Лабораторная работа № 2

Измерение и тестирование пропускной способности сети. Интерактивный эксперимент

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Содержание

Список иллюстраций

1 . Цель работы

Основной целью работы является знакомство с инструментом для измерения пропускной способности сети в режиме реального времени — iPerf3, а также получение навыков проведения интерактивного эксперимента по измерению пропускной способности моделируемой сети в среде Mininet.

2 . Выполнение лабораторной работы

```
mininet@mininet-vm:~$ sudo mn --topo=single,2 -x
*** Creating network
*** Adding controller
*** Adding hosts:
h1 h2
*** Adding switches:
s1
*** Adding links:
(h1, s1) (h2, s1)
*** Configuring hosts
h1 h2
*** Running terms on localhost:10.0
*** Starting controller
c0
*** Starting 1 switches
s1 ...X11 connection rejected because of wrong authentication.
X11 connection rejected because of wrong authentication.
X11 connection rejected because of wrong authentication.
X11 connection rejected because of wrong authentication.

*** Starting CLI:
mininet> net
h1 h1-eth0:s1-eth1
h2 h2-eth0:s1-eth2
s1 lo:  s1-eth1:h1-eth0 s1-eth2:h2-eth0
c0
mininet> link
invalid number of args: link end1 end2 [up down]
mininet> dump
<Host h1: h1-eth0:10.0.0.1 pid=806>
<Host h2: h2-eth0:10.0.0.2 pid=808>
<OVSSwitch s1: lo:127.0.0.1,s1-eth1:None,s1-eth2:None pid=813>
<Controller c0: 127.0.0.1:6653 pid=799>
```

Фигура № 1

Я начал с входа на гостевую машину по ssh. Используя терминал mininet i inetractive, я создал топологию из двух хостов h1 и h2.

