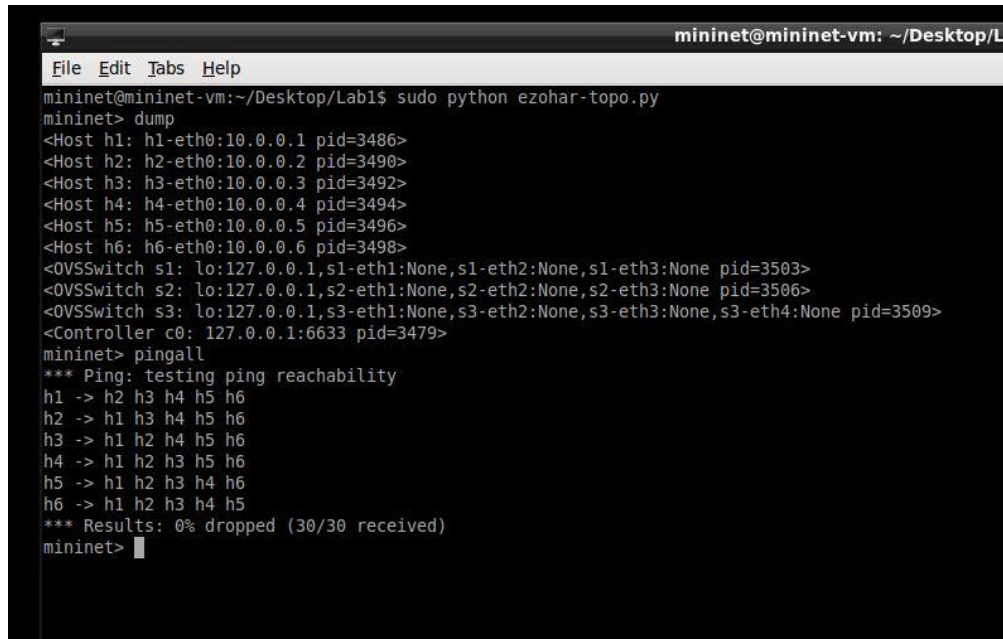
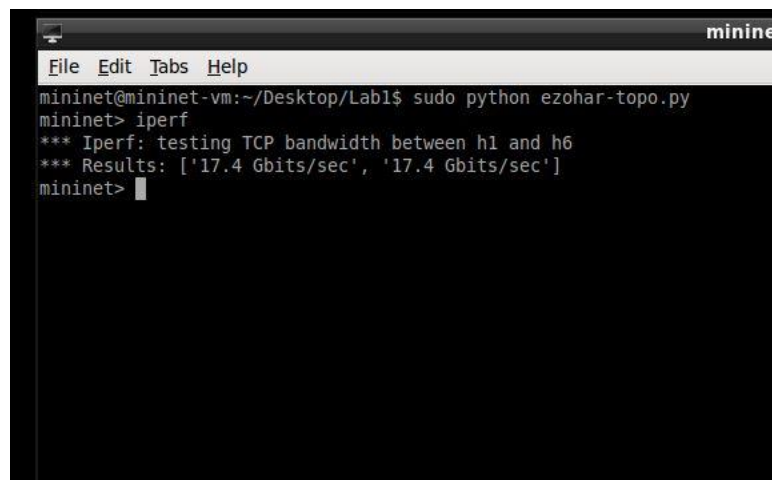


2. In the screenshot the *dump* command is called and so all info related to the custom mininet is “dumped.” Also *pingall* is called which pings all hosts and shows they are reachable from all other hosts.



```
mininet@mininet-vm: ~/Desktop/L
File Edit Tabs Help
mininet@mininet-vm:~/Desktop/Lab1$ sudo python ezohar-topo.py
mininet> dump
<Host h1: h1-eth0:10.0.0.1 pid=3486>
<Host h2: h2-eth0:10.0.0.2 pid=3490>
<Host h3: h3-eth0:10.0.0.3 pid=3492>
<Host h4: h4-eth0:10.0.0.4 pid=3494>
<Host h5: h5-eth0:10.0.0.5 pid=3496>
<Host h6: h6-eth0:10.0.0.6 pid=3498>
<OVSSwitch s1: lo:127.0.0.1,s1-eth1:None,s1-eth2:None,s1-eth3:None pid=3503>
<OVSSwitch s2: lo:127.0.0.1,s2-eth1:None,s2-eth2:None,s2-eth3:None pid=3506>
<OVSSwitch s3: lo:127.0.0.1,s3-eth1:None,s3-eth2:None,s3-eth3:None,s3-eth4:None pid=3509>
<Controller c0: 127.0.0.1:6633 pid=3479>
mininet> pingall
*** Ping: testing ping reachability
h1 -> h2 h3 h4 h5 h6
h2 -> h1 h3 h4 h5 h6
h3 -> h1 h2 h4 h5 h6
h4 -> h1 h2 h3 h5 h6
h5 -> h1 h2 h3 h4 h6
h6 -> h1 h2 h3 h4 h5
*** Results: 0% dropped (30/30 received)
mininet> 
```

3. The connects speed is 17.4 Gbits/sec



```
minine
File Edit Tabs Help
mininet@mininet-vm:~/Desktop/Lab1$ sudo python ezohar-topo.py
mininet> iperf
*** Iperf: testing TCP bandwidth between h1 and h6
*** Results: ['17.4 Gbits/sec', '17.4 Gbits/sec']
mininet> 
```

4. a. For the command *h1 ping -c 5 h6* there are a total of **11** “of_packet_in” message.

