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PROJECT 3

1. TASK 1

CODE HAS BEEN ATTACHED WITH THE ZIP

```
mininet> h5 brctl showmacs br0
port no mac addr                is local?       ageing timer
  1     00:00:00:00:05:00       yes                0.00
  1     00:00:00:00:05:00       yes                0.00
  4     76:7e:b1:a7:2d:84       yes                0.00
  4     76:7e:b1:a7:2d:84       yes                0.00
  3     82:d3:a6:46:55:37       yes                0.00
  3     82:d3:a6:46:55:37       yes                0.00
  2     86:e8:ae:bf:19:73       yes                0.00
  2     86:e8:ae:bf:19:73       yes                0.00
```

```
mininet> pingall
*** Ping: testing ping reachability
h1 -> h2 h3 h4 X
h2 -> h1 h3 h4 X
h3 -> h1 h2 h4 X
h4 -> h1 h2 h3 X
h5 -> X X X X
*** Results: 40% dropped (12/20 received)
```

```
mininet> h1 ping h3
PING 10.0.0.3 (10.0.0.3) 56(84) bytes of data.
64 bytes from 10.0.0.3: icmp_seq=1 ttl=64 time=0.118 ms
64 bytes from 10.0.0.3: icmp_seq=2 ttl=64 time=0.305 ms
64 bytes from 10.0.0.3: icmp_seq=3 ttl=64 time=0.146 ms
64 bytes from 10.0.0.3: icmp_seq=4 ttl=64 time=0.186 ms
64 bytes from 10.0.0.3: icmp_seq=5 ttl=64 time=0.313 ms
64 bytes from 10.0.0.3: icmp_seq=6 ttl=64 time=0.284 ms
^C
--- 10.0.0.3 ping statistics ---
6 packets transmitted, 6 received, 0% packet loss, time 5131ms
rtt min/avg/max/mdev = 0.118/0.225/0.313/0.078 ms
```

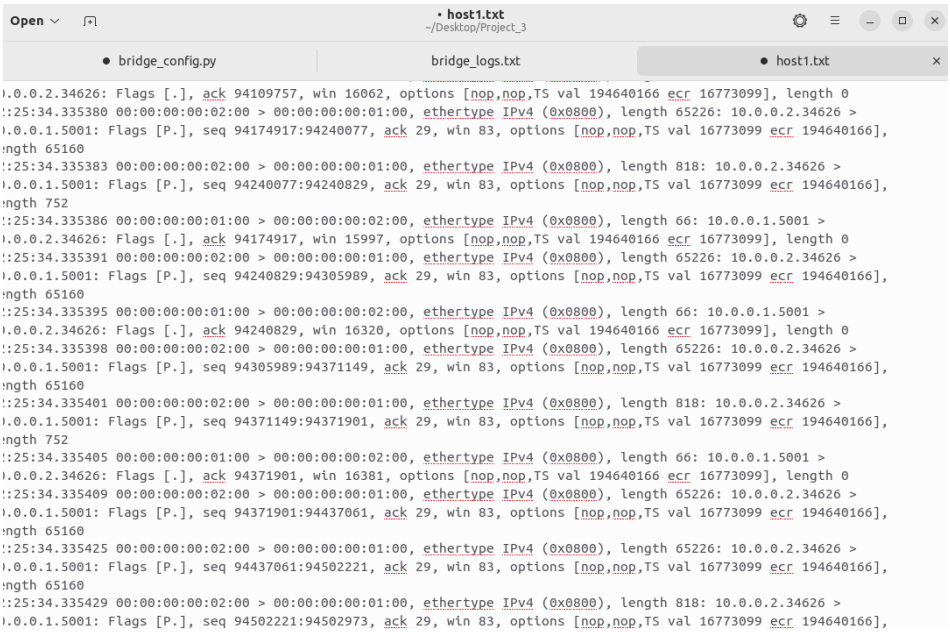
```
mininet> h5 brctl show br0
bridge name     bridge id               STP enabled     interfaces
br0             8000.000000000500       no              h5-eth0
                                                        h5-eth1
                                                        h5-eth2
                                                        h5-eth3
```