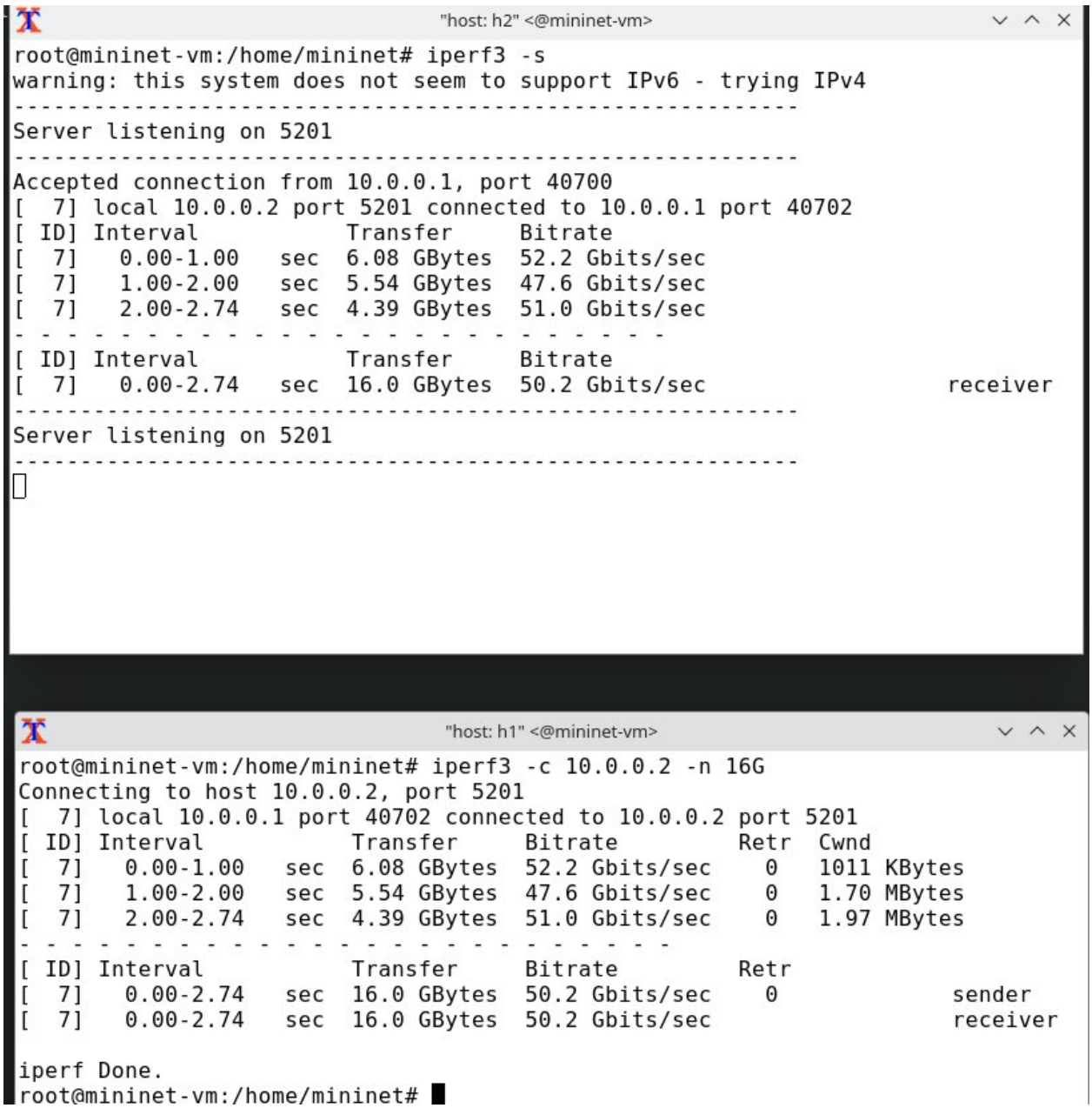
```
mininet> h2 iperf3 -s &
mininet> h1 iperf3 -c h2
Connecting to host 10.0.0.2, port 5201
[  5] local 10.0.0.1 port 40682 connected to 10.0.0.2 port 5201
[ ID] Interval           Transfer     Bitrate         Retr  Cwnd
[  5]   0.00-1.00   sec  4.08 GBytes  35.0 Gbits/sec    9   5.25 MBytes
[  5]   1.00-2.00   sec  4.89 GBytes  42.0 Gbits/sec    2   10.6 MBytes
[  5]   2.00-3.00   sec  5.12 GBytes  44.0 Gbits/sec    2   10.6 MBytes
[  5]   3.00-4.00   sec  5.89 GBytes  50.6 Gbits/sec    0   10.6 MBytes
[  5]   4.00-5.00   sec  5.91 GBytes  50.8 Gbits/sec    0   18.6 MBytes
[  5]   5.00-6.00   sec  5.55 GBytes  47.7 Gbits/sec    0   18.6 MBytes
[  5]   6.00-7.00   sec  5.93 GBytes  51.0 Gbits/sec    0   18.6 MBytes
[  5]   7.00-8.00   sec  5.84 GBytes  50.2 Gbits/sec    0   18.6 MBytes
[  5]   8.00-9.00   sec  5.66 GBytes  48.7 Gbits/sec    0   18.6 MBytes
[  5]   9.00-10.00  sec  4.92 GBytes  42.2 Gbits/sec    8   18.6 MBytes
- - - - - - - - - - - - - - - - - - - - - - - - -
[ ID] Interval           Transfer     Bitrate         Retr
[  5]   0.00-10.00  sec  53.8 GBytes  46.2 Gbits/sec   21             sender
[  5]   0.00-10.00  sec  53.8 GBytes  46.2 Gbits/sec                  receiver

iperf Done.
```

Фигура № 2

Я запустил сервер iperf3 на хосте номер 2, а клиент – на хосте номер 1, просто чтобы проверить его работу.

