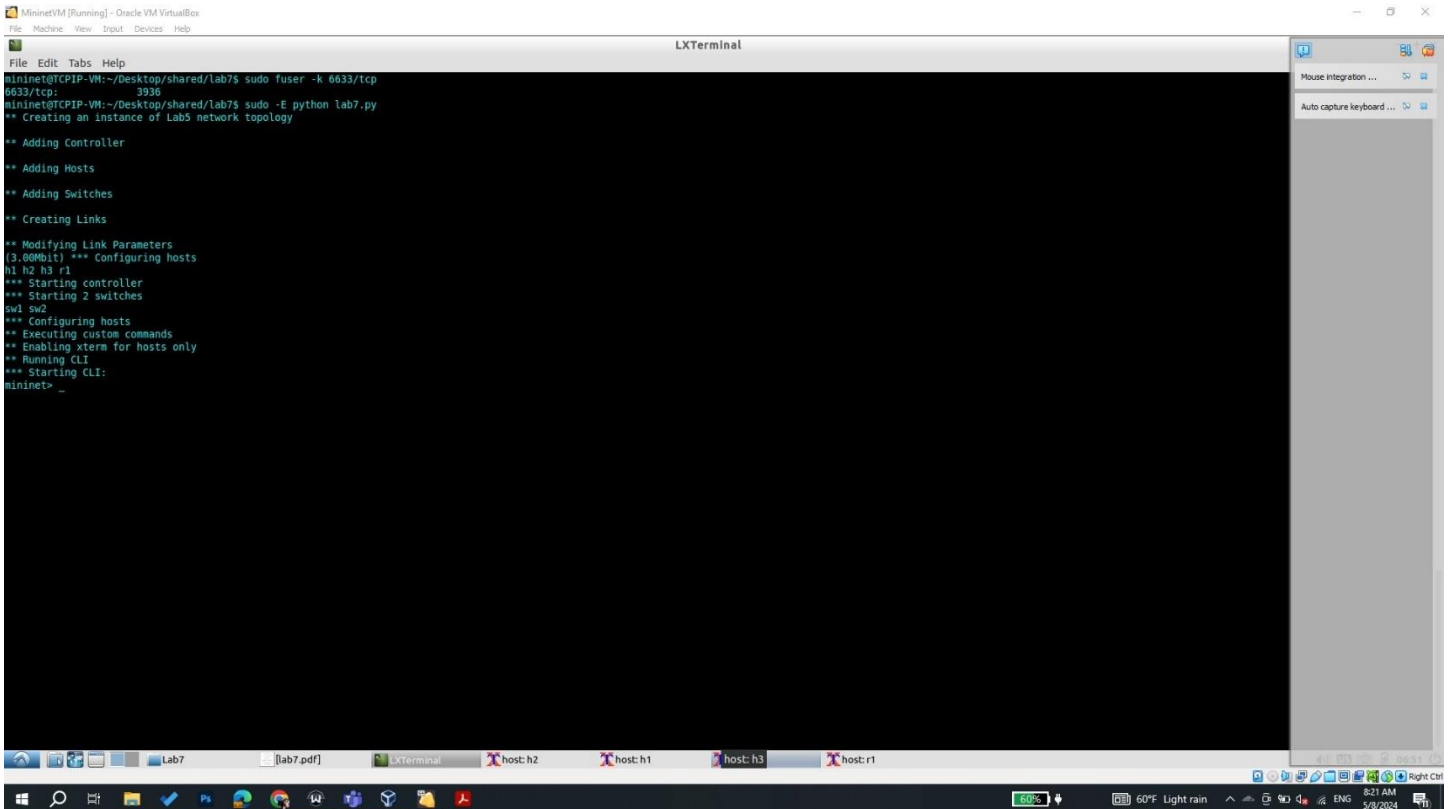


به نام خدا

زهراسادات طباطبائی ۹۹۵۲۱۴۱۵ - ستاره باباجانی ۹۹۵۲۱۱۰۹

سوال (۱)