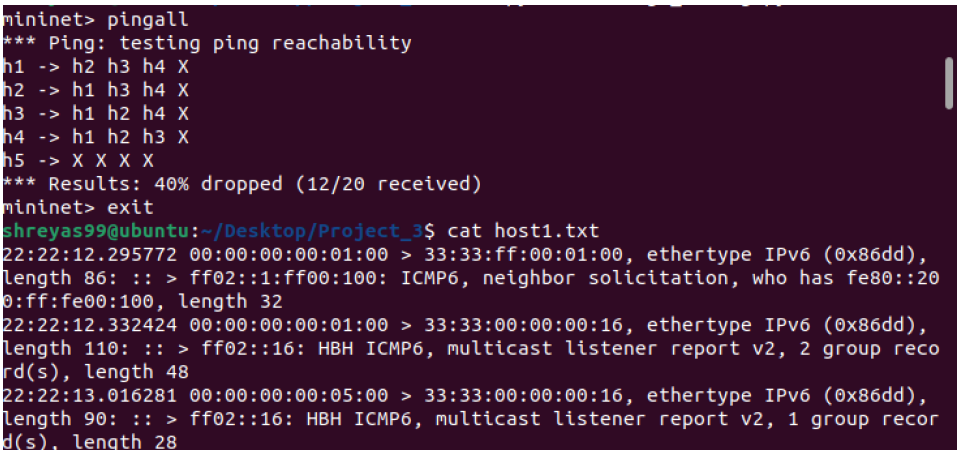
```
mininet> h5 brctl showmacs br0
port no mac addr                is local?       ageing timer
  1     00:00:00:00:01:00       no                28.79
  2     00:00:00:00:02:00       no               148.58
  3     00:00:00:00:03:00       no               104.05
  4     00:00:00:00:04:00       no               146.55
  1     00:00:00:00:05:00       yes                0.00
  1     00:00:00:00:05:00       yes                0.00
  4     76:7e:b1:a7:2d:84       yes                0.00
  4     76:7e:b1:a7:2d:84       yes                0.00
  3     82:d3:a6:46:55:37       yes                0.00
  3     82:d3:a6:46:55:37       yes                0.00
  2     86:e8:ae:bf:19:73       yes                0.00
  2     86:e8:ae:bf:19:73       yes                0.00
```

2. TASK 2

BRIDGE LOGS ARE ATTACHED WITH THE ZIP. (HOST LOGS TOO BIG TO BE ATTACHED, HENCE SCREENSHOT ATTACHED)

```
shreyas99@ubuntu:~/Desktop/Project_3$ sudo python3 bridge_config.py
mininet> h5 bridge monitor fdb >> bridge_logs.txt &
mininet> pingall
*** Ping: testing ping reachability
h1 -> h2 h3 h4 X
h2 -> h1 h3 h4 X
h3 -> h1 h2 h4 X
h4 -> h1 h2 h3 X
h5 -> X X X X
*** Results: 40% dropped (12/20 received)
mininet> exit
shreyas99@ubuntu:~/Desktop/Project_3$ cat bridge_logs.txt
00:00:00:00:02:00 dev h5-eth1 master br0
00:00:00:00:04:00 dev h5-eth3 master br0
00:00:00:00:03:00 dev h5-eth2 master br0
00:00:00:00:01:00 dev h5-eth0 master br0
```