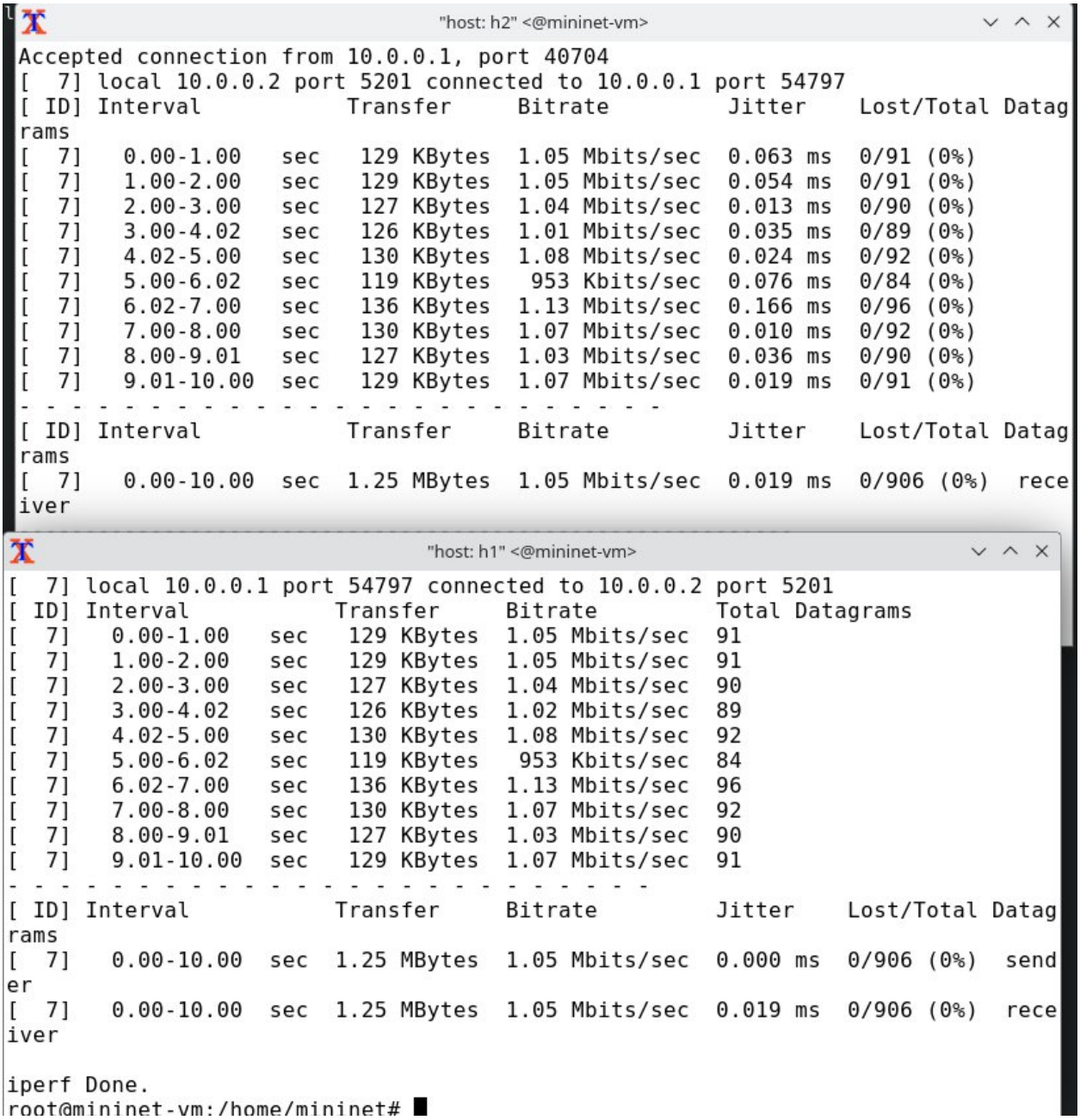
```
mininet>  h2 killall iperf3
warning: this system does not seem to support IPv6 - trying IPv4
-----------------------------------------------------------
Server listening on 5201
-----------------------------------------------------------
Accepted connection from 10.0.0.1, port 40680
[  5] local 10.0.0.2 port 5201 connected to 10.0.0.1 port 40682
[ ID] Interval           Transfer     Bitrate
[  5]   0.00-1.00   sec  4.05 GBytes  34.8 Gbits/sec
[  5]   1.00-2.00   sec  4.89 GBytes  42.0 Gbits/sec
[  5]   2.00-3.00   sec  5.14 GBytes  44.2 Gbits/sec
[  5]   3.00-4.00   sec  5.89 GBytes  50.6 Gbits/sec
[  5]   4.00-5.00   sec  5.88 GBytes  50.5 Gbits/sec
[  5]   5.00-6.00   sec  5.58 GBytes  47.9 Gbits/sec
[  5]   6.00-7.00   sec  5.93 GBytes  51.0 Gbits/sec
[  5]   7.00-8.00   sec  5.84 GBytes  50.2 Gbits/sec
[  5]   8.00-9.00   sec  5.66 GBytes  48.7 Gbits/sec
[  5]   9.00-10.00  sec  4.89 GBytes  42.0 Gbits/sec
- - - - - - - - - - - - - - - - - - - - - - - - -
[ ID] Interval           Transfer     Bitrate
[  5]   0.00-10.00  sec  53.8 GBytes  46.2 Gbits/sec                  receiver
-----------------------------------------------------------
Server listening on 5201
-----------------------------------------------------------
iperf3: interrupt - the server has terminated
mininet>
```