ابتدا فایل lab7.py را ران میکنیم:



```
File Edit Tabs Help
mininet@tcpip-VN:~/Desktop/shared/lab7$ sudo fuser -k 6633/tcp
6633/tcp: 3936
mininet@tcpip-VN:~/Desktop/shared/lab7$ sudo -E python lab7.py
** Creating an instance of Lab5 network topology

** Adding Controller

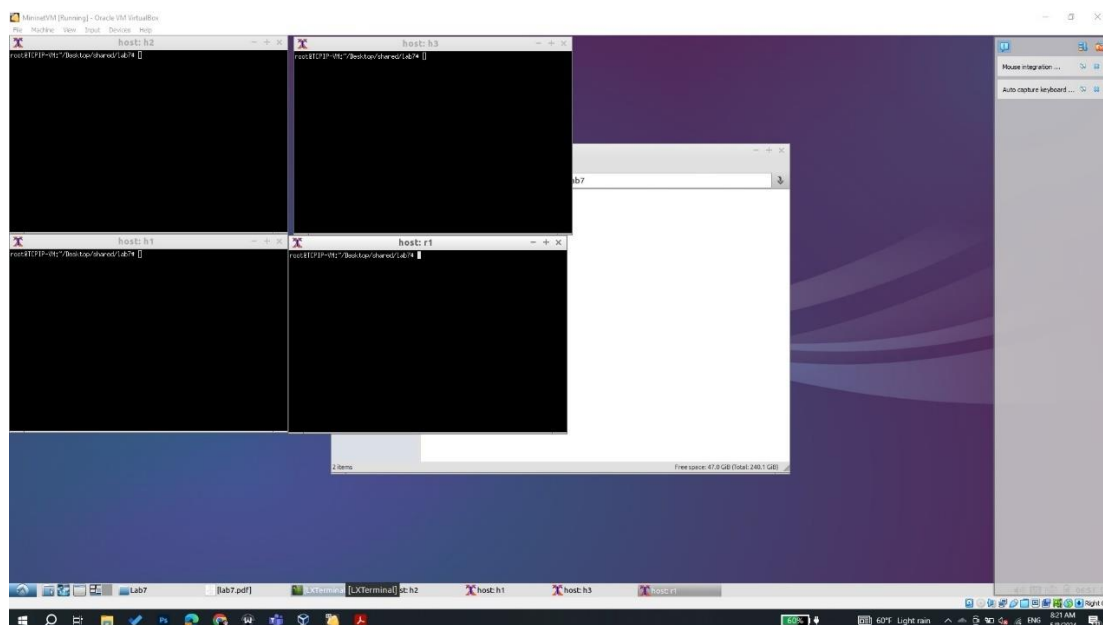
** Adding Hosts

** Adding Switches

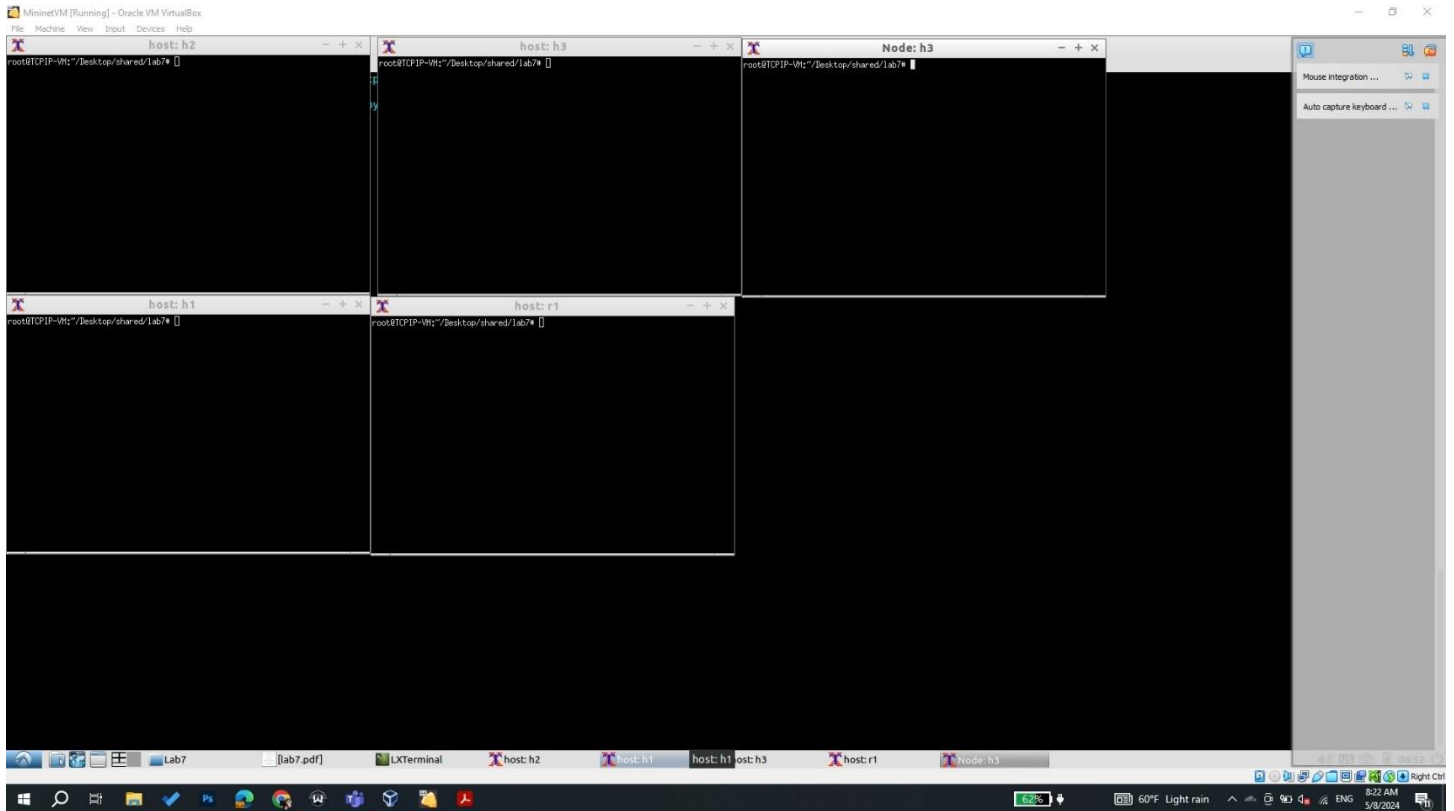
** Creating Links

** Modifying Link Parameters
(3.00Mbit) *** Configuring hosts
h1 h2 h3 r1
*** Starting controller
*** Starting 2 switches
sw1 sw2
*** Configuring hosts
** Executing custom commands
** Enabling xterm for hosts only
** Running CLI
*** Starting CLI:
mininet> _
```

این ها برای ما باز میشود



با دستور node h3 هم باز میکنیم:



سرورهای UDP هاست h3 را روی پورتهای ۱۰۰۰۲ و ۱۰۰۰۳ ایجاد میکنیم و سناریوهای گفته شده را انجام میدهیم:

سناریو اول

کلاینت UDP هم روی h3 باز کنید که با نرخ ۱ Mbps ارسال کند

Node: h3	host: h3
166.1s - received: 20657/ sent: 20657 pkts (loss 0.000%), 1000.9 kbit/s	167.1s - received: 20775/ sent: 20775 pkts (loss 0.000%), 1000.9 kbit/s
167.1s - received: 20783/ sent: 20783 pkts (loss 0.000%), 999.8 kbit/s	168.1s - received: 20901/ sent: 20901 pkts (loss 0.000%), 1001.2 kbit/s
168.1s - received: 20909/ sent: 20909 pkts (loss 0.000%), 1000.5 kbit/s	169.1s - received: 21027/ sent: 21027 pkts (loss 0.000%), 1000.7 kbit/s
169.1s - received: 21034/ sent: 21034 pkts (loss 0.000%), 999.8 kbit/s	170.1s - received: 21152/ sent: 21152 pkts (loss 0.000%), 999.7 kbit/s
170.1s - received: 21160/ sent: 21160 pkts (loss 0.000%), 1000.9 kbit/s	171.1s - received: 21278/ sent: 21278 pkts (loss 0.000%), 1002.4 kbit/s
171.1s - received: 21286/ sent: 21286 pkts (loss 0.000%), 1000.7 kbit/s	172.1s - received: 21404/ sent: 21404 pkts (loss 0.000%), 1000.6 kbit/s
172.1s - received: 21412/ sent: 21412 pkts (loss 0.000%), 1000.2 kbit/s	173.1s - received: 21530/ sent: 21530 pkts (loss 0.000%), 1000.0 kbit/s
173.1s - received: 21538/ sent: 21538 pkts (loss 0.000%), 1001.1 kbit/s	174.1s - received: 21656/ sent: 21656 pkts (loss 0.000%), 1001.4 kbit/s
174.1s - received: 21663/ sent: 21663 pkts (loss 0.000%), 999.8 kbit/s	175.1s - received: 21782/ sent: 21782 pkts (loss 0.000%), 1001.4 kbit/s
175.1s - received: 21789/ sent: 21789 pkts (loss 0.000%), 1000.8 kbit/s	176.1s - received: 21908/ sent: 21908 pkts (loss 0.000%), 1000.6 kbit/s
176.1s - received: 21915/ sent: 21915 pkts (loss 0.000%), 1000.0 kbit/s	177.1s - received: 22033/ sent: 22033 pkts (loss 0.000%), 999.9 kbit/s
177.2s - received: 22041/ sent: 22041 pkts (loss 0.000%), 1000.6 kbit/s	178.1s - received: 22159/ sent: 22159 pkts (loss 0.000%), 1000.9 kbit/s
178.2s - received: 22167/ sent: 22167 pkts (loss 0.000%), 1002.0 kbit/s	179.2s - received: 22285/ sent: 22285 pkts (loss 0.000%), 1002.0 kbit/s
179.2s - received: 22293/ sent: 22293 pkts (loss 0.000%), 1000.5 kbit/s	180.2s - received: 22411/ sent: 22411 pkts (loss 0.000%), 1000.5 kbit/s
180.2s - received: 22419/ sent: 22419 pkts (loss 0.000%), 1000.9 kbit/s	181.2s - received: 22537/ sent: 22537 pkts (loss 0.000%), 1000.7 kbit/s
181.2s - received: 22545/ sent: 22545 pkts (loss 0.000%), 999.7 kbit/s	182.2s - received: 22663/ sent: 22663 pkts (loss 0.000%), 1000.4 kbit/s
182.2s - received: 22671/ sent: 22671 pkts (loss 0.000%), 1001.9 kbit/s	183.2s - received: 22789/ sent: 22789 pkts (loss 0.000%), 1000.6 kbit/s
183.2s - received: 22796/ sent: 22796 pkts (loss 0.000%), 1000.0 kbit/s	184.2s - received: 22915/ sent: 22915 pkts (loss 0.000%), 1000.2 kbit/s
184.2s - received: 22922/ sent: 22922 pkts (loss 0.000%), 1000.6 kbit/s	185.2s - received: 23041/ sent: 23041 pkts (loss 0.000%), 999.7 kbit/s
185.2s - received: 23048/ sent: 23048 pkts (loss 0.000%), 1001.7 kbit/s	186.2s - received: 23167/ sent: 23167 pkts (loss 0.000%), 1001.5 kbit/s
186.2s - received: 23174/ sent: 23174 pkts (loss 0.000%), 1000.7 kbit/s	187.2s - received: 23293/ sent: 23293 pkts (loss 0.000%), 1000.7 kbit/s

