

LAPORAN

Simulasi Pada Mininet

Disusun untuk memenuhi Tugas Besar

Mata Kuliah CII2J4 – Jaringan Komputer



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BAB I

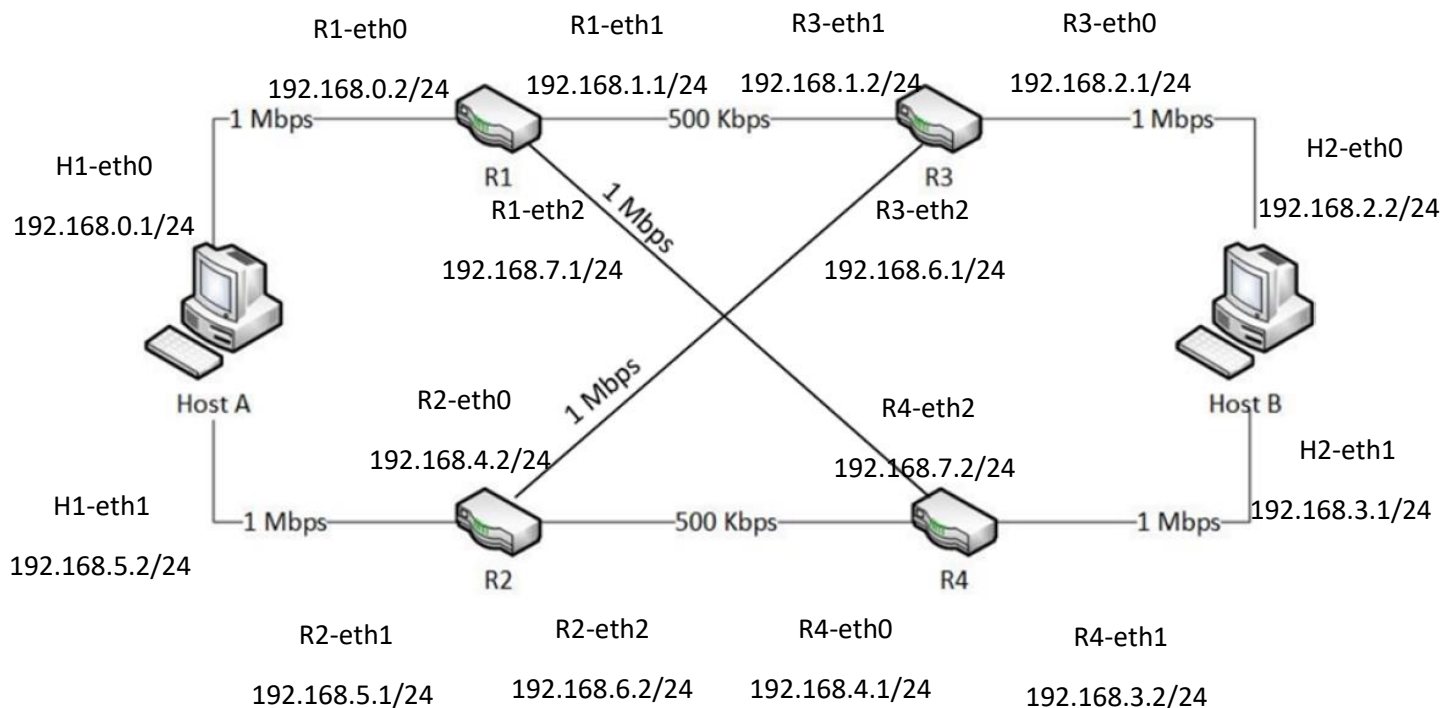
CLO 1

A. Tabel Subnet

IP Jaringan: 192.168.0.0

Nama	Needs	Alokasi	Network ID	Host Range	Broadcast	Prefix	Subnet Mask
Host A	2	256	192.168.0.0	192.168.0.1 – 192.168.0.254	192.168.0.255	/24	255.255.255.0
Host B	2	256	192.168.1.0	192.168.1.1 – 192.168.1.254	192.168.1.255	/24	255.255.255.0
R1	2	256	192.168.2.0	192.168.2.1 – 192.168.2.254	192.168.2.255	/24	255.255.255.0
R2	2	256	192.168.3.0	192.168.3.1 – 192.168.3.254	192.168.3.255	/24	255.255.255.0
R3	4	256	192.168.4.0	192.168.4.1 – 192.168.4.254	192.168.4.255	/24	255.255.255.0
R4	4	256	192.168.5.0	192.168.5.1 – 192.168.5.254	192.168.5.255	/24	255.255.255.0
Net 1	2	256	192.168.6.0	192.168.6.1 – 192.168.6.254	192.168.6.255	/24	255.255.255.0
Net 2	2	256	192.168.7.0	192.168.7.1 – 192.168.7.254	192.168.7.255	/24	255.255.255.0

