

به نام خدا

زهراسادات طباطبائی ۹۹۵۲۱۴۱۵ - ستاره باباجانی ۹۹۵۲۱۱۰۹

(بخش الف)

ابتدا با دستور زیر فایل های موجود را اجرا میکنیم:

```
chmod +x tcp/tcpclient tcp/tcpserver udp/udpclient udp/udpserver
```

```
mininet@TCPIP-VM:~/Desktop/shared/lab6$ chmod +x tcp/tcpclient tcp/tcpserver udp
/udpclient udp/udpserver
mininet@TCPIP-VM:~/Desktop/shared/lab6$
```

حال با دستور بعدی مکانیزم کنترل ازدحام در ماشین مجازی را بررسی می‌کنیم:

```
cat /proc/sys/net/ipv4/tcp_congestion_control
```

```
mininet@TCPIP-VM:~/Desktop/shared/lab6$ cat /proc/sys/net/ipv4/tcp_congestion_control
cubic
mininet@TCPIP-VM:~/Desktop/shared/lab6$
```

در این آزمایش، ما TCP را ملزم می کنیم که از الگوریتم کنترل ازدحام reno استفاده کند. پس دستورات بعدی را وارد نمی کنیم.

(بخش ب)

بخش های زیر را به فایل lab6.py اضافه می کنیم:

թ3 = սեհ՝զզզհօզհ(,թ3,) իժ=,թ6՝թ6՝ՅՅՅ4, թօզլթսե=,թ3, ԵՆԼԳԶԳՈԴԻՆ=ԼՈՒՆԵ, ԵՆԼԳԶԳՈԴԻՆ=ԼՈՒՆԵ, ԴՊՈՒՄԴԻՄԵԶԳԵ=ԼՈՒՆԵ, ԴՅԻԴԻՄԵԶԳԵ=ԼՈՒՆԵ, ԴՈՂԻՄԵԶԳԵ=ԼՈՒՆԵ
 թ5 = սեհ՝զզզհօզհ(,թ5,) իժ=,թ6՝թ6՝ՅՅՅ4, թօզլթսե=,թ5, ԵՆԼԳԶԳՈԴԻՆ=ԼՈՒՆԵ, ԵՆԼԳԶԳՈԴԻՆ=ԼՈՒՆԵ, ԴՊՈՒՄԴԻՄԵԶԳԵ=ԼՈՒՆԵ, ԴՅԻԴԻՄԵԶԳԵ=ԼՈՒՆԵ, ԴՈՂԻՄԵԶԳԵ=ԼՈՒՆԵ
 թ7 = սեհ՝զզզհօզհ(,թ7,) իժ=,թ6՝թ6՝ՅՅՅ4, թօզլթսե=,թ7, ԵՆԼԳԶԳՈԴԻՆ=ԼՈՒՆԵ, ԵՆԼԳԶԳՈԴԻՆ=ԼՈՒՆԵ, ԴՊՈՒՄԴԻՄԵԶԳԵ=ԼՈՒՆԵ, ԴՅԻԴԻՄԵԶԳԵ=ԼՈՒՆԵ, ԴՈՂԻՄԵԶԳԵ=ԼՈՒՆԵ
 և ձեռք ռ ռ զզ ծալ ռոմմառլզ էօ ռօլլլլլլլլլլլ լլլ լլ թզզզզզզ
 Լ7 = սեհ՝զզզհօզհ(,Լ7,) իժ=,թ6՝թ6՝ՅՅՅ4, թօզլթսե=,Լ7, ԵՆԼԳԶԳՈԴԻՆ=ԼՈՒՆԵ, ԵՆԼԳԶԳՈԴԻՆ=ԼՈՒՆԵ, ԴՊՈՒՄԴԻՄԵԶԳԵ=ԼՈՒՆԵ, ԴՅԻԴԻՄԵԶԳԵ=ԼՈՒՆԵ, ԴՈՂԻՄԵԶԳԵ=ԼՈՒՆԵ
 ԴՈՒՅ(,U,,, զզզլլլ ռօզհ(,U,)

```
r1.cmd('ifconfig ri-eth1 10.10.1.10 netmask 255.255.255.0')
# Space to add commands for configuring routing tables and default gateways
r1.cmd('ifconfig ri-eth0 10.10.0.10 netmask 255.255.255.0')
r1.cmd('echo 1 > /proc/sys/net/ipv4/ip_forward')
h1.cmd('ip route add default via 10.10.0.10')
h2.cmd('ip route add default via 10.10.0.10')
h3.cmd('ip route add default via 10.10.1.10')
```