Open
• host1.txt
~/Desktop/Project_3
bridge_config.py
bridge_logs.txt
host1.txt
).0.0.2.34626: Flags [.], ack 94109757, win 16062, options [nop,nop,TS val 194640166 ecr 16773099], length 0
::25:34.335380 00:00:00:00:02:00 > 00:00:00:00:01:00, ethertype IPv4 (0x0800), length 65226: 10.0.0.2.34626 >
).0.0.1.5001: Flags [P.], seq 94174917:94240077, ack 29, win 83, options [nop,nop,TS val 16773099 ecr 194640166],
ength 65160
::25:34.335383 00:00:00:00:02:00 > 00:00:00:00:01:00, ethertype IPv4 (0x0800), length 818: 10.0.0.2.34626 >
).0.0.1.5001: Flags [P.], seq 94240077:94240829, ack 29, win 83, options [nop,nop,TS val 16773099 ecr 194640166],
ength 752
::25:34.335386 00:00:00:00:01:00 > 00:00:00:00:02:00, ethertype IPv4 (0x0800), length 66: 10.0.0.1.5001 >
).0.0.2.34626: Flags [.], ack 94174917, win 15997, options [nop,nop,TS val 194640166 ecr 16773099], length 0
::25:34.335391 00:00:00:00:02:00 > 00:00:00:00:01:00, ethertype IPv4 (0x0800), length 65226: 10.0.0.2.34626 >
).0.0.1.5001: Flags [P.], seq 94240829:94305989, ack 29, win 83, options [nop,nop,TS val 16773099 ecr 194640166],
ength 65160
::25:34.335395 00:00:00:00:01:00 > 00:00:00:00:02:00, ethertype IPv4 (0x0800), length 66: 10.0.0.1.5001 >
).0.0.2.34626: Flags [.], ack 94240829, win 16320, options [nop,nop,TS val 194640166 ecr 16773099], length 0
::25:34.335398 00:00:00:00:02:00 > 00:00:00:00:01:00, ethertype IPv4 (0x0800), length 65226: 10.0.0.2.34626 >
).0.0.1.5001: Flags [P.], seq 94305989:94371149, ack 29, win 83, options [nop,nop,TS val 16773099 ecr 194640166],
ength 65160
::25:34.335401 00:00:00:00:02:00 > 00:00:00:00:01:00, ethertype IPv4 (0x0800), length 818: 10.0.0.2.34626 >
).0.0.1.5001: Flags [P.], seq 94371149:94371901, ack 29, win 83, options [nop,nop,TS val 16773099 ecr 194640166],
ength 752
::25:34.335405 00:00:00:00:01:00 > 00:00:00:00:02:00, ethertype IPv4 (0x0800), length 66: 10.0.0.1.5001 >
).0.0.2.34626: Flags [.], ack 94371901, win 16381, options [nop,nop,TS val 194640166 ecr 16773099], length 0
::25:34.335409 00:00:00:00:02:00 > 00:00:00:00:01:00, ethertype IPv4 (0x0800), length 65226: 10.0.0.2.34626 >
).0.0.1.5001: Flags [P.], seq 94371901:94437061, ack 29, win 83, options [nop,nop,TS val 16773099 ecr 194640166],
ength 65160
::25:34.335425 00:00:00:00:02:00 > 00:00:00:00:01:00, ethertype IPv4 (0x0800), length 65226: 10.0.0.2.34626 >
).0.0.1.5001: Flags [P.], seq 94437061:94502221, ack 29, win 83, options [nop,nop,TS val 16773099 ecr 194640166],
ength 65160
::25:34.335429 00:00:00:00:02:00 > 00:00:00:00:01:00, ethertype IPv4 (0x0800), length 818: 10.0.0.2.34626 >
).0.0.1.5001: Flags [P.], seq 94502221:94502973, ack 29, win 83, options [nop,nop,TS val 16773099 ecr 194640166],