79	35.00561800	127.0.0.1	127.0.0.1	OF 1.0	76 of echo reply
81	35.00562900	127.0.0.1	127.0.0.1	OF 1.0	76 of echo reply
84	37.58484800	10.0.0.1	10.0.0.6	OF 1.0	184 of packet_in
85	37.58531800	127.0.0.1	127.0.0.1	OF 1.0	92 of packet_out
91	37.58576900	10.0.0.1	10.0.0.6	OF 1.0	184 of packet_in
92	37.58627000	127.0.0.1	127.0.0.1	OF 1.0	92 of packet_out
100	37.58686300	10.0.0.6	10.0.0.1	OF 1.0	184 of packet_in
101	37.58693200	10.0.0.1	10.0.0.6	OF 1.0	184 of packet_in
102	37.58720000	127.0.0.1	127.0.0.1	OF 1.0	148 of flow add
105	37.58751900	10.0.0.6	10.0.0.1	OF 1.0	184 of packet_in
106	37.58809800	127.0.0.1	127.0.0.1	OF 1.0	92 of packet_out
111	37.58862700	127.0.0.1	127.0.0.1	OF 1.0	148 of flow add
118	38.59932600	10.0.0.1	10.0.0.6	OF 1.0	184 of packet_in
119	38.60129800	127.0.0.1	127.0.0.1	OF 1.0	148 of flow add
123	38.60332600	10.0.0.1	10.0.0.6	OF 1.0	184 of packet_in
124	38.60486900	127.0.0.1	127.0.0.1	OF 1.0	148 of flow add
157	41.99941800	127.0.0.1	127.0.0.1	OF 1.0	76 of echo request
158	41.99995600	127.0.0.1	127.0.0.1	OF 1.0	76 of echo reply
165	42.60365400	76:6a:86:65:48:48	7a:f8:e2:6b:46:e2	OF 1.0	128 of packet_in
166	42.60444900	127.0.0.1	127.0.0.1	OF 1.0	148 of flow add
170	42.60569500	76:6a:86:65:48:48	7a:f8:e2:6b:46:e2	OF 1.0	128 of packet_in
171	42.60597200	127.0.0.1	127.0.0.1	OF 1.0	148 of flow add
175	42.60709400	7a:f8:e2:6b:46:e2	76:6a:86:65:48:48	OF 1.0	128 of packet_in
176	42.60768400	127.0.0.1	127.0.0.1	OF 1.0	148 of flow add
179	42.60923700	7a:f8:e2:6b:46:e2	76:6a:86:65:48:48	OF 1.0	128 of packet_in
180	42.60967600	127.0.0.1	127.0.0.1	OF 1.0	148 of flow add

- b. For of_packet_in the source and destination switch between 10.0.0.1 and 10.0.0.6.

For of_packet_out the source and destination is 127.0.0.1

81	35.00562900	127.0.0.1	127.0.0.1	OF 1.0	76 of echo reply
84	37.58484800	10.0.0.1	10.0.0.6	OF 1.0	184 of packet_in
85	37.58531800	127.0.0.1	127.0.0.1	OF 1.0	92 of packet_out
91	37.58576900	10.0.0.1	10.0.0.6	OF 1.0	184 of packet_in
85	37.58627000	127.0.0.1	127.0.0.1	OF 1.0	92 of packet_out

```

Frame 85: 92 bytes on wire (736 bits), 92 bytes captured (736 bits) on interface 0
Linux cooked capture
Internet Protocol Version 4, Src: 127.0.0.1 (127.0.0.1), Dst: 127.0.0.1 (127.0.0.1)
Transmission Control Protocol, Src Port: 6633 (6633), Dst Port: 38894 (38894), Seq: 65, Ack: 181, Len: 24
OpenFlow
  version: 1
  type: OFPT_PACKET_OUT (13)
  length: 24
  xid: 0
  buffer_id: 265
  in_port: 1
  actions_len: 8
  of_action list
    of_action_output
      type: OFPAT_OUTPUT (0)
      len: 8
      port: 65531
      max_len: 0

```

c. There are 257 entries. The ICMP file types are “Echo (ping) reply” and “Echo (ping) request.”