Sudo python lab6.py

```
mininet@TCPIP-VM:~/Desktop/shared/lab6$ sudo python lab6.py
[sudo] password for mininet:
Sorry, try again.
[sudo] password for mininet:
** Creating an instance of Lab5 network topology

** Adding Controller

** Adding Hosts

** Adding Switches

** Creating Links

** Modifying Link Parameters
(10.00Mbit) *** Configuring hosts
r1 h1 h2 h3
*** Starting controller
*** Starting 2 switches
sw1 sw2
*** Configuring hosts
** Executing custom commands
** Enabling xterm for hosts only
** Running CLI
*** Starting CLI:
mininet> _
```

اتصالات را چک میکنیم:

```
mininet> pingall
*** Ping: testing ping reachability
r1 -> h1 h2 h3
h1 -> r1 h2 h3
h2 -> r1 h1 h3
h3 -> r1 h1 h2
*** Results: 0% dropped (12/12 received)
mininet>
```

با دستور زیر یک سرور از جنس udp بالا میاوریم که به پورت ۱۰۰۰۰ گوش دهد

Cd udp/

./udpsrv 10000

```
root@TCPIP-VM:~/Desktop/shared/lab6# cd udp/
root@TCPIP-VM:~/Desktop/shared/lab6/udp# ./udpsrv 10000
□
```

با استفاده از دستور زیر روی ماشین h1 یک کلاینت udp اجرا میکنیم که برای سرور h3 بسته ارسال کند:

Cd udp/

./udpcli 10.10.1.3 10000 100

```
root@TCPIP-VM:~/Desktop/shared/lab6/udp# ./udpcli 10.10.1.3 10000 100
1.0s - sent: 14 pkts, 107.6 kbits/s
2.1s - sent: 27 pkts, 100.0 kbits/s
3.1s - sent: 40 pkts, 100.0 kbits/s
4.2s - sent: 53 pkts, 100.0 kbits/s
5.2s - sent: 66 pkts, 99.8 kbits/s
6.2s - sent: 79 pkts, 100.2 kbits/s
7.3s - sent: 92 pkts, 101.2 kbits/s
8.3s - sent: 105 pkts, 101.5 kbits/s
9.4s - sent: 118 pkts, 100.9 kbits/s
10.4s - sent: 131 pkts, 100.0 kbits/s
11.4s - sent: 144 pkts, 100.8 kbits/s
12.5s - sent: 157 pkts, 101.0 kbits/s
13.5s - sent: 170 pkts, 101.3 kbits/s
14.6s - sent: 183 pkts, 101.0 kbits/s
15.6s - sent: 196 pkts, 100.9 kbits/s
16.6s - sent: 209 pkts, 101.4 kbits/s
17.7s - sent: 222 pkts, 101.5 kbits/s
18.7s - sent: 235 pkts, 101.9 kbits/s
19.8s - sent: 248 pkts, 101.2 kbits/s
20.8s - sent: 261 pkts, 100.6 kbits/s
21.8s - sent: 274 pkts, 101.2 kbits/s
22.9s - sent: 287 pkts, 100.1 kbits/s
23.9s - sent: 300 pkts, 100.7 kbits/s
25.0s - sent: 313 pkts, 100.0 kbits/s
26.0s - sent: 326 pkts, 101.7 kbits/s
27.0s - sent: 339 pkts, 99.9 kbits/s
28.1s - sent: 352 pkts, 100.0 kbits/s
^Cpackets sent = 357, avg rate= 100.1kbps
```

```

root@TCPIP-VM:~/Desktop/shared/lab6/udp# ./udpserver 10000
0.0s - received: 1/ sent: 1 pkts (loss 0.000%), 0.7 kbit/s
11.4s - received: 14/ sent: 14 pkts (loss 0.000%), 98.2 kbit/s
12.4s - received: 27/ sent: 27 pkts (loss 0.000%), 100.8 kbit/s
13.5s - received: 40/ sent: 40 pkts (loss 0.000%), 99.8 kbit/s
14.5s - received: 53/ sent: 53 pkts (loss 0.000%), 100.1 kbit/s
15.6s - received: 66/ sent: 66 pkts (loss 0.000%), 101.0 kbit/s
16.6s - received: 79/ sent: 79 pkts (loss 0.000%), 100.2 kbit/s
17.6s - received: 92/ sent: 92 pkts (loss 0.000%), 100.2 kbit/s
18.7s - received: 105/ sent: 105 pkts (loss 0.000%), 100.2 kbit/s
19.7s - received: 118/ sent: 118 pkts (loss 0.000%), 100.1 kbit/s
20.7s - received: 131/ sent: 131 pkts (loss 0.000%), 100.0 kbit/s
21.8s - received: 144/ sent: 144 pkts (loss 0.000%), 100.3 kbit/s
22.8s - received: 157/ sent: 157 pkts (loss 0.000%), 100.1 kbit/s
23.9s - received: 170/ sent: 170 pkts (loss 0.000%), 101.2 kbit/s
24.9s - received: 183/ sent: 183 pkts (loss 0.000%), 100.3 kbit/s
25.9s - received: 196/ sent: 196 pkts (loss 0.000%), 100.2 kbit/s
27.0s - received: 209/ sent: 209 pkts (loss 0.000%), 100.3 kbit/s
28.0s - received: 222/ sent: 222 pkts (loss 0.000%), 100.2 kbit/s
29.1s - received: 235/ sent: 235 pkts (loss 0.000%), 100.3 kbit/s
30.1s - received: 248/ sent: 248 pkts (loss 0.000%), 100.3 kbit/s
31.1s - received: 261/ sent: 261 pkts (loss 0.000%), 100.1 kbit/s
32.2s - received: 274/ sent: 274 pkts (loss 0.000%), 100.1 kbit/s
33.2s - received: 287/ sent: 287 pkts (loss 0.000%), 100.1 kbit/s
34.3s - received: 300/ sent: 300 pkts (loss 0.000%), 100.2 kbit/s
35.3s - received: 313/ sent: 313 pkts (loss 0.000%), 100.0 kbit/s
36.3s - received: 326/ sent: 326 pkts (loss 0.000%), 100.3 kbit/s
37.4s - received: 339/ sent: 339 pkts (loss 0.000%), 99.9 kbit/s
38.4s - received: 352/ sent: 352 pkts (loss 0.000%), 100.0 kbit/s
packet received = 357 / 357 sent: 0.000% loss