mininet> pingall
*** Ping: testing ping reachability
h1 -> h2 h3 h4 X
h2 -> h1 h3 h4 X
h3 -> h1 h2 h4 X
h4 -> h1 h2 h3 X
h5 -> X X X X
*** Results: 40% dropped (12/20 received)
mininet> exit
shreyas99@ubuntu:~/Desktop/Project_3$ cat host1.txt
22:22:12.295772 00:00:00:00:01:00 > 33:33:ff:00:01:00, ethertype IPv6 (0x86dd),
length 86: :: > ff02::1:ff00:100: ICMP6, neighbor solicitation, who has fe80::20
0:ff:fe00:100, length 32
22:22:12.332424 00:00:00:00:01:00 > 33:33:00:00:00:16, ethertype IPv6 (0x86dd),
length 110: :: > ff02::16: HBH ICMP6, multicast listener report v2, 2 group reco
rd(s), length 48
22:22:13.016281 00:00:00:00:05:00 > 33:33:00:00:00:16, ethertype IPv6 (0x86dd),
length 90: :: > ff02::16: HBH ICMP6, multicast listener report v2, 1 group recor
d(s), length 28

```
shreyas99@ubuntu:~/Desktop/Project_3$ sudo python3 bridg
mininet> pingall
*** Ping: testing ping reachability
h1 -> h2 h3 h4 X
h2 -> h1 h3 h4 X
h3 -> h1 h2 h4 X
h4 -> h1 h2 h3 X
h5 -> X X X X
*** Results: 40% dropped (12/20 received)
mininet> h5 brctl showmacs br0
port no mac addr                is local?       ageing t
  1     00:00:00:00:01:00       no                16.28
  2     00:00:00:00:02:00       no                16.28
  3     00:00:00:00:03:00       no                14.11
  4     00:00:00:00:04:00       no                14.11
  1     00:00:00:00:05:00       yes                0.00
  1     00:00:00:00:05:00       yes                0.00
  2     32:27:1b:53:a1:cc       yes                0.00
  2     32:27:1b:53:a1:cc       yes                0.00
  3     4a:58:e0:0b:84:4d       yes                0.00
  3     4a:58:e0:0b:84:4d       yes                0.00
  4     fa:e8:49:bd:51:81       yes                0.00
  4     fa:e8:49:bd:51:81       yes                0.00
mininet>
```

Ageing timer drop can be seen prominently.

```
mininet> pingall
*** Ping: testing ping reachability
h1 -> h2 h3 h4 X
h2 -> h1 h3 h4 X
h3 -> h1 h2 h4 X
h4 -> h1 h2 h3 X
h5 -> X X X X
*** Results: 40% dropped (12/20 received)
mininet> h5 brctl showmacs br0
port no mac addr                is local?       ageing timer
  1     00:00:00:00:01:00       no                 6.56
  2     00:00:00:00:02:00       no                 6.56
  3     00:00:00:00:03:00       no                 4.56
  4     00:00:00:00:04:00       no                 4.52
  1     00:00:00:00:05:00       yes                0.00
  1     00:00:00:00:05:00       yes                0.00
  2     32:27:1b:53:a1:cc       yes                0.00
  2     32:27:1b:53:a1:cc       yes                0.00
  3     4a:58:e0:0b:84:4d       yes                0.00
  3     4a:58:e0:0b:84:4d       yes                0.00
  4     fa:e8:49:bd:51:81       yes                0.00
  4     fa:e8:49:bd:51:81       yes                0.00
```