B. Topologi



C. Uji Konektivitas

```
mininet> net
h1 h1-eth0:r1-eth0 h1-eth1:r2-eth1
h2 h2-eth0:r3-eth0 h2-eth1:r4-eth1
r1 r1-eth0:h1-eth0 r1-eth1:r3-eth1 r1-eth2:r4-eth2
r2 r2-eth1:h1-eth1 r2-eth2:r3-eth2 r2-eth0:r4-eth0
r3 r3-eth0:h2-eth0 r3-eth1:r1-eth1 r3-eth2:r2-eth2
r4 r4-eth1:h2-eth1 r4-eth2:r1-eth2 r4-eth0:r2-eth0
mininet> links
h1-eth0<->r1-eth0 (OK OK)
h1-eth1<->r2-eth1 (OK OK)
h2-eth0<->r3-eth0 (OK OK)
h2-eth1<->r4-eth1 (OK OK)
r1-eth1<->r3-eth1 (OK OK)
r1-eth2<->r4-eth2 (OK OK)
r2-eth2<->r3-eth2 (OK OK)
r2-eth0<->r4-eth0 (OK OK)
mininet>
```

BAB II

CLO 2

A. Ping Antar Host

1. H1-R1

```
mininet> h1 ping r1
PING 192.168.0.2 (192.168.0.2) 56(84) bytes of data.
64 bytes from 192.168.0.2: icmp_seq=1 ttl=64 time=100 ms
64 bytes from 192.168.0.2: icmp_seq=2 ttl=64 time=100 ms
64 bytes from 192.168.0.2: icmp_seq=3 ttl=64 time=100 ms
64 bytes from 192.168.0.2: icmp_seq=4 ttl=64 time=100 ms
64 bytes from 192.168.0.2: icmp_seq=5 ttl=64 time=100 ms
64 bytes from 192.168.0.2: icmp_seq=6 ttl=64 time=100 ms
64 bytes from 192.168.0.2: icmp_seq=7 ttl=64 time=100 ms
^C
--- 192.168.0.2 ping statistics ---
7 packets transmitted, 7 received, 0% packet loss, time 6005ms
rtt min/avg/max/mdev = 100.074/100.311/100.709/0.397 ms
mininet> 
```

2. H1-R2

```
mininet> h1 ping r2
PING 192.168.5.1 (192.168.5.1) 56(84) bytes of data.
64 bytes from 192.168.5.1: icmp_seq=1 ttl=64 time=0.049 ms
64 bytes from 192.168.5.1: icmp_seq=2 ttl=64 time=0.038 ms
64 bytes from 192.168.5.1: icmp_seq=3 ttl=64 time=0.112 ms
64 bytes from 192.168.5.1: icmp_seq=4 ttl=64 time=0.088 ms
64 bytes from 192.168.5.1: icmp_seq=5 ttl=64 time=0.041 ms
64 bytes from 192.168.5.1: icmp_seq=6 ttl=64 time=0.060 ms
^C
--- 192.168.5.1 ping statistics ---
6 packets transmitted, 6 received, 0% packet loss, time 5128ms
rtt min/avg/max/mdev = 0.038/0.064/0.112/0.028 ms
mininet> 
```

3. H2-R3

```
mininet> h2 ping r3
PING 192.168.2.1 (192.168.2.1) 56(84) bytes of data.
64 bytes from 192.168.2.1: icmp_seq=1 ttl=64 time=0.036 ms
64 bytes from 192.168.2.1: icmp_seq=2 ttl=64 time=0.037 ms
64 bytes from 192.168.2.1: icmp_seq=3 ttl=64 time=0.034 ms
64 bytes from 192.168.2.1: icmp_seq=4 ttl=64 time=0.038 ms
64 bytes from 192.168.2.1: icmp_seq=5 ttl=64 time=0.039 ms
^C
--- 192.168.2.1 ping statistics ---
5 packets transmitted, 5 received, 0% packet loss, time 4076ms
rtt min/avg/max/mdev = 0.034/0.036/0.039/0.007 ms
mininet> 
```