```

همانطور که میبینیم احتمال loss برابر صفر و goodput بابر ۱۰۰ میباشد.

برای بخش های بعدی هم به همین صورت تکرار میکنیم:(مقدار goodput , loss در شکل ها قابل مشاهده است)

1Mbps

host: h3					host: h1				
8.8s - received:	772/	sent: 1028 pkts (loss 24.903%),	908.5 kbit/s		3.0s - sent:	37653 pkts,	100893.4 kbits/s		
9.8s - received:	860/	sent: 1116 pkts (loss 22.933%),	699.0 kbit/s		4.0s - sent:	49828 pkts,	97237.8 kbits/s		
0.9s - received:	956/	sent: 1212 pkts (loss 21.122%),	763.6 kbit/s		5.0s - sent:	62727 pkts,	103024.3 kbits/s		
1.9s - received:	1038/	sent: 1382 pkts (loss 24.891%),	654.1 kbit/s		6.0s - sent:	75393 pkts,	101316.5 kbits/s		
2.9s - received:	1134/	sent: 1478 pkts (loss 23.275%),	765.6 kbit/s		7.0s - sent:	87942 pkts,	100390.6 kbits/s		
3.9s - received:	1236/	sent: 1647 pkts (loss 24.954%),	810.4 kbit/s		8.1s - sent:	100468 pkts,	100035.7 kbits/s		
4.9s - received:	1305/	sent: 1716 pkts (loss 23.951%),	546.5 kbit/s		9.1s - sent:	113166 pkts,	101579.6 kbits/s		
5.9s - received:	1444/	sent: 1855 pkts (loss 22.156%),	1109.2 kbit/s		10.1s - sent:	125716 pkts,	100393.9 kbits/s		
6.9s - received:	1624/	sent: 2035 pkts (loss 20.197%),	1413.3 kbit/s		11.1s - sent:	138271 pkts,	100410.1 kbits/s		
7.9s - received:	1805/	sent: 2216 pkts (loss 18.547%),	1432.8 kbit/s		12.1s - sent:	150815 pkts,	99909.9 kbits/s		
8.9s - received:	1988/	sent: 2409 pkts (loss 17.061%),	1536.1 kbit/s		13.1s - sent:	163421 pkts,	100828.9 kbits/s		
9.9s - received:	2192/	sent: 2603 pkts (loss 15.789%),	1551.4 kbit/s		14.1s - sent:	175921 pkts,	99991.1 kbits/s		
0.9s - received:	2367/	sent: 2778 pkts (loss 14.795%),	1395.2 kbit/s		15.1s - sent:	188409 pkts,	99878.7 kbits/s		
1.9s - received:	2586/	sent: 2997 pkts (loss 13.714%),	1705.2 kbit/s		16.1s - sent:	200965 pkts,	100422.6 kbits/s		
					17.1s - sent:	213447 pkts,	99786.6 kbits/s		
ot@TCPIP-VM:~/Desktop/shared/lab6/udp# ./udpserver 10000					^C				
0.0s - received:	1/	sent: 1 pkts (loss 0.000%),	3.9 kbit/s		^Crecv: Interrupted system call				
2.1s - received:	1186/	sent: 2004 pkts (loss 40.818%),	9446.7 kbit/s		root@TCPIP-VM:~/Desktop/shared/lab6/udp# ./udpclient 10.10.1.3 10000 100000				
3.1s - received:	2385/	sent: 14634 pkts (loss 83.702%),	9588.1 kbit/s		1.0s - sent:	12482 pkts,	99852.3 kbits/s		
4.1s - received:	3578/	sent: 27122 pkts (loss 86.808%),	9544.0 kbit/s		2.0s - sent:	25035 pkts,	100424.0 kbits/s		
5.1s - received:	4773/	sent: 39616 pkts (loss 87.952%),	9553.8 kbit/s		3.0s - sent:	37530 pkts,	99863.4 kbits/s		
6.1s - received:	5963/	sent: 52070 pkts (loss 88.548%),	9518.4 kbit/s		4.0s - sent:	50019 pkts,	99551.5 kbits/s		
cket received = 6023 / 52724 sent: 88.576% loss					^Cpackets sent = 52724, avg rate=83306.3kbps				
					root@TCPIP-VM:~/Desktop/shared/lab6/udp#				