Фигура № 3

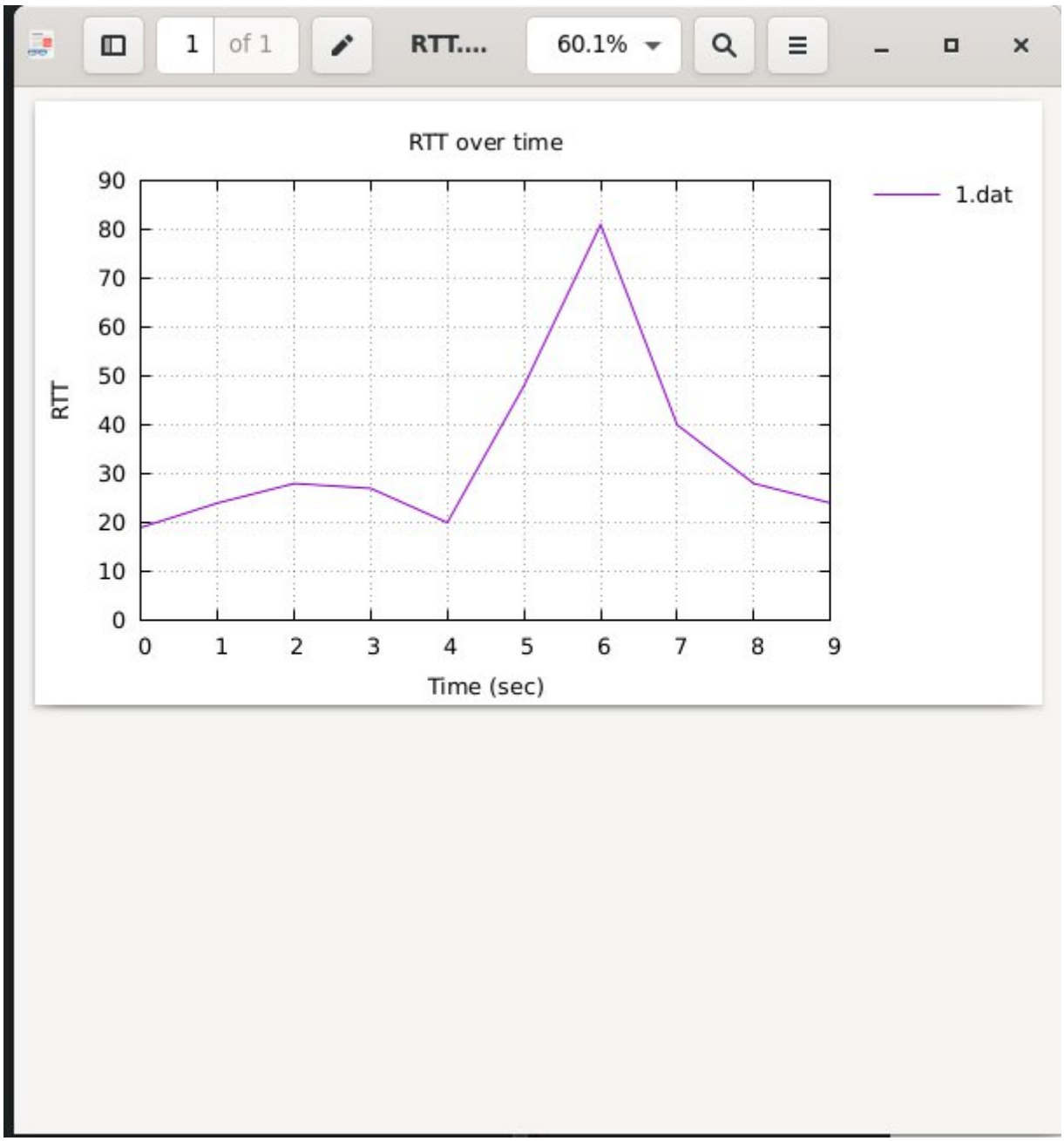


Фигура № 4

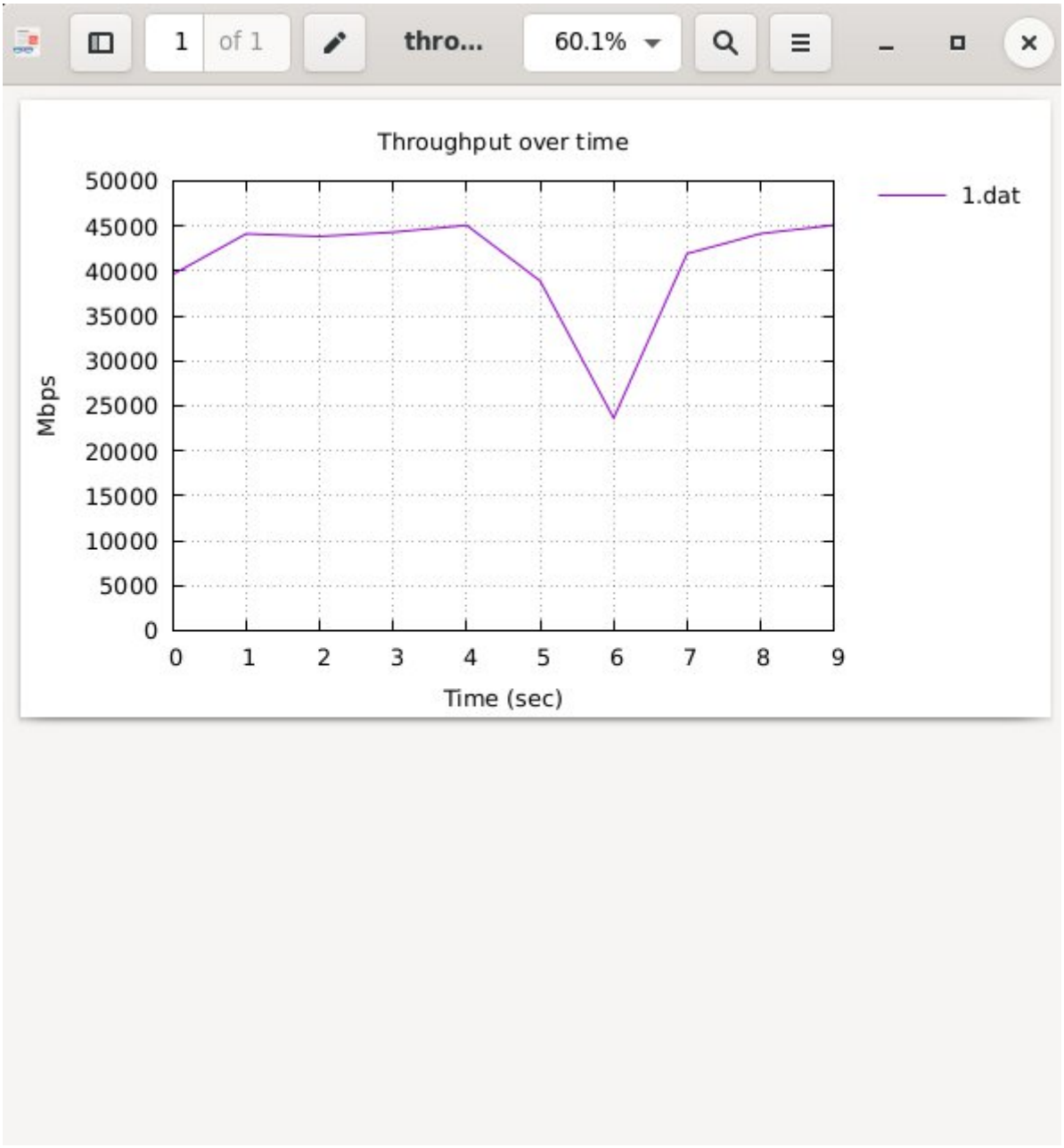
Со стороны клиента с помощью параметра -n указывается количество байт для передачи не за определенный временной интервал, а в целом.