TASK 3

```
shreyas99@ubuntu:~/Desktop/Project_3$ sudo python3 bridge_config.py
mininet> h1 iperf -s -i 2 &
mininet> h2 iperf -c h1 -t 5 &
mininet> h1 iperf -s -i 2
------------------------------------------------------------
Server listening on TCP port 5001
TCP window size: 85.3 KByte (default)
------------------------------------------------------------
[  1] local 10.0.0.1 port 5001 connected with 10.0.0.2 port 39270 (icwnd/mss/irt
t=14/1448/53)
[ ID] Interval       Transfer     Bandwidth
[  1] 0.0000-2.0000 sec  22.2 GBytes  95.5 Gbits/sec
[  1] 2.0000-4.0000 sec  22.7 GBytes  97.4 Gbits/sec
[  1] 4.0000-5.0005 sec  11.3 GBytes  97.0 Gbits/sec
[  1] 0.0000-5.0005 sec  56.2 GBytes  96.6 Gbits/sec
listener bind failed: Address already in use
```

```
mininet> h5 brctl showmacs br0
port no mac addr                is local?       ageing timer
  1     00:00:00:00:05:00       yes                0.00
  1     00:00:00:00:05:00       yes                0.00
  4     76:7e:b1:a7:2d:84       yes                0.00
  4     76:7e:b1:a7:2d:84       yes                0.00
  3     82:d3:a6:46:55:37       yes                0.00
  3     82:d3:a6:46:55:37       yes                0.00
  2     86:e8:ae:bf:19:73       yes                0.00
  2     86:e8:ae:bf:19:73       yes                0.00
```

```
mininet> h1 ping h3
PING 10.0.0.3 (10.0.0.3) 56(84) bytes of data.
64 bytes from 10.0.0.3: icmp_seq=1 ttl=64 time=0.118 ms
64 bytes from 10.0.0.3: icmp_seq=2 ttl=64 time=0.305 ms
64 bytes from 10.0.0.3: icmp_seq=3 ttl=64 time=0.146 ms
64 bytes from 10.0.0.3: icmp_seq=4 ttl=64 time=0.186 ms
64 bytes from 10.0.0.3: icmp_seq=5 ttl=64 time=0.313 ms
64 bytes from 10.0.0.3: icmp_seq=6 ttl=64 time=0.284 ms
^C
--- 10.0.0.3 ping statistics ---
6 packets transmitted, 6 received, 0% packet loss, time 5131ms
rtt min/avg/max/mdev = 0.118/0.225/0.313/0.078 ms
mininet> h5 brctl show br0
bridge name     bridge id               STP enabled     interfaces
br0             8000.000000000500       no              h5-eth0
                                                        h5-eth1
                                                        h5-eth2
                                                        h5-eth3
```

```
mininet> h5 brctl setageing br0 0
mininet> h1 iperf -s -i 2 &
mininet> h2 iperf -c h1 -t 5 &
------------------------------------------------------------
Client connecting to 10.0.0.1, TCP port 5001
TCP window size: 85.3 KByte (default)
------------------------------------------------------------
[  1] local 10.0.0.2 port 39270 connected with 10.0.0.1 port 5001 (icwnd/mss/irt
t=14/1448/190)
[ ID] Interval       Transfer     Bandwidth
[  1] 0.0000-5.0046 sec  56.2 GBytes  96.5 Gbits/sec
mininet> h1 iperf -s -i 5 &
listener bind failed: Address already in use
[  2] local 10.0.0.1 port 5001 connected with 10.0.0.2 port 46578 (icwnd/mss/irt
t=14/1448/33)
[ ID] Interval       Transfer     Bandwidth
[  2] 0.0000-2.0000 sec  19.8 GBytes  85.0 Gbits/sec
[  2] 2.0000-4.0000 sec  20.0 GBytes  85.8 Gbits/sec
[  2] 4.0000-5.0003 sec  9.99 GBytes  85.8 Gbits/sec
[  2] 0.0000-5.0003 sec  49.8 GBytes  85.5 Gbits/sec
```

3. OBSERVATIONS

A. TASK 1 –

i. We configure everything and check if everything works by using the ping command.

ii. We use python to configure our host and bridge.

iii. We check the bridge connections and mac address of all hosts connected.

B. TASK 2-

i. We run bridge monitor command to check for the log entries that are been added and discarded from the table by running the relevant command.

ii. We save the logs in a file(attached in the zip).

iii. We do a TCPDump by adding the relevant code in the py file and the output of the same is stored in h1.text file (attached in the zip)

iv. Now we ping all and print the forwarding table.

v. We repeat the above step again and we see a considerable difference in the ageing table.

C. TASK 3-

i. Install iperf packet.

ii. We run the iperf commands.

iii. We look at the outputs carefully.

iv. We run the iperf commands again with setageing set to Zero.

v. We look at the output again and we see that there is a drop in the Bandwidth