10 Mbps

host: h3	host: h1
<pre> 7.9s - received: 1805/ sent: 2216 pkts (loss 18.547%), 1432.8 kbit/s 8.9s - received: 1998/ sent: 2409 pkts (loss 17.061%), 1536.1 kbit/s 9.9s - received: 2192/ sent: 2603 pkts (loss 15.789%), 1551.4 kbit/s 0.9s - received: 2367/ sent: 2778 pkts (loss 14.795%), 1395.2 kbit/s 1.9s - received: 2586/ sent: 2937 pkts (loss 13.714%), 1705.2 kbit/s ot@TCPIP-VM:~/Desktop/shared/lab6/udp# ./udpserver 10000 0.0s - received: 1/ sent: 1 pkts (loss 0.000%), 3.9 kbit/s 2.1s - received: 1186/ sent: 2004 pkts (loss 40.818%), 9446.7 kbit/s 3.1s - received: 2385/ sent: 14634 pkts (loss 83.702%), 9588.1 kbit/s 4.1s - received: 3578/ sent: 27122 pkts (loss 86.808%), 9544.0 kbit/s 5.1s - received: 4773/ sent: 39616 pkts (loss 87.952%), 9553.8 kbit/s 6.1s - received: 5963/ sent: 52070 pkts (loss 88.548%), 9518.4 kbit/s cket received = 6023 / 52724 sent: 88.576% loss 7.1s - received: 1/ sent: 1 pkts (loss 0.000%), 9.2 kbit/s 0.2s - received: 1196/ sent: 17974 pkts (loss 93.346%), 9540.8 kbit/s 1.2s - received: 2382/ sent:142774 pkts (loss 98.332%), 9474.3 kbit/s 2.2s - received: 3552/ sent:264265 pkts (loss 98.656%), 9359.2 kbit/s 3.2s - received: 4725/ sent:390026 pkts (loss 98.789%), 9377.5 kbit/s 4.2s - received: 5909/ sent:508149 pkts (loss 98.837%), 9407.8 kbit/s 5.2s - received: 7081/ sent:638163 pkts (loss 98.890%), 9374.7 kbit/s 6.2s - received: 8240/ sent:747799 pkts (loss 98.898%), 9271.7 kbit/s cket received = 9046 / 840781 sent: 98.924% loss </pre>	<pre> 11.1s - sent:138271 pkts, 100410.1 kbits/s 12.1s - sent:150815 pkts, 99909.9 kbits/s 13.1s - sent:163421 pkts, 100828.9 kbits/s 14.1s - sent:175921 pkts, 99991.1 kbits/s 15.1s - sent:188409 pkts, 99878.7 kbits/s 16.1s - sent:200965 pkts, 100422.6 kbits/s 17.1s - sent:213447 pkts, 99786.6 kbits/s ^C ^Crecv: Interrupted system call root@TCPIP-VM:~/Desktop/shared/lab6/udp# ./udpclient 10.10.1.3 10000 100000 1.0s - sent: 12482 pkts, 99852.3 kbits/s 2.0s - sent: 25035 pkts, 100424.0 kbits/s 3.0s - sent: 37530 pkts, 99863.4 kbits/s 4.0s - sent: 50019 pkts, 99551.5 kbits/s ^Cpackets sent = 52724, avg rate=83306.3kbps root@TCPIP-VM:~/Desktop/shared/lab6/udp# ./udpclient 10.10.1.3 10000 1000000 1.0s - sent:123179 pkts, 985429.9 kbits/s 2.0s - sent:242351 pkts, 947426.2 kbits/s 3.0s - sent:369429 pkts, 1013147.8 kbits/s 4.0s - sent:488041 pkts, 941168.2 kbits/s 5.0s - sent:617390 pkts, 1011063.4 kbits/s 6.0s - sent:738187 pkts, 965292.0 kbits/s ^Cpackets sent = 840783, avg rate=241233.0kbps root@TCPIP-VM:~/Desktop/shared/lab6/udp# </pre>

100 Mbps

host: h3	host: h1