"host: h2" <@mininet-vm>
Accepted connection from 10.0.0.1, port 40704
[7] local 10.0.0.2 port 5201 connected to 10.0.0.1 port 54797
[ID] Interval Transfer Bitrate Jitter Lost/Total Datagrams
[7] 0.00-1.00 sec 129 KBytes 1.05 Mbits/sec 0.063 ms 0/91 (0%)
[7] 1.00-2.00 sec 129 KBytes 1.05 Mbits/sec 0.054 ms 0/91 (0%)
[7] 2.00-3.00 sec 127 KBytes 1.04 Mbits/sec 0.013 ms 0/90 (0%)
[7] 3.00-4.02 sec 126 KBytes 1.01 Mbits/sec 0.035 ms 0/89 (0%)
[7] 4.02-5.00 sec 130 KBytes 1.08 Mbits/sec 0.024 ms 0/92 (0%)
[7] 5.00-6.02 sec 119 KBytes 953 Kbits/sec 0.076 ms 0/84 (0%)
[7] 6.02-7.00 sec 136 KBytes 1.13 Mbits/sec 0.166 ms 0/96 (0%)
[7] 7.00-8.00 sec 130 KBytes 1.07 Mbits/sec 0.010 ms 0/92 (0%)
[7] 8.00-9.01 sec 127 KBytes 1.03 Mbits/sec 0.036 ms 0/90 (0%)
[7] 9.01-10.00 sec 129 KBytes 1.07 Mbits/sec 0.019 ms 0/91 (0%)
[ID] Interval Transfer Bitrate Jitter Lost/Total Datagrams
[7] 0.00-10.00 sec 1.25 MBytes 1.05 Mbits/sec 0.019 ms 0/906 (0%) receiver
"host: h1" <@mininet-vm>
[7] local 10.0.0.1 port 54797 connected to 10.0.0.2 port 5201
[ID] Interval Transfer Bitrate Total Datagrams
[7] 0.00-1.00 sec 129 KBytes 1.05 Mbits/sec 91
[7] 1.00-2.00 sec 129 KBytes 1.05 Mbits/sec 91
[7] 2.00-3.00 sec 127 KBytes 1.04 Mbits/sec 90
[7] 3.00-4.02 sec 126 KBytes 1.02 Mbits/sec 89
[7] 4.02-5.00 sec 130 KBytes 1.08 Mbits/sec 92
[7] 5.00-6.02 sec 119 KBytes 953 Kbits/sec 84
[7] 6.02-7.00 sec 136 KBytes 1.13 Mbits/sec 96
[7] 7.00-8.00 sec 130 KBytes 1.07 Mbits/sec 92
[7] 8.00-9.01 sec 127 KBytes 1.03 Mbits/sec 90
[7] 9.01-10.00 sec 129 KBytes 1.07 Mbits/sec 91
[ID] Interval Transfer Bitrate Jitter Lost/Total Datagrams
[7] 0.00-10.00 sec 1.25 MBytes 1.05 Mbits/sec 0.000 ms 0/906 (0%) sender
[7] 0.00-10.00 sec 1.25 MBytes 1.05 Mbits/sec 0.019 ms 0/906 (0%) receiver
iperf Done.
root@mininet-vm:/home/mininet#