Loss = 0 , goodput~= 1000

کلاینت UDP هم روی ۲ هابز کنید که با نرخ Mbps2 ارسال کند

Node: h3					host: h3				
104.2s	- received:	15130/	sent: 15130 pkts	(loss 0.000%), 1919.2 kbit/s	114.8s	- received:	10219/	sent: 10219 pkts	(loss 0.000%), 960.7 kbit/s
105.2s	- received:	15370/	sent: 15370 pkts	(loss 0.000%), 1917.0 kbit/s	115.8s	- received:	10339/	sent: 10339 pkts	(loss 0.000%), 958.2 kbit/s
106.2s	- received:	15610/	sent: 15610 pkts	(loss 0.000%), 1917.9 kbit/s	116.8s	- received:	10459/	sent: 10459 pkts	(loss 0.000%), 959.9 kbit/s
107.2s	- received:	15850/	sent: 15850 pkts	(loss 0.000%), 1917.7 kbit/s	117.8s	- received:	10579/	sent: 10579 pkts	(loss 0.000%), 957.2 kbit/s
108.2s	- received:	16090/	sent: 16090 pkts	(loss 0.000%), 1918.4 kbit/s	118.8s	- received:	10700/	sent: 10700 pkts	(loss 0.000%), 960.6 kbit/s
109.2s	- received:	16331/	sent: 16331 pkts	(loss 0.000%), 1927.8 kbit/s	119.8s	- received:	10820/	sent: 10820 pkts	(loss 0.000%), 958.7 kbit/s
110.2s	- received:	16574/	sent: 16582 pkts	(loss 0.048%), 1941.3 kbit/s	120.8s	- received:	10938/	sent: 10944 pkts	(loss 0.055%), 939.0 kbit/s
111.2s	- received:	16817/	sent: 16833 pkts	(loss 0.095%), 1943.6 kbit/s	121.8s	- received:	11056/	sent: 11070 pkts	(loss 0.126%), 937.8 kbit/s
112.2s	- received:	17059/	sent: 17084 pkts	(loss 0.146%), 1931.5 kbit/s	122.8s	- received:	11173/	sent: 11196 pkts	(loss 0.205%), 932.4 kbit/s
113.2s	- received:	17302/	sent: 17335 pkts	(loss 0.190%), 1932.3 kbit/s	123.8s	- received:	11293/	sent: 11322 pkts	(loss 0.256%), 953.3 kbit/s
114.2s	- received:	17545/	sent: 17585 pkts	(loss 0.227%), 1939.5 kbit/s	124.8s	- received:	11411/	sent: 11448 pkts	(loss 0.323%), 936.0 kbit/s
115.2s	- received:	17787/	sent: 17835 pkts	(loss 0.263%), 1935.1 kbit/s	125.8s	- received:	11529/	sent: 11573 pkts	(loss 0.380%), 943.8 kbit/s
116.2s	- received:	18027/	sent: 18086 pkts	(loss 0.326%), 1914.4 kbit/s	126.8s	- received:	11647/	sent: 11698 pkts	(loss 0.436%), 941.8 kbit/s
117.2s	- received:	18267/	sent: 18386 pkts	(loss 0.376%), 1919.6 kbit/s	127.8s	- received:	11769/	sent: 11823 pkts	(loss 0.457%), 975.3 kbit/s
118.2s	- received:	18506/	sent: 18586 pkts	(loss 0.430%), 1909.9 kbit/s	128.8s	- received:	11890/	sent: 11948 pkts	(loss 0.485%), 966.9 kbit/s
119.2s	- received:	18750/	sent: 18837 pkts	(loss 0.462%), 1946.1 kbit/s	129.8s	- received:	12008/	sent: 12073 pkts	(loss 0.538%), 943.2 kbit/s
120.2s	- received:	18993/	sent: 19087 pkts	(loss 0.492%), 1942.4 kbit/s	130.8s	- received:	12126/	sent: 12199 pkts	(loss 0.598%), 938.5 kbit/s
121.2s	- received:	19237/	sent: 19338 pkts	(loss 0.522%), 1946.8 kbit/s	131.8s	- received:	12245/	sent: 12325 pkts	(loss 0.643%), 944.2 kbit/s
122.2s	- received:	19476/	sent: 19589 pkts	(loss 0.577%), 1946.8 kbit/s	132.8s	- received:	12363/	sent: 12451 pkts	(loss 0.707%), 938.7 kbit/s
123.3s	- received:	19716/	sent: 19839 pkts	(loss 0.620%), 1917.2 kbit/s	133.8s	- received:	12485/	sent: 12576 pkts	(loss 0.724%), 973.1 kbit/s
124.3s	- received:	19956/	sent: 20089 pkts	(loss 0.662%), 1913.0 kbit/s	134.8s	- received:	12605/	sent: 12701 pkts	(loss 0.756%), 957.4 kbit/s
125.3s	- received:	20197/	sent: 20342 pkts	(loss 0.713%), 1917.4 kbit/s	135.9s	- received:	12724/	sent: 12826 pkts	(loss 0.795%), 951.2 kbit/s
126.3s	- received:	20441/	sent: 20596 pkts	(loss 0.753%), 1951.8 kbit/s	136.9s	- received:	12845/	sent: 12952 pkts	(loss 0.826%), 962.4 kbit/s

سناریو سوم:

کلاینت UDP هم روی ۲ هابز کنید که با نرخ Mbps4.5 ارسال کند

Node: h3					host: h3				
122.6s	- received:	37653/	sent: 65492 pkts	(loss 42.507%), 2424.0 kbit/s	101.1s	- received:	4996/	sent: 12170 pkts	(loss 58.948%), 446.1 kbit/s
123.6s	- received:	37960/	sent: 66054 pkts	(loss 42.532%), 2455.8 kbit/s	102.2s	- received:	5090/	sent: 12295 pkts	(loss 58.926%), 431.3 kbit/s
124.6s	- received:	38264/	sent: 66617 pkts	(loss 42.561%), 2427.8 kbit/s	103.2s	- received:	5108/	sent: 12422 pkts	(loss 58.879%), 457.2 kbit/s
125.6s	- received:	38569/	sent: 67180 pkts	(loss 42.589%), 2439.9 kbit/s	104.2s	- received:	5162/	sent: 12549 pkts	(loss 58.865%), 425.0 kbit/s
126.6s	- received:	38880/	sent: 67745 pkts	(loss 42.608%), 2481.0 kbit/s	105.2s	- received:	5212/	sent: 12676 pkts	(loss 58.883%), 394.1 kbit/s
127.6s	- received:	39193/	sent: 68308 pkts	(loss 42.623%), 2500.6 kbit/s	106.2s	- received:	5261/	sent: 12801 pkts	(loss 58.902%), 391.8 kbit/s
128.6s	- received:	39506/	sent: 68872 pkts	(loss 42.639%), 2497.5 kbit/s	107.2s	- received:	5308/	sent: 12929 pkts	(loss 58.945%), 367.9 kbit/s
129.6s	- received:	39818/	sent: 69435 pkts	(loss 42.654%), 2494.5 kbit/s	108.2s	- received:	5358/	sent: 13060 pkts	(loss 58.974%), 382.0 kbit/s
130.6s	- received:	40135/	sent: 70000 pkts	(loss 42.664%), 2529.6 kbit/s	109.3s	- received:	5405/	sent: 13186 pkts	(loss 59.010%), 372.9 kbit/s
131.6s	- received:	40452/	sent: 70566 pkts	(loss 42.675%), 2522.0 kbit/s	110.3s	- received:	5447/	sent: 13318 pkts	(loss 59.100%), 319.0 kbit/s
132.6s	- received:	40770/	sent: 72023 pkts	(loss 43.393%), 2525.8 kbit/s	111.3s	- received:	5497/	sent: 13630 pkts	(loss 59.670%), 398.6 kbit/s
133.6s	- received:	41066/	sent: 72319 pkts	(loss 43.215%), 2366.2 kbit/s	112.3s	- received:	5563/	sent: 13696 pkts	(loss 59.382%), 523.5 kbit/s
134.6s	- received:	41361/	sent: 72614 pkts	(loss 43.040%), 2355.4 kbit/s	113.3s	- received:	5629/	sent: 13762 pkts	(loss 59.098%), 523.7 kbit/s
135.6s	- received:	41656/	sent: 72909 pkts	(loss 42.866%), 2359.9 kbit/s	114.4s	- received:	5695/	sent: 13828 pkts	(loss 58.815%), 523.6 kbit/s
136.6s	- received:	41956/	sent: 73384 pkts	(loss 42.827%), 2399.4 kbit/s	115.4s	- received:	5750/	sent: 13949 pkts	(loss 58.778%), 431.5 kbit/s
137.6s	- received:	42268/	sent: 73947 pkts	(loss 42.840%), 2495.9 kbit/s	116.4s	- received:	5801/	sent: 14075 pkts	(loss 58.785%), 404.7 kbit/s
138.6s	- received:	42578/	sent: 74507 pkts	(loss 42.854%), 2478.6 kbit/s	117.4s	- received:	5849/	sent: 14200 pkts	(loss 58.810%), 383.8 kbit/s
139.6s	- received:	42890/	sent: 75072 pkts	(loss 42.868%), 2494.3 kbit/s	118.4s	- received:	5900/	sent: 14329 pkts	(loss 58.825%), 395.3 kbit/s
140.6s	- received:	43203/	sent: 75636 pkts	(loss 42.880%), 2497.2 kbit/s	119.4s	- received:	5949/	sent: 14455 pkts	(loss 58.845%), 389.0 kbit/s
141.6s	- received:	43511/	sent: 76200 pkts	(loss 42.899%), 2456.4 kbit/s	120.4s	- received:	6000/	sent: 14580 pkts	(loss 58.848%), 408.0 kbit/s
142.6s	- received:	43828/	sent: 76764 pkts	(loss 42.906%), 2534.2 kbit/s	121.4s	- received:	6044/	sent: 14707 pkts	(loss 58.904%), 347.0 kbit/s
143.6s	- received:	44147/	sent: 77328 pkts	(loss 42.909%), 2545.1 kbit/s	122.4s	- received:	6083/	sent: 14839 pkts	(loss 59.007%), 295.6 kbit/s
144.6s	- received:	44470/	sent: 77892 pkts	(loss 42.908%), 2577.1 kbit/s	123.5s	- received:	6130/	sent: 14964 pkts	(loss 59.035%), 375.8 kbit/s

(سوال ۲)

بله تفاوت‌هایی کمی وجود دارند و بخاطر این است که loss اما تقریبی است و فرض کرده ایم پهنای باند مربوط به host ها جداگانه و ثابت هستند.