<pre> 3.1s - received: 2385/ sent: 14634 pkts (loss 83.702%), 9588.1 kbit/s 4.1s - received: 3578/ sent: 27122 pkts (loss 86.808%), 9544.0 kbit/s 5.1s - received: 4773/ sent: 39616 pkts (loss 87.952%), 9553.8 kbit/s 6.1s - received: 5963/ sent: 52070 pkts (loss 88.548%), 9518.4 kbit/s cket received = 6023 / 52724 sent: 88.576% loss 7.1s - received: 1/ sent: 1 pkts (loss 0.000%), 9.2 kbit/s 0.2s - received: 1196/ sent: 17974 pkts (loss 93.346%), 9540.8 kbit/s 1.2s - received: 2382/ sent:142774 pkts (loss 98.332%), 9474.3 kbit/s 2.2s - received: 3552/ sent:264265 pkts (loss 98.656%), 9359.2 kbit/s 3.2s - received: 4725/ sent:390026 pkts (loss 98.789%), 9377.5 kbit/s 4.2s - received: 5909/ sent:508149 pkts (loss 98.837%), 9407.8 kbit/s 5.2s - received: 7081/ sent:638163 pkts (loss 98.890%), 9374.7 kbit/s 6.2s - received: 8240/ sent:747799 pkts (loss 98.898%), 9271.7 kbit/s cket received = 9046 / 840781 sent: 98.924% loss 7.2s - received: 1/ sent: 1 pkts (loss 0.000%), 193.8 kbit/s 0.5s - received: 1172/ sent: 11128 pkts (loss 89.468%), 9359.6 kbit/s 1.5s - received: 2338/ sent: 77968 pkts (loss 97.001%), 9321.0 kbit/s 2.5s - received: 3513/ sent:140185 pkts (loss 97.494%), 9399.0 kbit/s 3.5s - received: 4678/ sent:219216 pkts (loss 97.866%), 9279.8 kbit/s 4.5s - received: 5844/ sent:274126 pkts (loss 97.868%), 9319.9 kbit/s 5.5s - received: 7011/ sent:319722 pkts (loss 97.807%), 9329.3 kbit/s 6.5s - received: 8159/ sent:464635 pkts (loss 98.244%), 9173.5 kbit/s cket received = 9266 / 616555 sent: 98.497% loss </pre>	<pre> root@TCPIP-VM:~/Desktop/shared/lab6/udp# ./udpclient 10.10.1.3 10000 100000 1.0s - sent: 12482 pkts, 99852.3 kbits/s 2.0s - sent: 25035 pkts, 100424.0 kbits/s 3.0s - sent: 37530 pkts, 99863.4 kbits/s 4.0s - sent: 50019 pkts, 99551.5 kbits/s ^Cpackets sent = 52724, avg rate=83306.3kbps root@TCPIP-VM:~/Desktop/shared/lab6/udp# ./udpclient 10.10.1.3 10000 1000000 1.0s - sent:123179 pkts, 985429.9 kbits/s 2.0s - sent:242351 pkts, 947426.2 kbits/s 3.0s - sent:369429 pkts, 1013147.8 kbits/s 4.0s - sent:488041 pkts, 941168.2 kbits/s 5.0s - sent:617390 pkts, 1011063.4 kbits/s 6.0s - sent:738187 pkts, 965292.0 kbits/s ^Cpackets sent = 840783, avg rate=241233.0kbps root@TCPIP-VM:~/Desktop/shared/lab6/udp# ./udpclient 10.10.1.3 10000 10000000 1.0s - sent: 65578 pkts, 524622.9 kbits/s 2.0s - sent:134159 pkts, 548585.5 kbits/s 3.0s - sent:206889 pkts, 581839.4 kbits/s 4.0s - sent:268578 pkts, 493444.5 kbits/s 5.0s - sent:313199 pkts, 356849.9 kbits/s 6.0s - sent:447774 pkts, 1071984.0 kbits/s 7.0s - sent:601794 pkts, 1227970.2 kbits/s ^Cpackets sent = 616665, avg rate=80022.2kbps root@TCPIP-VM:~/Desktop/shared/lab6/udp# </pre>