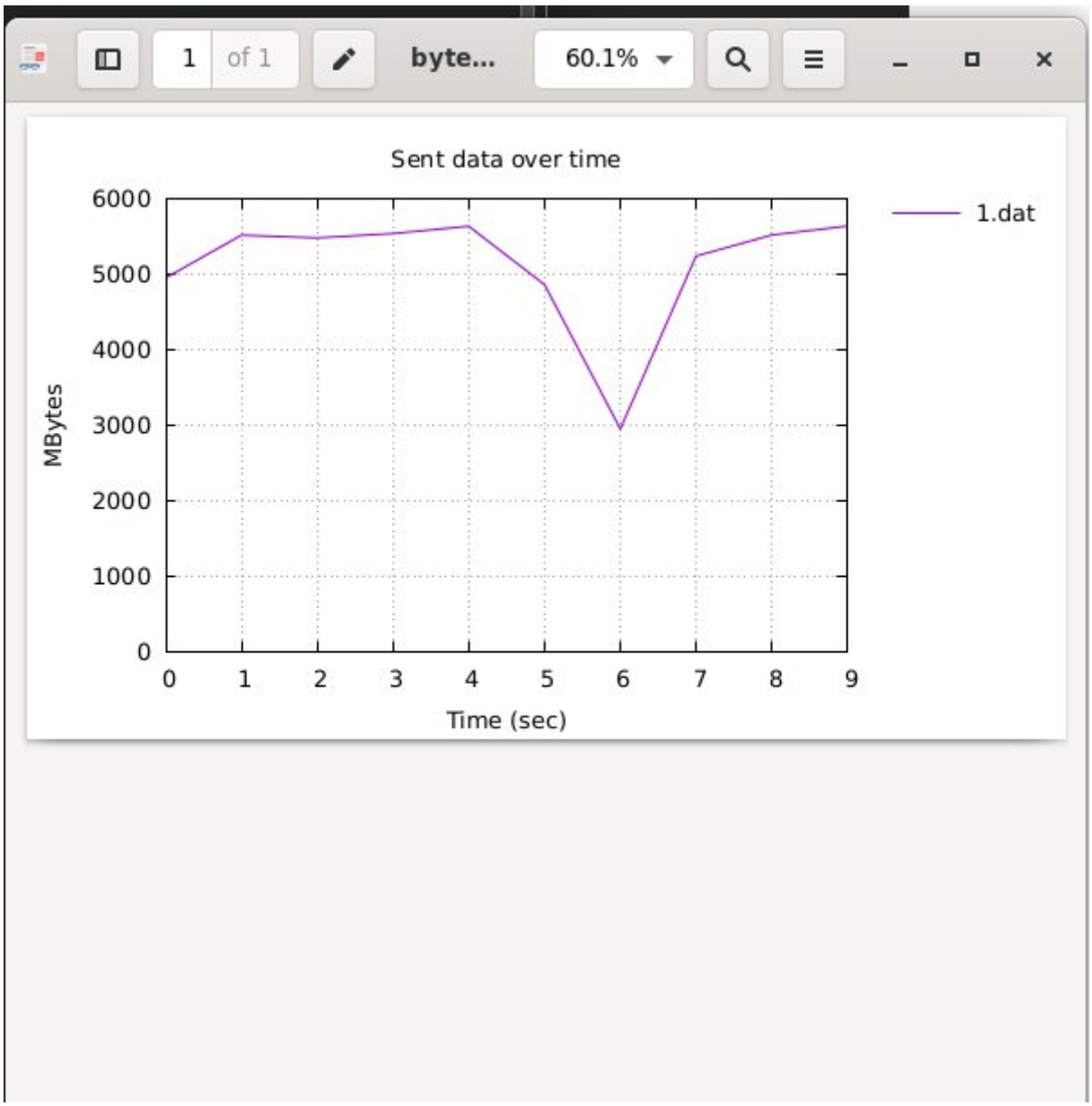
Фигура № 5


1 of 1
RTT....
60.1%
RTT over time
1.dat
RTT
Time (sec)
0
10
20
30
40
50
60
70
80
90
0
1
2
3
4
5
6
7
8
9

Фигура № 6


1
of 1
thro...
60.1%
Throughput over time
Mbps
Time (sec)
1.dat
50000
45000
40000
35000
30000
25000
20000
15000
10000
5000
0
0
1
2
3
4
5
6
7
8
9

Фигура № 7



Фигура № 8

3. Вывод

Изучил информацию об Iperf3 и использовал инструмент для создания отчета.