Настройка пропускной способности глобальной сети с помощью Token Bucket Filter

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Введение

Основной целью работы является знакомство с принципами работы дисцилины очереди Token Bucket Filter, которая формирует входящий/исходящий трафик для ограничения пропускной способности, а также получение навыков моделирования и исследования поведения трафика посредством проведения интерактивного и воспроизводимого экспериментов в Mininet.

Выполнение задачи

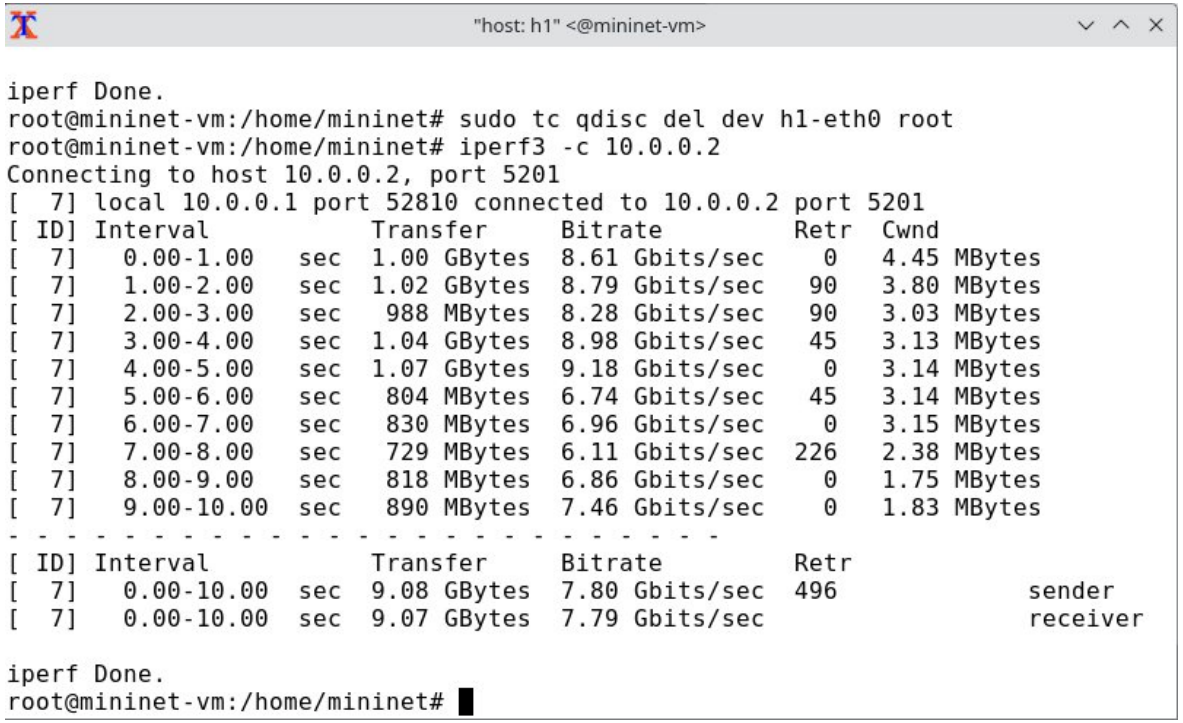
"host: h1" <@mininet-vm>

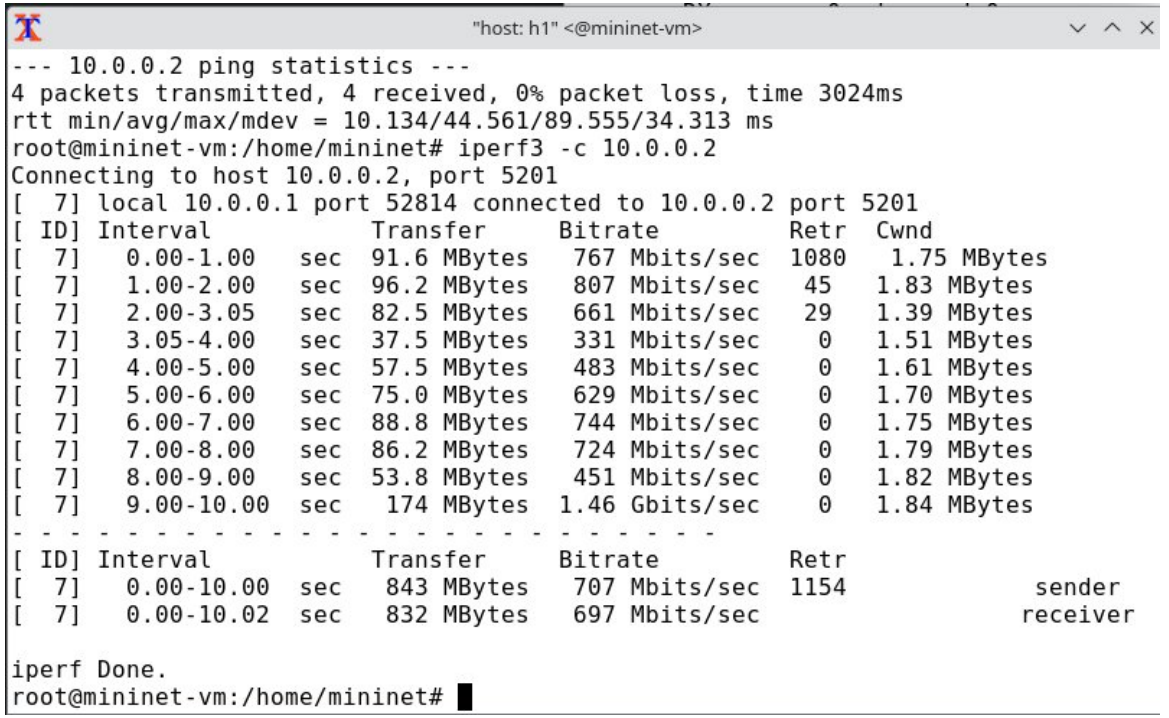
```
       TX packets 1307  bytes 3432624 (3.4 MB)
       TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0

oot@mininet-vm:/home/mininet# iperf3 -c 10.0.0.2
onnecting to host 10.0.0.2, port 5201
  7] local 10.0.0.1 port 52802 connected to 10.0.0.2 port 5201
 ID] Interval           Transfer     Bitrate         Retr  Cwnd
  7]   0.00-1.00   sec  4.62 GBytes  39.6 Gbits/sec   10   6.47 MBytes