Node: h3	host: h3
1677.5s - received: 60437/ sent: 78144 pkts (loss 22.659%), 998.1 kbit/s	45.2s - received: 5759/ sent: 16325 pkts (loss 64.723%), 997.1 kbit/s
1678.5s - received: 60563/ sent: 78144 pkts (loss 22.498%), 1000.1 kbit/s	46.2s - received: 5885/ sent: 16451 pkts (loss 64.227%), 1001.0 kbit/s
1679.5s - received: 60688/ sent: 78144 pkts (loss 22.338%), 998.6 kbit/s	47.2s - received: 6011/ sent: 16577 pkts (loss 63.739%), 999.8 kbit/s
1680.5s - received: 60814/ sent: 78144 pkts (loss 22.177%), 1000.4 kbit/s	48.2s - received: 6136/ sent: 16702 pkts (loss 63.262%), 990.2 kbit/s
1681.5s - received: 60939/ sent: 78144 pkts (loss 22.017%), 987.3 kbit/s	49.2s - received: 6262/ sent: 16828 pkts (loss 62.788%), 1001.4 kbit/s
1682.5s - received: 61065/ sent: 78144 pkts (loss 21.856%), 1004.6 kbit/s	50.2s - received: 6388/ sent: 16954 pkts (loss 62.322%), 1000.9 kbit/s
1683.5s - received: 61191/ sent: 78144 pkts (loss 21.695%), 1000.8 kbit/s	51.2s - received: 6513/ sent: 17079 pkts (loss 61.865%), 998.5 kbit/s
1684.5s - received: 61316/ sent: 78144 pkts (loss 21.535%), 998.8 kbit/s	52.2s - received: 6638/ sent: 17204 pkts (loss 61.416%), 997.6 kbit/s
1685.5s - received: 61441/ sent: 78144 pkts (loss 21.375%), 998.0 kbit/s	53.2s - received: 6763/ sent: 17329 pkts (loss 60.973%), 997.8 kbit/s
1686.5s - received: 61566/ sent: 78144 pkts (loss 21.215%), 998.2 kbit/s	54.2s - received: 6888/ sent: 17454 pkts (loss 60.536%), 997.5 kbit/s
1687.5s - received: 61691/ sent: 78144 pkts (loss 21.055%), 998.0 kbit/s	55.2s - received: 7013/ sent: 17579 pkts (loss 60.106%), 998.1 kbit/s
1688.5s - received: 61816/ sent: 78144 pkts (loss 20.895%), 997.9 kbit/s	56.2s - received: 7138/ sent: 17704 pkts (loss 59.681%), 998.0 kbit/s
1689.5s - received: 61941/ sent: 78144 pkts (loss 20.735%), 998.5 kbit/s	57.2s - received: 7263/ sent: 17829 pkts (loss 59.253%), 998.4 kbit/s
1690.5s - received: 62066/ sent: 78144 pkts (loss 20.575%), 998.7 kbit/s	58.2s - received: 7388/ sent: 17954 pkts (loss 58.850%), 998.2 kbit/s
1691.5s - received: 62191/ sent: 78144 pkts (loss 20.415%), 998.5 kbit/s	59.2s - received: 7513/ sent: 18079 pkts (loss 58.443%), 998.5 kbit/s
1692.5s - received: 62317/ sent: 78144 pkts (loss 20.254%), 1001.1 kbit/s	60.2s - received: 7638/ sent: 18204 pkts (loss 58.042%), 998.5 kbit/s
1693.5s - received: 62442/ sent: 78144 pkts (loss 20.094%), 990.7 kbit/s	61.2s - received: 7763/ sent: 18329 pkts (loss 57.646%), 995.6 kbit/s
1694.5s - received: 62568/ sent: 78144 pkts (loss 19.932%), 1001.5 kbit/s	62.2s - received: 7887/ sent: 18454 pkts (loss 57.259%), 998.7 kbit/s
1695.5s - received: 62693/ sent: 78144 pkts (loss 19.772%), 998.2 kbit/s	63.2s - received: 8013/ sent: 18579 pkts (loss 56.871%), 1001.5 kbit/s
1696.5s - received: 62818/ sent: 78144 pkts (loss 19.613%), 998.5 kbit/s	64.2s - received: 8139/ sent: 18705 pkts (loss 56.488%), 1001.4 kbit/s
1697.5s - received: 62943/ sent: 78144 pkts (loss 19.453%), 998.1 kbit/s	65.3s - received: 8264/ sent: 18830 pkts (loss 56.113%), 998.4 kbit/s
1698.5s - received: 63068/ sent: 78144 pkts (loss 19.293%), 998.9 kbit/s	66.3s - received: 8389/ sent: 18955 pkts (loss 55.743%), 998.5 kbit/s
1699.5s - received: 63193/ sent: 78144 pkts (loss 19.133%), 998.5 kbit/s	67.3s - received: 8521/ sent: 19087 pkts (loss 55.357%), 1049.1 kbit/s

Node: h2	Node: h3
122.2: 978.5kbps avg ( 859.5[inst], 859.9[mov,avg]) cwnd 211 rtt2776.5ms	root@TCP-IP-VM:/media/sf_shared# cd lab5
124.2: 976.6kbps avg ( 859.9[inst], 859.9[mov,avg]) cwnd 211 rtt2776.5ms	root@TCP-IP-VM:/media/sf_shared/lab5# cd tcp
125.2: 975.5kbps avg ( 837.1[inst], 857.6[mov,avg]) cwnd 211 rtt2777.5ms	root@TCP-IP-VM:/media/sf_shared/lab5/tcp# ./tcpserver 10003
126.2: 974.6kbps avg ( 859.7[inst], 857.8[mov,avg]) cwnd 211 rtt2775.5ms	Handling client 10.10.0.2
127.2: 973.5kbps avg ( 856.4[inst], 857.7[mov,avg]) cwnd 212 rtt2781.0ms	with child process: 17776
128.2: 972.7kbps avg ( 859.7[inst], 857.9[mov,avg]) cwnd 212 rtt2779.5ms	
129.2: 971.9kbps avg ( 859.0[inst], 858.0[mov,avg]) cwnd 212 rtt2779.5ms	
131.2: 970.2kbps avg ( 859.9[inst], 858.2[mov,avg]) cwnd 212 rtt2787.5ms	
133.2: 968.5kbps avg ( 859.9[inst], 858.4[mov,avg]) cwnd 213 rtt2795.5ms	
134.2: 967.7kbps avg ( 859.8[inst], 858.5[mov,avg]) cwnd 213 rtt2795.5ms	
135.2: 966.9kbps avg ( 859.3[inst], 858.6[mov,avg]) cwnd 213 rtt2795.5ms	
137.2: 965.2kbps avg ( 848.7[inst], 857.6[mov,avg]) cwnd 213 rtt2800.5ms	
138.2: 964.4kbps avg ( 859.0[inst], 857.7[mov,avg]) cwnd 213 rtt2800.5ms	
139.2: 964.4kbps avg ( 859.0[inst], 857.7[mov,avg]) cwnd 214 rtt2805.5ms	
140.2: 962.9kbps avg ( 860.1[inst], 858.0[mov,avg]) cwnd 214 rtt2804.0ms	
141.2: 962.3kbps avg ( 882.1[inst], 860.4[mov,avg]) cwnd 214 rtt2808.0ms	
143.2: 960.8kbps avg ( 848.6[inst], 859.2[mov,avg]) cwnd 214 rtt2810.0ms	
144.2: 960.8kbps avg ( 848.6[inst], 859.2[mov,avg]) cwnd 215 rtt2819.0ms	
144.2: 960.2kbps avg ( 882.4[inst], 861.5[mov,avg]) cwnd 215 rtt2819.0ms	
145.2: 959.4kbps avg ( 836.8[inst], 859.0[mov,avg]) cwnd 215 rtt2819.5ms	
146.2: 958.7kbps avg ( 859.8[inst], 859.1[mov,avg]) cwnd 215 rtt2819.5ms	
^Z	
[1]+ Stopped ./tcpclient 10.10.1.3 10003	
root@TCP-IP-VM:/media/sf_shared/lab5/tcp#	