1 Gbps

host: h3	host: h1
<pre> 5.2s - received: 7081/ sent:638163 pkts (loss 98.890%), 9374.7 kbit/s 6.2s - received: 8240/ sent:747799 pkts (loss 98.898%), 9271.7 kbit/s cket received = 9046 / 840781 sent: 98.924% loss 7.2s - received: 1/ sent: 1 pkts (loss 0.000%), 193.8 kbit/s 0.5s - received: 1172/ sent: 11128 pkts (loss 89.468%), 9359.6 kbit/s 1.5s - received: 2338/ sent: 77968 pkts (loss 97.001%), 9321.0 kbit/s 2.5s - received: 3513/ sent:140185 pkts (loss 97.494%), 9399.0 kbit/s 3.5s - received: 4678/ sent:219216 pkts (loss 97.866%), 9279.8 kbit/s 4.5s - received: 5844/ sent:274126 pkts (loss 97.868%), 9319.9 kbit/s 5.5s - received: 7011/ sent:319722 pkts (loss 97.807%), 9329.3 kbit/s 6.5s - received: 8159/ sent:464635 pkts (loss 98.244%), 9173.5 kbit/s cket received = 9266 / 616555 sent: 98.497% loss 7.5s - received: 1/ sent: 1 pkts (loss 0.000%), 216.1 kbit/s 8.5s - received: 1170/ sent: 11657 pkts (loss 89.963%), 9337.2 kbit/s 9.5s - received: 2352/ sent: 94415 pkts (loss 97.509%), 9448.8 kbit/s 0.5s - received: 3538/ sent:174499 pkts (loss 97.972%), 9481.1 kbit/s 1.5s - received: 4716/ sent:248841 pkts (loss 98.105%), 9416.7 kbit/s 2.5s - received: 5899/ sent:355252 pkts (loss 98.339%), 9459.0 kbit/s 3.5s - received: 7085/ sent:572191 pkts (loss 98.762%), 9486.3 kbit/s 4.5s - received: 8252/ sent:791641 pkts (loss 98.958%), 9318.8 kbit/s 5.5s - received: 9418/ sent:949104 pkts (loss 99.008%), 9317.9 kbit/s 6.5s - received: 10584/ sent:1096244 pkts (loss 99.035%), 9323.7 kbit/s cket received = 11376 / 1242117 sent: 99.084% loss </pre>	<pre> 4.0s - sent:488041 pkts, 941168.2 kbits/s 5.0s - sent:617390 pkts, 1011063.4 kbits/s 6.0s - sent:738187 pkts, 965292.0 kbits/s ^Cpackets sent = 840783, avg rate=241233.0kbps root@TCPIP-VM:~/Desktop/shared/lab6/udp# ./udpclient 10.10.1.3 10000 10000000 1.0s - sent: 82488 pkts, 659900.1 kbits/s 2.0s - sent:161333 pkts, 630759.4 kbits/s 3.0s - sent:238937 pkts, 620373.0 kbits/s 4.0s - sent:326468 pkts, 700247.2 kbits/s 5.0s - sent:538463 pkts, 1695146.4 kbits/s 6.0s - sent:759519 pkts, 1767354.1 kbits/s 7.0s - sent:915529 pkts, 1241543.3 kbits/s 8.0s - sent:1082911 pkts, 1337241.6 kbits/s ^Cpackets sent = 1242447, avg rate=138846.4kbps root@TCPIP-VM:~/Desktop/shared/lab6/udp# </pre>