4. H2-R4

```
mininet> h2 ping r4
PING 192.168.3.2 (192.168.3.2) 56(84) bytes of data.
64 bytes from 192.168.3.2: icmp_seq=1 ttl=64 time=0.120 ms
64 bytes from 192.168.3.2: icmp_seq=2 ttl=64 time=0.037 ms
64 bytes from 192.168.3.2: icmp_seq=3 ttl=64 time=0.035 ms
64 bytes from 192.168.3.2: icmp_seq=4 ttl=64 time=0.038 ms
64 bytes from 192.168.3.2: icmp_seq=5 ttl=64 time=0.059 ms
^C
--- 192.168.3.2 ping statistics ---
5 packets transmitted, 5 received, 0% packet loss, time 4089ms
rtt min/avg/max/mdev = 0.035/0.057/0.120/0.033 ms
mininet>
```

5. R1-R3

```
mininet> r1 ping r3
PING 192.168.2.1 (192.168.2.1) 56(84) bytes of data.
64 bytes from 192.168.2.1: icmp_seq=1 ttl=64 time=0.035 ms
64 bytes from 192.168.2.1: icmp_seq=2 ttl=64 time=0.036 ms
64 bytes from 192.168.2.1: icmp_seq=3 ttl=64 time=0.047 ms
64 bytes from 192.168.2.1: icmp_seq=4 ttl=64 time=0.041 ms
64 bytes from 192.168.2.1: icmp_seq=5 ttl=64 time=0.050 ms
^C
--- 192.168.2.1 ping statistics ---
5 packets transmitted, 5 received, 0% packet loss, time 4102ms
rtt min/avg/max/mdev = 0.035/0.041/0.050/0.010 ms
mininet> █
```

6. R1-R4

```
mininet> r1 ping r4
PING 192.168.3.2 (192.168.3.2) 56(84) bytes of data.
64 bytes from 192.168.3.2: icmp_seq=1 ttl=64 time=0.078 ms
64 bytes from 192.168.3.2: icmp_seq=2 ttl=64 time=0.037 ms
64 bytes from 192.168.3.2: icmp_seq=3 ttl=64 time=0.036 ms
64 bytes from 192.168.3.2: icmp_seq=4 ttl=64 time=0.094 ms
64 bytes from 192.168.3.2: icmp_seq=5 ttl=64 time=0.060 ms
^C
--- 192.168.3.2 ping statistics ---
5 packets transmitted, 5 received, 0% packet loss, time 4079ms
rtt min/avg/max/mdev = 0.036/0.061/0.094/0.022 ms
mininet>
```

7. R2-R3

```
mininet> r2 ping r3
PING 192.168.2.1 (192.168.2.1) 56(84) bytes of data.
64 bytes from 192.168.2.1: icmp_seq=1 ttl=64 time=0.048 ms
64 bytes from 192.168.2.1: icmp_seq=2 ttl=64 time=0.084 ms
64 bytes from 192.168.2.1: icmp_seq=3 ttl=64 time=0.038 ms
64 bytes from 192.168.2.1: icmp_seq=4 ttl=64 time=0.038 ms
64 bytes from 192.168.2.1: icmp_seq=5 ttl=64 time=0.107 ms
^C
--- 192.168.2.1 ping statistics ---
5 packets transmitted, 5 received, 0% packet loss, time 4085ms
rtt min/avg/max/mdev = 0.038/0.063/0.107/0.027 ms
mininet>
```

8. R2-R4

```
mininet> h2 ping r4
PING 192.168.3.2 (192.168.3.2) 56(84) bytes of data.
64 bytes from 192.168.3.2: icmp_seq=1 ttl=64 time=0.120 ms
64 bytes from 192.168.3.2: icmp_seq=2 ttl=64 time=0.037 ms
64 bytes from 192.168.3.2: icmp_seq=3 ttl=64 time=0.035 ms
64 bytes from 192.168.3.2: icmp_seq=4 ttl=64 time=0.038 ms
64 bytes from 192.168.3.2: icmp_seq=5 ttl=64 time=0.059 ms
^C
--- 192.168.3.2 ping statistics ---
5 packets transmitted, 5 received, 0% packet loss, time 4089ms
rtt min/avg/max/mdev = 0.035/0.057/0.120/0.033 ms
mininet>
```

