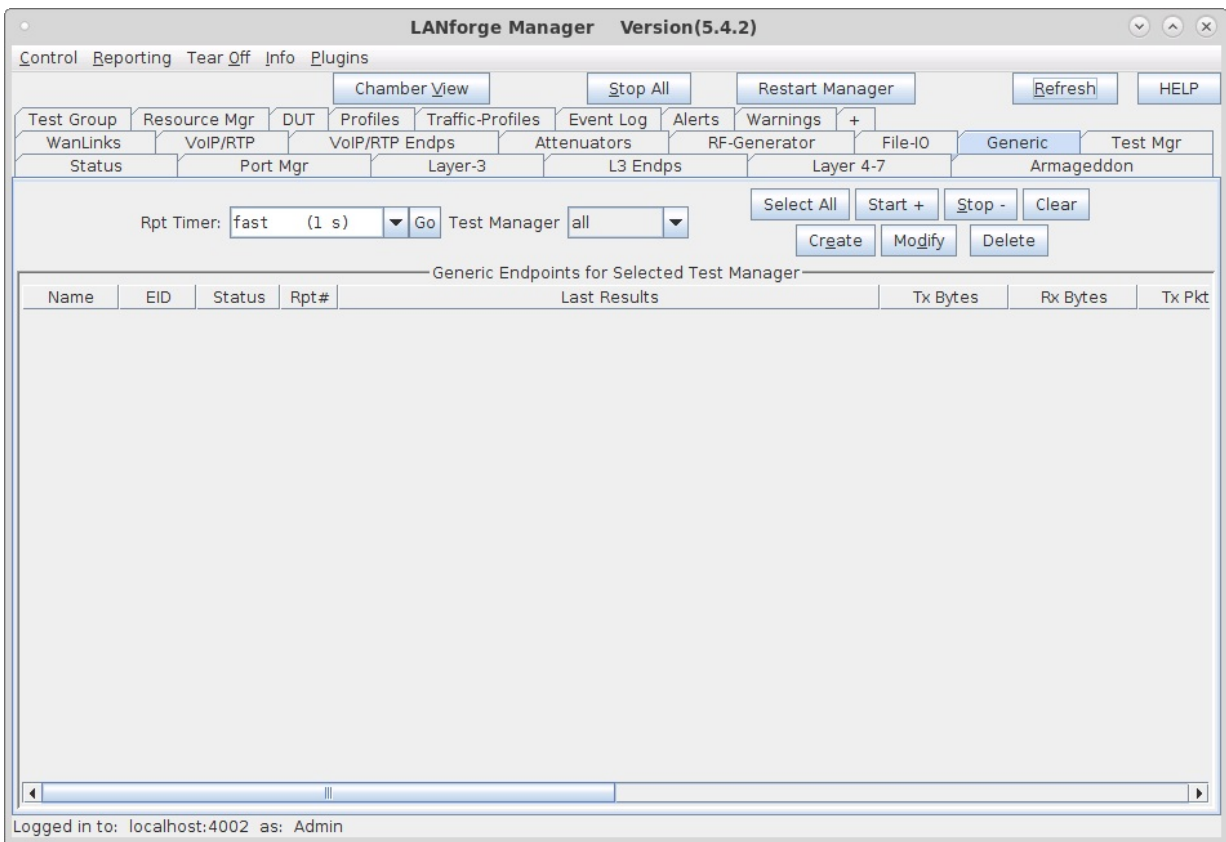
- B. Run one of the available tests. Because LANforge is using vrf, use the **vrf_exec.bash** script to specify which interface to run the test. The direction of the test is from the perspective of the wired interface. Use the **--swap-up-down** option to change the direction to the host interface which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

```
[lanforge@ct523c-0b29 ~]$ sudo ./vrf_exec.bash eth2 flent -x -H sta00000 tcp_download --swap-up-down