سوال (۳) مقدار برابر 8312.6 است.

```
23.6: 8250.6kbps avg ( 9041.7[inst], 8023.0[mov.avg]) cwnd 16 rtt 17.6ms
23.7: 8250.6kbps avg ( 9041.7[inst], 8023.0[mov.avg]) cwnd 19 rtt 21.7ms
23.8: 8250.6kbps avg ( 9041.7[inst], 8023.0[mov.avg]) cwnd 21 rtt 24.7ms
24.0: 8284.3kbps avg ( 9011.7[inst], 8121.8[mov.avg]) cwnd 16 rtt 22.0ms
24.1: 8284.3kbps avg ( 9011.7[inst], 8121.8[mov.avg]) cwnd 17 rtt 20.1ms
24.2: 8284.3kbps avg ( 9011.7[inst], 8121.8[mov.avg]) cwnd 20 rtt 22.4ms
24.3: 8284.3kbps avg ( 9011.7[inst], 8121.8[mov.avg]) cwnd 22 rtt 25.9ms
24.4: 8284.3kbps avg ( 9011.7[inst], 8121.8[mov.avg]) cwnd 17 rtt 22.3ms
24.5: 8284.3kbps avg ( 9011.7[inst], 8121.8[mov.avg]) cwnd 19 rtt 21.4ms
24.6: 8284.3kbps avg ( 9011.7[inst], 8121.8[mov.avg]) cwnd 21 rtt 24.8ms
24.8: 8284.3kbps avg ( 9011.7[inst], 8121.8[mov.avg]) cwnd 16 rtt 26.4ms
24.9: 8284.3kbps avg ( 9011.7[inst], 8121.8[mov.avg]) cwnd 17 rtt 20.3ms
25.0: 8284.3kbps avg ( 9011.7[inst], 8121.8[mov.avg]) cwnd 20 rtt 24.1ms
25.1: 8312.6kbps avg ( 8922.9[inst], 8201.9[mov.avg]) cwnd 22 rtt 27.0ms
25.2: 8312.6kbps avg ( 8922.9[inst], 8201.9[mov.avg]) cwnd 12 rtt 17.8ms
25.3: 8312.6kbps avg ( 8922.9[inst], 8201.9[mov.avg]) cwnd 14 rtt 15.2ms
25.4: 8312.6kbps avg ( 8922.9[inst], 8201.9[mov.avg]) cwnd 18 rtt 19.9ms
25.5: 8312.6kbps avg ( 8922.9[inst], 8201.9[mov.avg]) cwnd 20 rtt 22.4ms
25.7: 8312.6kbps avg ( 8922.9[inst], 8201.9[mov.avg]) cwnd 22 rtt 24.9ms
25.8: 8312.6kbps avg ( 8922.9[inst], 8201.9[mov.avg]) cwnd 12 rtt 17.7ms
25.9: 8312.6kbps avg ( 8922.9[inst], 8201.9[mov.avg]) cwnd 14 rtt 16.2ms
26.0: 8312.6kbps avg ( 8922.9[inst], 8201.9[mov.avg]) cwnd 17 rtt 20.1ms
```