Node: h3	host: h3
82.2s - received: 19465/ sent: 42457 pkts (loss 54.154%), 1882.4 kbit/s	46.2s - received: 5889/ sent: 21110 pkts (loss 72.103%), 1000.0 kbit/s
83.2s - received: 19701/ sent: 42708 pkts (loss 53.870%), 1877.8 kbit/s	47.2s - received: 6015/ sent: 21236 pkts (loss 71.675%), 999.8 kbit/s
84.2s - received: 19935/ sent: 42959 pkts (loss 53.595%), 1867.2 kbit/s	48.2s - received: 6140/ sent: 21361 pkts (loss 71.256%), 998.8 kbit/s
85.2s - received: 20170/ sent: 43209 pkts (loss 53.320%), 1878.4 kbit/s	49.2s - received: 6266/ sent: 21487 pkts (loss 70.838%), 999.3 kbit/s
86.2s - received: 20406/ sent: 43460 pkts (loss 53.046%), 1881.3 kbit/s	50.2s - received: 6391/ sent: 21613 pkts (loss 70.430%), 994.6 kbit/s
87.2s - received: 20642/ sent: 43711 pkts (loss 52.776%), 1883.6 kbit/s	51.2s - received: 6517/ sent: 21739 pkts (loss 70.022%), 1002.2 kbit/s
88.2s - received: 20877/ sent: 43962 pkts (loss 52.511%), 1874.5 kbit/s	52.2s - received: 6641/ sent: 21863 pkts (loss 69.624%), 999.6 kbit/s
89.2s - received: 21111/ sent: 44210 pkts (loss 52.248%), 1867.3 kbit/s	53.2s - received: 6765/ sent: 21988 pkts (loss 69.233%), 999.8 kbit/s
90.3s - received: 21346/ sent: 44460 pkts (loss 51.988%), 1876.4 kbit/s	54.2s - received: 6891/ sent: 22114 pkts (loss 68.839%), 1002.4 kbit/s
91.3s - received: 21580/ sent: 44713 pkts (loss 51.737%), 1872.0 kbit/s	55.2s - received: 7018/ sent: 22241 pkts (loss 68.446%), 1010.4 kbit/s
92.3s - received: 21816/ sent: 44964 pkts (loss 51.481%), 1881.9 kbit/s	56.3s - received: 7143/ sent: 22367 pkts (loss 68.065%), 993.9 kbit/s
93.3s - received: 22051/ sent: 45214 pkts (loss 51.230%), 1879.6 kbit/s	57.3s - received: 7268/ sent: 22492 pkts (loss 67.686%), 999.8 kbit/s
94.3s - received: 22286/ sent: 45464 pkts (loss 50.981%), 1879.7 kbit/s	58.3s - received: 7393/ sent: 22617 pkts (loss 67.312%), 997.8 kbit/s
95.3s - received: 22520/ sent: 45714 pkts (loss 50.737%), 1871.1 kbit/s	59.3s - received: 7518/ sent: 22742 pkts (loss 66.942%), 997.2 kbit/s
96.3s - received: 22755/ sent: 45964 pkts (loss 50.494%), 1877.0 kbit/s	60.3s - received: 7643/ sent: 22867 pkts (loss 66.576%), 997.8 kbit/s
97.3s - received: 22990/ sent: 46215 pkts (loss 50.254%), 1875.9 kbit/s	61.3s - received: 7769/ sent: 22993 pkts (loss 66.211%), 1004.9 kbit/s
98.3s - received: 23225/ sent: 46466 pkts (loss 50.017%), 1873.8 kbit/s	62.3s - received: 7894/ sent: 23118 pkts (loss 65.853%), 998.4 kbit/s
99.3s - received: 23460/ sent: 46717 pkts (loss 49.783%), 1878.3 kbit/s	63.3s - received: 8020/ sent: 23244 pkts (loss 65.496%), 1005.2 kbit/s
100.3s - received: 23695/ sent: 46967 pkts (loss 49.550%), 1879.6 kbit/s	64.3s - received: 8145/ sent: 23369 pkts (loss 65.146%), 998.4 kbit/s
101.3s - received: 23930/ sent: 47218 pkts (loss 49.320%), 1874.0 kbit/s	65.3s - received: 8271/ sent: 23495 pkts (loss 64.797%), 1000.3 kbit/s
102.3s - received: 24165/ sent: 47468 pkts (loss 49.092%), 1879.5 kbit/s	66.3s - received: 8397/ sent: 23621 pkts (loss 64.451%), 1001.2 kbit/s
103.3s - received: 24400/ sent: 47718 pkts (loss 48.866%), 1879.3 kbit/s	67.3s - received: 8523/ sent: 23747 pkts (loss 64.109%), 999.5 kbit/s
104.3s - received: 24635/ sent: 47968 pkts (loss 48.643%), 1879.3 kbit/s	68.3s - received: 8666/ sent: 23890 pkts (loss 63.725%), 1143.2 kbit/s