[sudo] password for lanforge:
Started Flent 1.9.9-git-d06e0b6 using Python 3.7.6.
Starting tcp_download test. Expected run time: 70 seconds.
Data file written to ./tcp_download-2020-04-15T113910.591355.flent.gz

Summary of tcp_download test run from 2020-04-15 18:39:10.591355

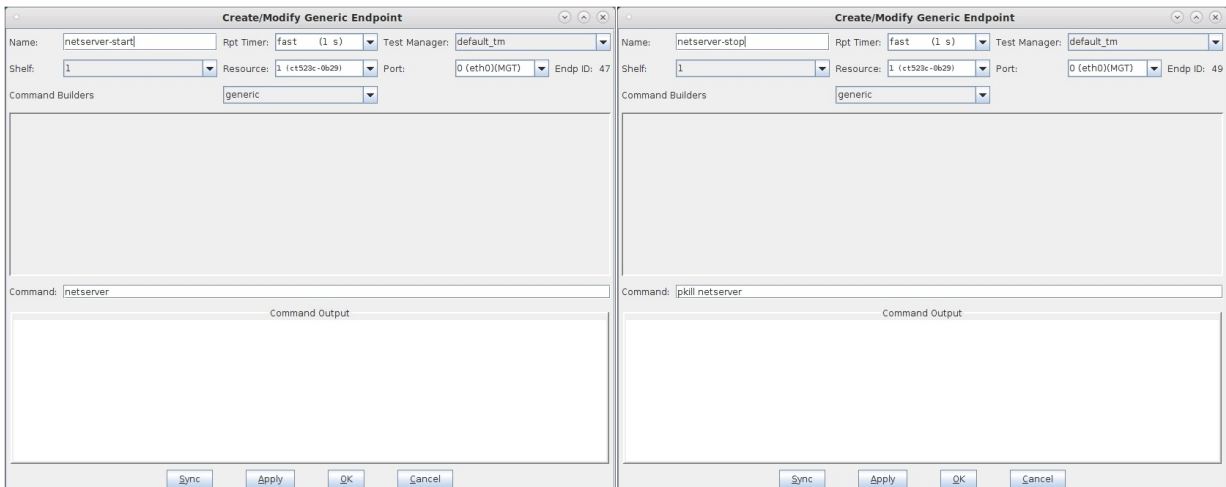
      avg      median      # data pts
Ping (ms) ICMP :    23.20    23.10 ms    350
TCP download   :   671.49    672.59 Mbits/s    350
[lanforge@ct523c-0b29 ~]$
```