Filter: icmp && not of

Expression... Clear Apply Save

No.	Time	Source	Destination	Protocol	Length	Info
92	16.592254000	10.0.0.1	10.0.0.2	ICMP	100	Echo (ping) request id=0x11a6, seq=1/256, ttl=64 (request in 92)
93	16.592254000	10.0.0.2	10.0.0.1	ICMP	100	Echo (ping) reply id=0x11a6, seq=1/256, ttl=64 (request in 92)
96	16.593384000	10.0.0.2	10.0.0.1	ICMP	100	Echo (ping) reply id=0x11a6, seq=1/256, ttl=64
97	16.593393000	10.0.0.2	10.0.0.1	ICMP	100	Echo (ping) reply id=0x11a6, seq=1/256, ttl=64
100	16.594601000	10.0.0.2	10.0.0.1	ICMP	100	Echo (ping) reply id=0x11a6, seq=1/256, ttl=64
101	16.594609000	10.0.0.2	10.0.0.1	ICMP	100	Echo (ping) reply id=0x11a6, seq=1/256, ttl=64
104	16.595680000	10.0.0.2	10.0.0.1	ICMP	100	Echo (ping) reply id=0x11a6, seq=1/256, ttl=64
123	16.601059000	10.0.0.1	10.0.0.3	ICMP	100	Echo (ping) request id=0x11a8, seq=1/256, ttl=64
131	16.602393000	10.0.0.1	10.0.0.3	ICMP	100	Echo (ping) request id=0x11a8, seq=1/256, ttl=64 (reply in 132)
132	16.602407000	10.0.0.3	10.0.0.1	ICMP	100	Echo (ping) reply id=0x11a8, seq=1/256, ttl=64 (request in 131)
135	16.603192000	10.0.0.3	10.0.0.1	ICMP	100	Echo (ping) reply id=0x11a8, seq=1/256, ttl=64
167	16.612912000	10.0.0.1	10.0.0.4	ICMP	100	Echo (ping) request id=0x11a9, seq=1/256, ttl=64
170	16.613757000	10.0.0.1	10.0.0.4	ICMP	100	Echo (ping) request id=0x11a9, seq=1/256, ttl=64
171	16.613763000	10.0.0.1	10.0.0.4	ICMP	100	Echo (ping) request id=0x11a9, seq=1/256, ttl=64
174	16.614668000	10.0.0.1	10.0.0.4	ICMP	100	Echo (ping) request id=0x11a9, seq=1/256, ttl=64
175	16.614673000	10.0.0.1	10.0.0.4	ICMP	100	Echo (ping) request id=0x11a9, seq=1/256, ttl=64
178	16.615495000	10.0.0.1	10.0.0.4	ICMP	100	Echo (ping) request id=0x11a9, seq=1/256, ttl=64 (reply in 179)
179	16.615558000	10.0.0.4	10.0.0.1	ICMP	100	Echo (ping) reply id=0x11a9, seq=1/256, ttl=64 (request in 178)
182	16.616280000	10.0.0.4	10.0.0.1	ICMP	100	Echo (ping) reply id=0x11a9, seq=1/256, ttl=64
183	16.616286000	10.0.0.4	10.0.0.1	ICMP	100	Echo (ping) reply id=0x11a9, seq=1/256, ttl=64
186	16.617080000	10.0.0.4	10.0.0.1	ICMP	100	Echo (ping) reply id=0x11a9, seq=1/256, ttl=64
187	16.617086000	10.0.0.4	10.0.0.1	ICMP	100	Echo (ping) reply id=0x11a9, seq=1/256, ttl=64
▶ Frame 81: 100 bytes on wire (800 bits), 100 bytes captured (800 bits) on interface 0						
▶ Linux cooked capture						
▶ Internet Protocol Version 4, Src: 10.0.0.1 (10.0.0.1), Dst: 10.0.0.2 (10.0.0.2)						
▶ Internet Control Message Protocol						
0000	00 00 00 01 00 06 7a f8	e2 6b 46 e2 00 00 08 00Z..kF....			
0010	45 00 00 54 a9 41 40 00	40 01 7d 65 0a 00 00 01	E..T.A@.}e....			
0020	0a 00 00 02 08 00 50 1f	11 a6 00 01 99 d7 97 5eP.....^			
0030	6f 00 0b 00 08 09 0a 0b	0c 0d 0e 0f 10 11 12 13	0.....			
0040	14 15 16 17 18 19 1a 1b	1c 1d 1e 1f 20 21 22 23!#"			
0050	24 25 26 27 28 29 2a 2b	2c 2d 2e 2f 30 31 32 33	\$\$%()*+,-./0123			
0060	34 35 36 37		4567			

File: ~/tmp/wireshark_pcapng_...

Packets: 1275 · Displayed: 257 (20.2%) · Dropped: 1 (0.1%)