  7]   1.00-2.00   sec  4.04 GBytes  34.7 Gbits/sec    0   6.47 MBytes
  7]   2.00-3.00   sec  4.25 GBytes  36.5 Gbits/sec    0   6.53 MBytes
  7]   3.00-4.00   sec  3.86 GBytes  33.2 Gbits/sec    0   6.53 MBytes
  7]   4.00-5.00   sec  3.69 GBytes  31.7 Gbits/sec    1   6.53 MBytes
  7]   5.00-6.00   sec  3.40 GBytes  29.2 Gbits/sec    0   6.53 MBytes
  7]   6.00-7.00   sec  4.08 GBytes  35.0 Gbits/sec    0   6.53 MBytes
  7]   7.00-8.00   sec  4.05 GBytes  34.8 Gbits/sec    0   6.53 MBytes
  7]   8.00-9.00   sec  4.04 GBytes  34.7 Gbits/sec    0   6.53 MBytes
  7]   9.00-10.00  sec  3.96 GBytes  34.1 Gbits/sec    0   6.53 MBytes
 - - - - - - - - - - - - - - - - - - - - - - - - -
 ID] Interval           Transfer     Bitrate         Retr
  7]   0.00-10.00  sec  40.0 GBytes  34.4 Gbits/sec   11             sender
  7]   0.00-10.00  sec  40.0 GBytes  34.4 Gbits/sec                  receiver

perf Done.
oot@mininet-vm:/home/mininet#
```