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

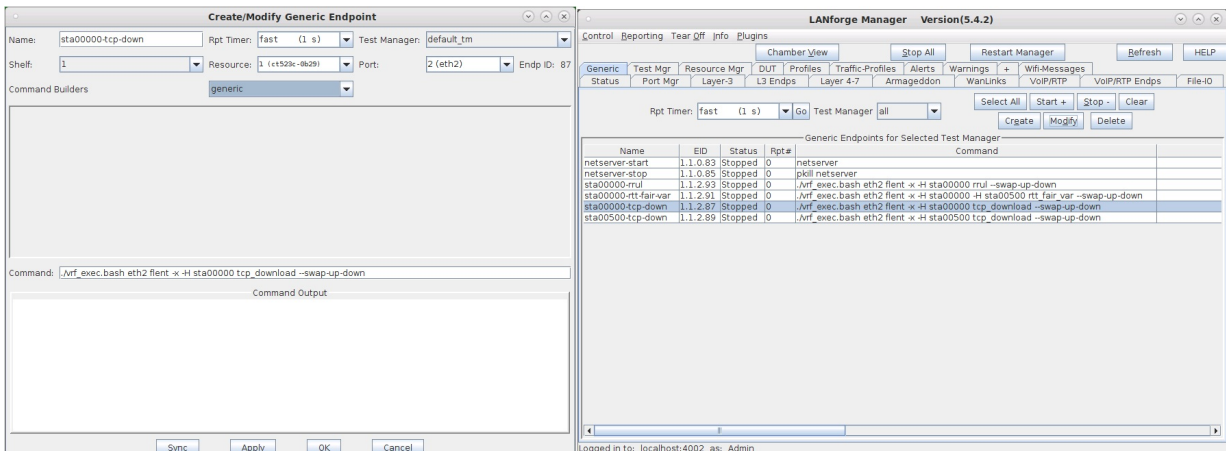


6. Create the Flent netserver.

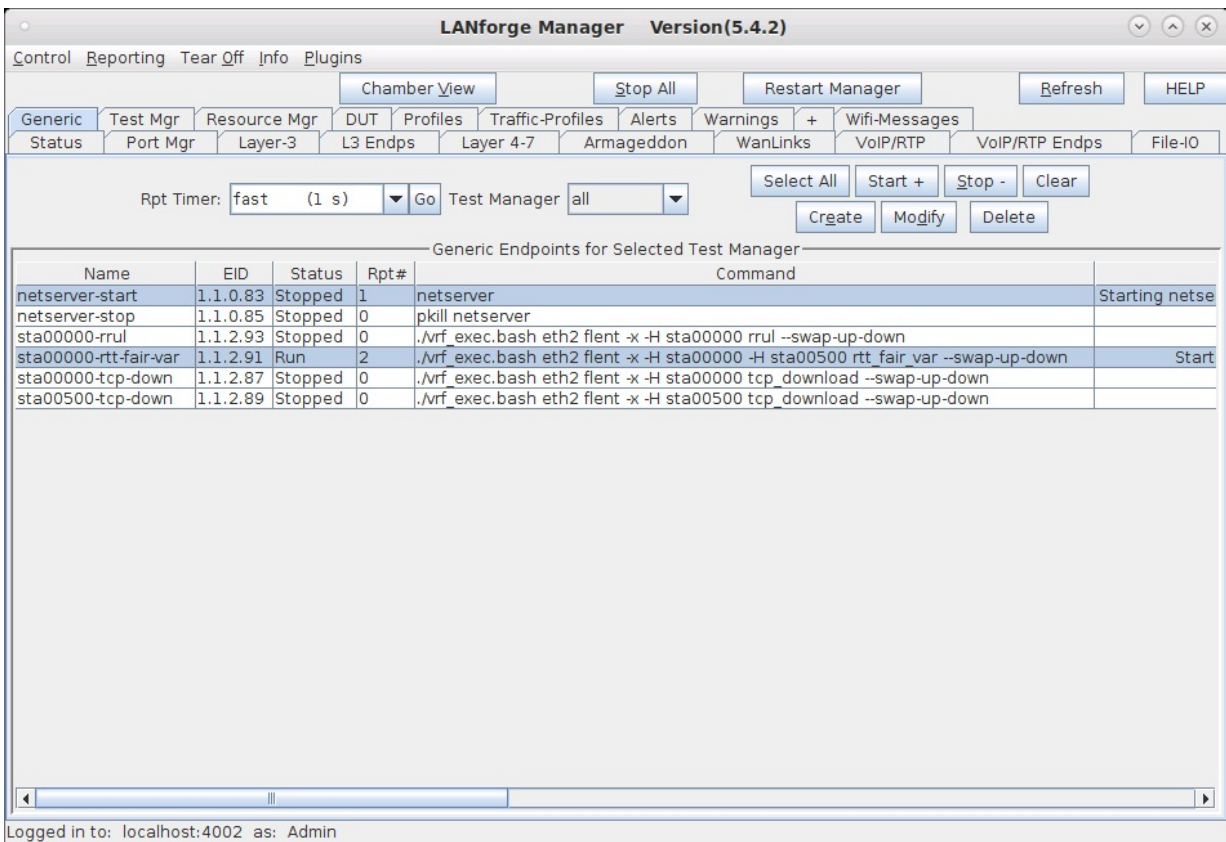
Here it is useful to create one Generic endpoint to start netserver and one to stop it because the netserver program runs in the background once it is started.