Berdasarkan hasil uji coba ping dapat dilihat bahwa setiap ping berhasil

B. Routing Table (Dibuktikan Ping antar Host)

```
mininet> h1 ping h2
PING 192.168.2.2 (192.168.2.2) 56(84) bytes of data.
64 bytes from 192.168.2.2: icmp_seq=1 ttl=62 time=100 ms
64 bytes from 192.168.2.2: icmp_seq=2 ttl=62 time=100 ms
64 bytes from 192.168.2.2: icmp_seq=3 ttl=62 time=100 ms
64 bytes from 192.168.2.2: icmp_seq=4 ttl=62 time=100 ms
64 bytes from 192.168.2.2: icmp_seq=5 ttl=62 time=100 ms
64 bytes from 192.168.2.2: icmp_seq=6 ttl=62 time=100 ms
64 bytes from 192.168.2.2: icmp_seq=7 ttl=62 time=100 ms
^C
--- 192.168.2.2 ping statistics ---
7 packets transmitted, 7 received, 0% packet loss, time 6008ms
rtt min/avg/max/mdev = 100.064/100.236/100.788/0.412 ms
mininet>
```

C. Menganalisis Menggunakan Traceroute

```
mininet> h1 traceroute h2
traceroute to 192.168.2.2 (192.168.2.2), 30 hops max, 60 byte packets
 1 _gateway (192.168.0.2)  100.049 ms  100.011 ms  100.795 ms
 2 192.168.1.2 (192.168.1.2)  100.787 ms  100.764 ms  100.750 ms
 3 192.168.2.2 (192.168.2.2)  100.737 ms  100.714 ms  100.697 ms
mininet>
```

Dengan menggunakan traceroute dapat dilihat bahwa rute yang dilalui dari jaringan h1 dan h 2 adalah berawal dari 192.168.0.2 kemudian ke 192.168.1.2 dan sampai di 192.168.2.2

BAB II

CLO 3

A. Test Traffic Menggunakan Iperf

1. Command

```
"Node: h1"
root@rasyid-VirtualBox:~/TUBES-1301200457# tcpdump -w clo3.pcap -c 200
tcpdump: listening on h1-eth0, link-type EN10MB (Ethernet), capture size 262144
bytes
200 packets captured
229 packets received by filter
0 packets dropped by kernel
root@rasyid-VirtualBox:~/TUBES-1301200457#

mininet> xterm h1
mininet> iperf h1 h2
*** Iperf: testing TCP bandwidth between h1 and h2
.*** Results: ['480 Kbits/sec', '994 Kbits/sec']
mininet>
```

2. Output Wireshark

The image shows the Wireshark interface with a packet capture of a TCP connection. The packet list table is as follows:

No.	Source	Destination	Protocol	Length	Info
9090	192.168.0.1	192.168.2.2	TCP	74	35270 → 5001 [SYN] Seq=0 Win=42340 Len=0 MSS=1460 SACK_PERM=1...
9298	192.168.2.2	192.168.0.1	TCP	54	5001 → 35270 [RST, ACK] Seq=1 Ack=1 Win=0 Len=0
3675	192.168.0.1	192.168.2.2	TCP	74	35272 → 5001 [SYN] Seq=0 Win=42340 Len=0 MSS=1460 SACK_PERM=1...
4259	192.168.2.2	192.168.0.1	TCP	74	5001 → 35272 [SYN, ACK] Seq=0 Ack=1 Win=43440 Len=0 MSS=1460 ...
4296	192.168.0.1	192.168.2.2	TCP	66	35272 → 5001 [ACK] Seq=1 Ack=1 Win=42496 Len=0 TSval=28401201...
4554	192.168.0.1	192.168.2.2	TCP	66	35272 → 5001 [FIN, ACK] Seq=1 Ack=1 Win=42496 Len=0 TSval=284...
9475	192.168.0.1	192.168.2.2	TCP	74	35274 → 5001 [SYN] Seq=0 Win=42340 Len=0 MSS=1460 SACK_PERM=1...
7564	192.168.2.2	192.168.0.1	TCP	66	5001 → 35272 [ACK] Seq=1 Ack=2 Win=43520 Len=0 TSval=78311641...
9521	192.168.2.2	192.168.0.1	TCP	74	5001 → 35274 [SYN, ACK] Seq=0 Ack=1 Win=43440 Len=0 MSS=1460 ...
9558	192.168.0.1	192.168.2.2	TCP	66	35274 → 5001 [ACK] Seq=1 Ack=1 Win=42496 Len=0 TSval=28401202...
9649	192.168.0.1	192.168.2.2	TCP	2962	35274 → 5001 [PSH, ACK] Seq=1 Ack=1 Win=42496 Len=2896 TSval=...
4828	192.168.2.2	192.168.0.1	TCP	66	5001 → 35272 [FIN, ACK] Seq=1 Ack=2 Win=43520 Len=0 TSval=783...
2159	192.168.0.1	192.168.2.2	TCP	2962	35274 → 5001 [PSH, ACK] Seq=2897 Ack=1 Win=42496 Len=2896 TSv...
6766	192.168.0.1	192.168.2.2	TCP	66	35272 → 5001 [ACK] Seq=2 Ack=2 Win=42496 Len=0 TSval=28401202...
6770	192.168.0.1	192.168.2.2	TCP	2962	35274 → 5001 [PSH, ACK] Seq=5793 Ack=1 Win=42496 Len=2896 TSv...
0919	192.168.0.1	192.168.2.2	TCP	2962	35274 → 5001 [PSH, ACK] Seq=8689 Ack=1 Win=42496 Len=2896 TSv...
4732	192.168.0.1	192.168.2.2	TCP	2962	35274 → 5001 [PSH, ACK] Seq=11585 Ack=1 Win=42496 Len=2896 TS...
0040	192.168.2.2	192.168.0.1	TCP	66	5001 → 35274 [ACK] Seq=1 Ack=2897 Win=41984 Len=0 TSval=78311...
9792	192.168.0.1	192.168.2.2	TCP	2962	35274 → 5001 [PSH, ACK] Seq=14481 Ack=1 Win=42496 Len=2896 TS...
4430	192.168.2.2	192.168.0.1	TCP	66	5001 → 35274 [ACK] Seq=1 Ack=5793 Win=41984 Len=0 TSval=78311...
3177	192.168.0.1	192.168.2.2	TCP	2962	35274 → 5001 [PSH, ACK] Seq=17377 Ack=1 Win=42496 Len=2896 TS...
7573	192.168.0.1	192.168.2.2	TCP	2962	35274 → 5001 [PSH, ACK] Seq=20273 Ack=1 Win=42496 Len=2896 TS...
4139	192.168.2.2	192.168.0.1	TCP	66	5001 → 35274 [ACK] Seq=1 Ack=8689 Win=41984 Len=0 TSval=78311...

Frame 1: 74 bytes on wire (592 bits), 74 bytes captured (592 bits)
Ethernet II, Src: 7e:2f:24:3d:b9:75 (7e:2f:24:3d:b9:75), Dst: 3e:91:52:12:9a:7b (3e:91:52:12:9a:7b)
Internet Protocol Version 4, Src: 192.168.0.1, Dst: 192.168.2.2
Transmission Control Protocol, Src Port: 35270, Dst Port: 5001, Seq: 0, Len: 0

BAB 4

CLO 4

A. Test buffer

1. Bufffer 20

```
mininet> h1 ping h2 -c 10
PING 192.168.2.2 (192.168.2.2) 56(84) bytes of data.
64 bytes from 192.168.2.2: icmp_seq=1 ttl=62 time=0.055 ms
64 bytes from 192.168.2.2: icmp_seq=2 ttl=62 time=0.057 ms
64 bytes from 192.168.2.2: icmp_seq=3 ttl=62 time=0.069 ms
64 bytes from 192.168.2.2: icmp_seq=4 ttl=62 time=0.055 ms
64 bytes from 192.168.2.2: icmp_seq=5 ttl=62 time=0.054 ms
64 bytes from 192.168.2.2: icmp_seq=6 ttl=62 time=0.064 ms
64 bytes from 192.168.2.2: icmp_seq=7 ttl=62 time=0.054 ms
64 bytes from 192.168.2.2: icmp_seq=8 ttl=62 time=0.054 ms
64 bytes from 192.168.2.2: icmp_seq=9 ttl=62 time=0.106 ms
64 bytes from 192.168.2.2: icmp_seq=10 ttl=62 time=0.062 ms

--- 192.168.2.2 ping statistics ---
10 packets transmitted, 10 received, 0% packet loss, time 9208ms
rtt min/avg/max/mdev = 0.054/0.063/0.106/0.015 ms
mininet> █
```