"host: h1" <@mininet-vm>

```
iperf Done.
root@mininet-vm:/home/mininet# sudo tc qdisc add dev h1-eth0 root tbf rate 10gb
it burst 5000000 limit 15000000
root@mininet-vm:/home/mininet# iperf3 -c 10.0.0.2
Connecting to host 10.0.0.2, port 5201
[  7] local 10.0.0.1 port 52806 connected to 10.0.0.2 port 5201
[ ID] Interval           Transfer     Bitrate         Retr  Cwnd
[  7]   0.00-1.00   sec  1.02 GBytes  8.79 Gbits/sec    0   3.24 MBytes
[  7]   1.00-2.00   sec   842 MBytes  7.07 Gbits/sec    0   4.79 MBytes
[  7]   2.00-3.00   sec   752 MBytes  6.31 Gbits/sec   45   5.28 MBytes
[  7]   3.00-4.01   sec  1011 MBytes  8.44 Gbits/sec    0   5.28 MBytes
[  7]   4.01-5.00   sec   810 MBytes  6.83 Gbits/sec    0   5.28 MBytes
[  7]   5.00-6.00   sec  1.08 GBytes  9.28 Gbits/sec    0   5.28 MBytes
[  7]   6.00-7.00   sec  1.04 GBytes  8.96 Gbits/sec    0   5.28 MBytes
[  7]   7.00-8.00   sec   968 MBytes  8.12 Gbits/sec    0   5.36 MBytes
[  7]   8.00-9.00   sec   852 MBytes  7.15 Gbits/sec    0   5.36 MBytes
[  7]   9.00-10.00  sec   864 MBytes  7.25 Gbits/sec   45   5.36 MBytes
- - - - - - - - - - - - - - - - - - - - - - - - -
[ ID] Interval           Transfer     Bitrate         Retr
[  7]   0.00-10.00  sec  9.10 GBytes  7.82 Gbits/sec   90             sender
[  7]   0.00-10.00  sec  9.09 GBytes  7.81 Gbits/sec                  receiver

iperf Done.
root@mininet-vm:/home/mininet#
```

Выполнение задачи





Выполнение задачи

```
mininet@mininet-vm:~/work/lab_tbf$ cat Makefile
all: ping.dat

ping.dat:
	sudo python lab06_TBF.py
	sudo chown mininet:mininet log.dat
clean:
	-rm -f *.dat
mininet@mininet-vm:~/work/lab_tbf$
```

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```
mininet@mininet-vm:~/work/lab_tbf$ nvim Makefile
mininet@mininet-vm:~/work/lab_tbf$ make
sudo python lab06_TBF.py
*** Adding controller
*** Adding hosts
*** Adding switch
*** Creating links
*** Starting network
*** Configuring hosts
h1 h2
*** Starting controller
c0
*** Starting 2 switches
s1 s2 ...
*** Waiting for switches to connect
s1 s2
*** Set delay
*** s1 : ('sudo tc qdisc add dev s1-eth2 root handle 1: netem delay 10ms',)
*** s1 : ('sudo tc qdisc add dev s1-eth2 parent 1: handle 2: tbf rate 2gbit burst 1000000 limit 2000000',)
*** h2 : ('iperf3 -s &',)
*** h1 : ('iperf3 -c 10.0.0.2 >> log.dat',)
*** Stopping network*** Stopping 1 controllers
c0
*** Stopping 3 links
...
*** Stopping 2 switches
s1 s2
*** Stopping 2 hosts
h1 h2
*** Done
sudo chown mininet:mininet log.dat
```

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```
mininet@mininet-vm:~/work/lab_tbf$ cat  log.dat
Connecting to host 10.0.0.2, port 5201
[  5] local 10.0.0.1 port 45390 connected to 10.0.0.2 port 5201
[ ID] Interval           Transfer     Bitrate         Retr  Cwnd
[  5]   0.00-1.00   sec  24.3 MBytes   204 Mbits/sec    0    971 KBytes
[  5]   1.00-2.00   sec   215 MBytes  1.80 Gbits/sec  585   3.09 MBytes
[  5]   2.00-3.00   sec   229 MBytes  1.92 Gbits/sec    0   3.33 MBytes
[  5]   3.00-4.00   sec   228 MBytes  1.91 Gbits/sec  180   2.47 MBytes
[  5]   4.00-5.00   sec   228 MBytes  1.91 Gbits/sec    0   2.60 MBytes
[  5]   5.00-6.00   sec   229 MBytes  1.92 Gbits/sec    0   2.70 MBytes
[  5]   6.00-7.00   sec   228 MBytes  1.91 Gbits/sec    0   2.78 MBytes
[  5]   7.00-8.00   sec   198 MBytes  1.66 Gbits/sec  720   1.98 MBytes
[  5]   8.00-9.00   sec   172 MBytes  1.45 Gbits/sec    0   2.10 MBytes
[  5]   9.00-10.00  sec   202 MBytes  1.70 Gbits/sec    0   2.20 MBytes
- - - - - - - - - - - - - - - - - - - - - - - - -
[ ID] Interval           Transfer     Bitrate         Retr
[  5]   0.00-10.00  sec  1.91 GBytes  1.64 Gbits/sec  1485             sender
[  5]   0.00-10.03  sec  1.90 GBytes  1.62 Gbits/sec                  receiver

iperf Done.
mininet@mininet-vm:~/work/lab_tbf$
```

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Спасибо За Внимание