7. Create the Flent test or tests.

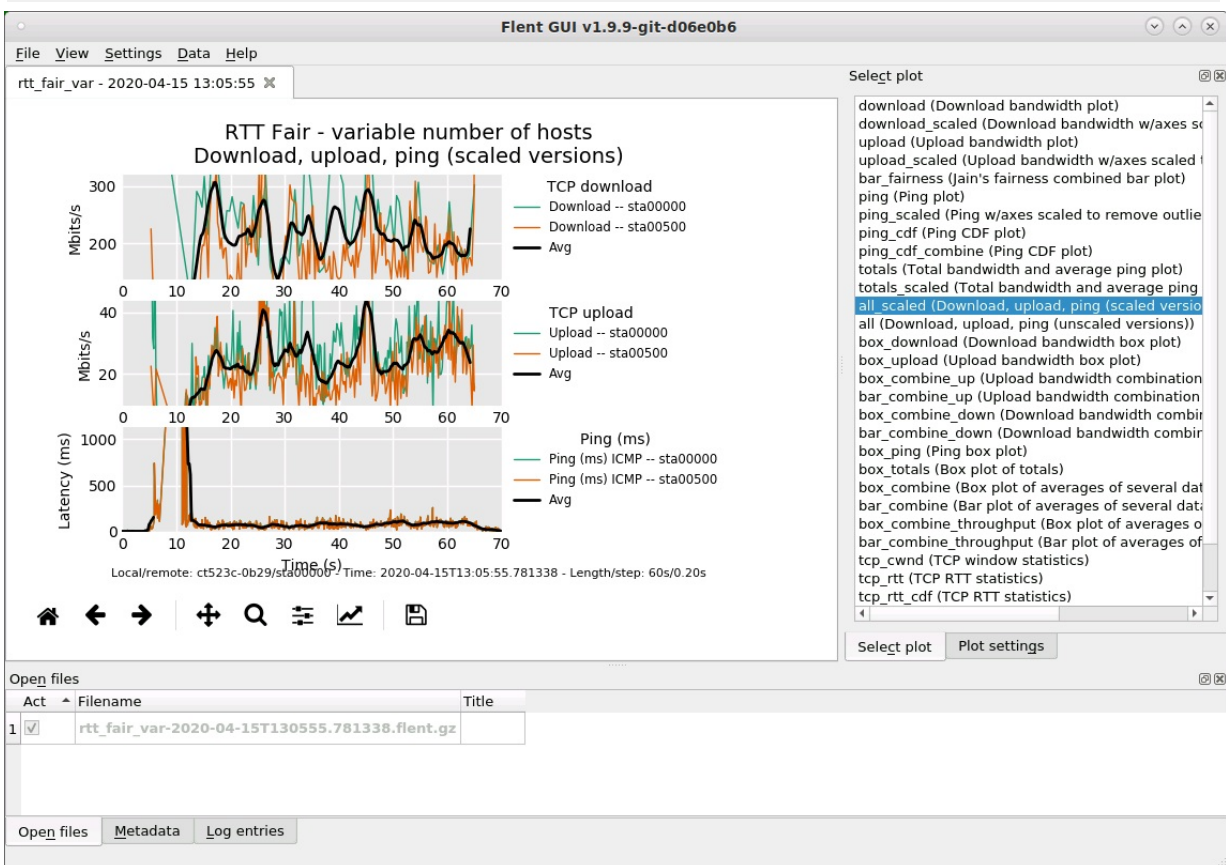


8. To start any Flent test, start the netserver first, then start the tests one at a time.



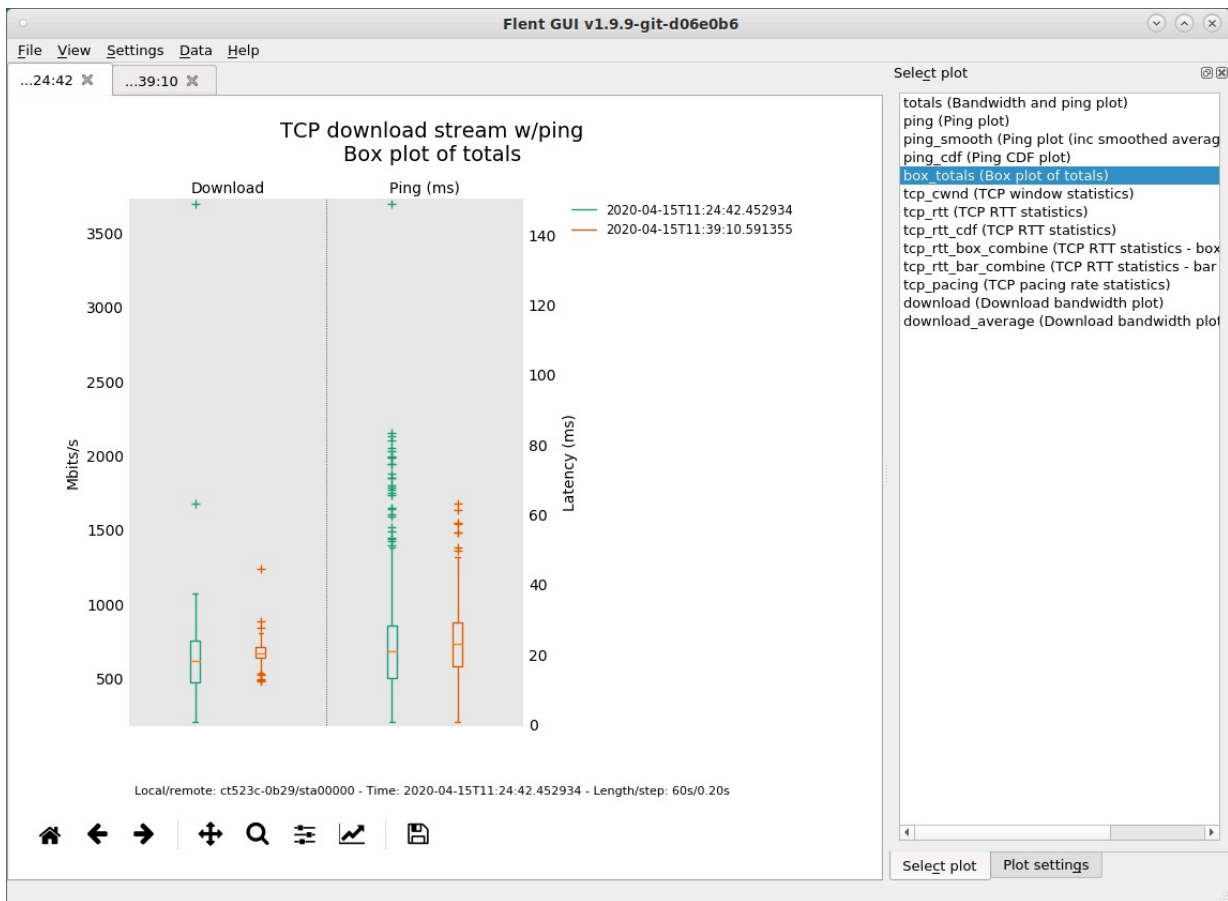
9. Use the Flent GUI to view Flent test results.

```
[lanforge@ct523c-0b29 ~]$ flent-gui rtt_fair_var-2020-04-15T130555.781338.flent.gz
```



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

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



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

```
[lanforge@ct523c-0b29 ~]$ cat flent-batch.txt

[Batch::tcp-down]
test_name = tcp_download
hosts = sta00000
title = sta00000-tcp-down rep:${repetition}
filename_extra = sta00000-tcp-down-${repetition}
repetitions = 5
[Batch::tcp-up]
test_name = tcp_upload
hosts = sta00000
title = sta00000-tcp-up rep:${repetition}
filename_extra = sta00000-tcp-up-${repetition}
repetitions = 5
[Batch::rrul]
test_name = rrul
hosts = sta00000
title = sta00000-rrul rep:${repetition}
filename_extra = sta00000-rrul-${repetition}
repetitions = 5\
```