Node: h2
- + x

```

163.1: 115.6kbps avg ( -0.0[inst], 46.6[mov,avg]) cwnd 11 rtt2788.0ms
164.1: 117.8kbps avg ( 486.4[inst], 90.6[mov,avg]) cwnd 11 rtt2787.0ms
165.1: 117.1kbps avg ( 0.0[inst], 81.5[mov,avg]) cwnd 11 rtt2787.0ms
167.1: 115.7kbps avg ( -0.0[inst], 73.4[mov,avg]) cwnd 11 rtt2787.0ms
168.1: 115.0kbps avg ( -0.0[inst], 66.0[mov,avg]) cwnd 1 rtt2787.0ms
169.2: 114.3kbps avg ( -0.0[inst], 59.4[mov,avg]) cwnd 1 rtt2787.0ms
170.2: 113.7kbps avg ( -0.0[inst], 53.5[mov,avg]) cwnd 1 rtt2787.0ms
172.2: 112.4kbps avg ( -0.0[inst], 48.1[mov,avg]) cwnd 1 rtt2787.0ms
174.2: 111.1kbps avg ( -0.0[inst], 43.3[mov,avg]) cwnd 1 rtt2787.0ms
175.2: 110.4kbps avg ( -0.0[inst], 39.0[mov,avg]) cwnd 1 rtt2787.0ms
177.2: 109.2kbps avg ( -0.0[inst], 35.1[mov,avg]) cwnd 1 rtt2787.0ms
178.2: 108.6kbps avg ( -0.0[inst], 31.6[mov,avg]) cwnd 1 rtt2787.0ms
180.2: 107.4kbps avg ( -0.0[inst], 28.4[mov,avg]) cwnd 1 rtt2787.0ms
181.2: 106.8kbps avg ( -0.0[inst], 25.6[mov,avg]) cwnd 1 rtt2787.0ms
182.2: 106.2kbps avg ( -0.0[inst], 23.0[mov,avg]) cwnd 1 rtt2787.0ms
183.2: 105.6kbps avg ( -0.0[inst], 20.7[mov,avg]) cwnd 1 rtt2787.0ms
184.2: 105.0kbps avg ( -0.0[inst], 18.6[mov,avg]) cwnd 1 rtt2787.0ms
185.2: 104.5kbps avg ( -0.0[inst], 16.8[mov,avg]) cwnd 1 rtt2787.0ms
186.2: 103.9kbps avg ( -0.0[inst], 15.1[mov,avg]) cwnd 1 rtt2787.0ms
188.2: 102.8kbps avg ( -0.0[inst], 13.6[mov,avg]) cwnd 1 rtt2787.0ms
189.2: 102.3kbps avg ( -0.0[inst], 12.2[mov,avg]) cwnd 1 rtt2787.0ms

```

Node: h3
- + x

```

root@TCPIP-VM:/media/sf_shared# cd lab5
root@TCPIP-VM:/media/sf_shared/lab5# cd tcp
root@TCPIP-VM:/media/sf_shared/lab5/tcp# ./tcpserver 10003
Handling client 10.10.0.2
with child process: 17776
Handling client 10.10.0.2
with child process: 17786

```

سناریو سوم

Node: h3
- + x

```

82.2s - received: 19465/ sent: 42467 pkts (loss 54.154%), 1882.4 kbit/s
83.2s - received: 19701/ sent: 42708 pkts (loss 53.870%), 1877.8 kbit/s
84.2s - received: 19935/ sent: 42959 pkts (loss 53.595%), 1867.2 kbit/s
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104.3s - received: 24635/ sent: 47968 pkts (loss 48.643%), 1879.3 kbit/s

```

host: h3
- + x

```

46.2s - received: 5889/ sent: 21110 pkts (loss 72.103%), 1000.0 kbit/s
47.2s - received: 6015/ sent: 21236 pkts (loss 71.675%), 999.8 kbit/s
48.2s - received: 6140/ sent: 21361 pkts (loss 71.256%), 998.8 kbit/s
49.2s - received: 6266/ sent: 21487 pkts (loss 70.838%), 999.3 kbit/s
50.2s - received: 6391/ sent: 21613 pkts (loss 70.430%), 994.6 kbit/s
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52.2s - received: 6641/ sent: 21863 pkts (loss 69.624%), 989.6 kbit/s
53.2s - received: 6765/ sent: 21988 pkts (loss 69.233%), 989.8 kbit/s
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```

Node: h2
- + x

```

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170.2: 113.7kbps avg ( -0.0[inst], 53.5[mov,avg]) cwnd 1 rtt2787.0ms
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188.2: 102.8kbps avg ( -0.0[inst], 13.6[mov,avg]) cwnd 1 rtt2787.0ms
189.2: 102.3kbps avg ( -0.0[inst], 12.2[mov,avg]) cwnd 1 rtt2787.0ms

```

Node: h3
- + x

```

root@TCPIP-VM:/media/sf_shared# cd lab5
root@TCPIP-VM:/media/sf_shared/lab5# cd tcp
root@TCPIP-VM:/media/sf_shared/lab5/tcp# ./tcpserver 10003
Handling client 10.10.0.2
with child process: 17776
Handling client 10.10.0.2
with child process: 17786

```

مثل سوال ۲ به تفاوت‌هایی کمی وجود دارند و بخاطر این است که loss اما تقریبی است و فرض کرده ایم پهنای باند مربوط به host ها جداگانه و ثابت هستند.