2. Buffer 40

```
mininet> h1 ping h2 -c 10
PING 192.168.2.2 (192.168.2.2) 56(84) bytes of data.
64 bytes from 192.168.2.2: icmp_seq=1 ttl=62 time=0.069 ms
64 bytes from 192.168.2.2: icmp_seq=2 ttl=62 time=0.054 ms
64 bytes from 192.168.2.2: icmp_seq=3 ttl=62 time=0.055 ms
64 bytes from 192.168.2.2: icmp_seq=4 ttl=62 time=0.078 ms
64 bytes from 192.168.2.2: icmp_seq=5 ttl=62 time=0.056 ms
64 bytes from 192.168.2.2: icmp_seq=6 ttl=62 time=0.056 ms
64 bytes from 192.168.2.2: icmp_seq=7 ttl=62 time=0.054 ms
64 bytes from 192.168.2.2: icmp_seq=8 ttl=62 time=0.089 ms
64 bytes from 192.168.2.2: icmp_seq=9 ttl=62 time=0.058 ms
64 bytes from 192.168.2.2: icmp_seq=10 ttl=62 time=0.092 ms

--- 192.168.2.2 ping statistics ---
10 packets transmitted, 10 received, 0% packet loss, time 9196ms
rtt min/avg/max/mdev = 0.054/0.066/0.092/0.014 ms
mininet> █
```

3. Buffer 60

```
mininet> h1 ping h2 -c 10
PING 192.168.2.2 (192.168.2.2) 56(84) bytes of data.
64 bytes from 192.168.2.2: icmp_seq=1 ttl=62 time=0.054 ms
64 bytes from 192.168.2.2: icmp_seq=2 ttl=62 time=0.094 ms
64 bytes from 192.168.2.2: icmp_seq=3 ttl=62 time=0.055 ms
64 bytes from 192.168.2.2: icmp_seq=4 ttl=62 time=0.058 ms
64 bytes from 192.168.2.2: icmp_seq=5 ttl=62 time=0.066 ms
64 bytes from 192.168.2.2: icmp_seq=6 ttl=62 time=0.075 ms
64 bytes from 192.168.2.2: icmp_seq=7 ttl=62 time=0.054 ms
64 bytes from 192.168.2.2: icmp_seq=8 ttl=62 time=0.055 ms
64 bytes from 192.168.2.2: icmp_seq=9 ttl=62 time=0.055 ms
64 bytes from 192.168.2.2: icmp_seq=10 ttl=62 time=0.061 ms

--- 192.168.2.2 ping statistics ---
10 packets transmitted, 10 received, 0% packet loss, time 9198ms
rtt min/avg/max/mdev = 0.054/0.062/0.094/0.015 ms
mininet> █
```

4. Buffer 100

```
mininet> h1 ping h2 -c 10
PING 192.168.2.2 (192.168.2.2) 56(84) bytes of data.
64 bytes from 192.168.2.2: icmp_seq=1 ttl=62 time=0.048 ms
64 bytes from 192.168.2.2: icmp_seq=2 ttl=62 time=0.100 ms
64 bytes from 192.168.2.2: icmp_seq=3 ttl=62 time=0.055 ms
64 bytes from 192.168.2.2: icmp_seq=4 ttl=62 time=0.056 ms
64 bytes from 192.168.2.2: icmp_seq=5 ttl=62 time=0.056 ms
64 bytes from 192.168.2.2: icmp_seq=6 ttl=62 time=0.055 ms
64 bytes from 192.168.2.2: icmp_seq=7 ttl=62 time=0.062 ms
64 bytes from 192.168.2.2: icmp_seq=8 ttl=62 time=0.061 ms
64 bytes from 192.168.2.2: icmp_seq=9 ttl=62 time=0.062 ms
64 bytes from 192.168.2.2: icmp_seq=10 ttl=62 time=0.056 ms

--- 192.168.2.2 ping statistics ---
10 packets transmitted, 10 received, 0% packet loss, time 9220ms
rtt min/avg/max/mdev = 0.048/0.061/0.100/0.014 ms
mininet> █
```

B. Kesimpulan

Perubahan delay pada buffer baru akan terasa saat buffer di set di atas 60 dimana saat buffer si set 100 didapatkan waktu delay terlama.