Create/Modify Generic Endpoint

Name: Rpt Timer: Test Manager:

Shelf: Resource: Port: Endp ID: 95

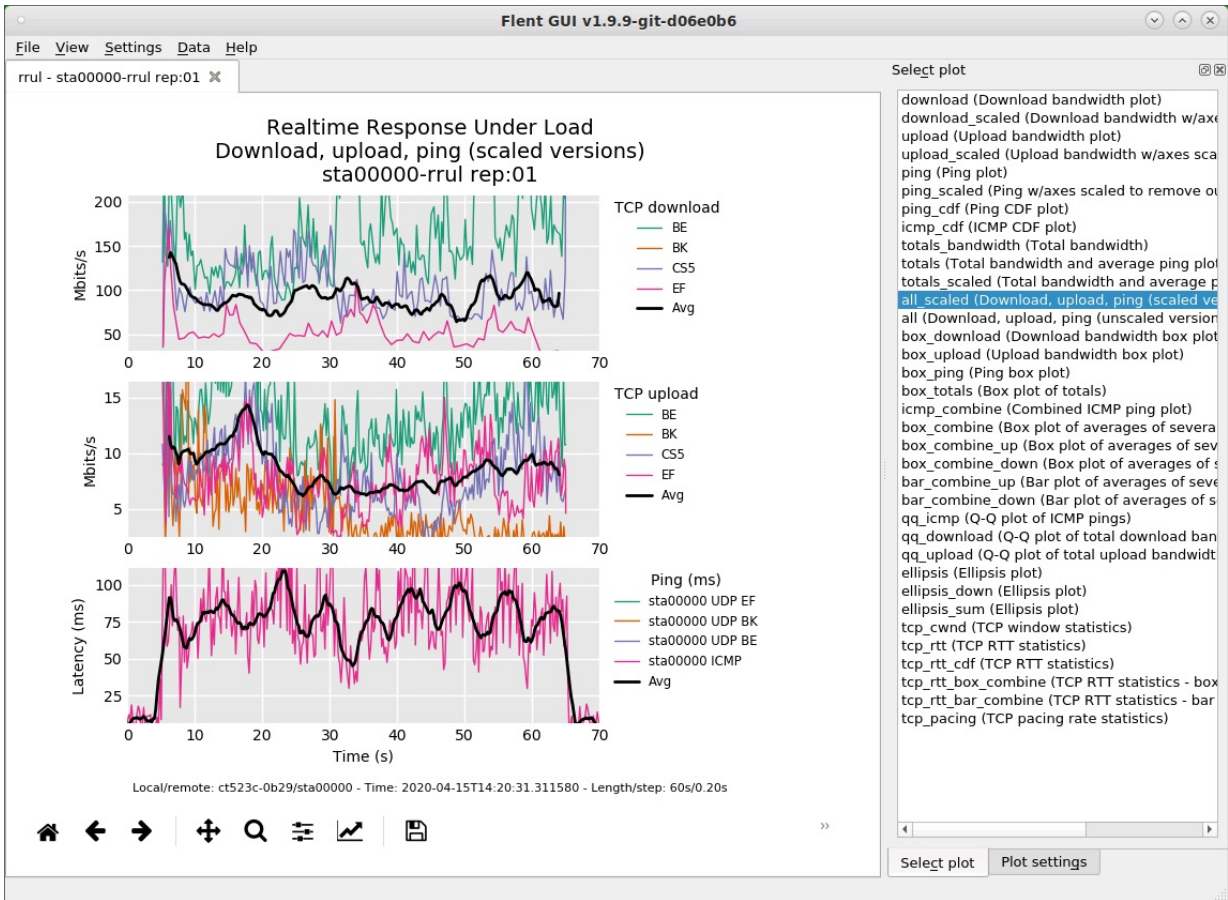
Command Builders:

Command:

Command Output

12. **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.



13. Flent batch results for five rrul repetitions.

