CENG435
Homework 3

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PART 1:

After the configuration process is done, I obtained the necessary packages by the command “h1 ping -c 3 h2”.

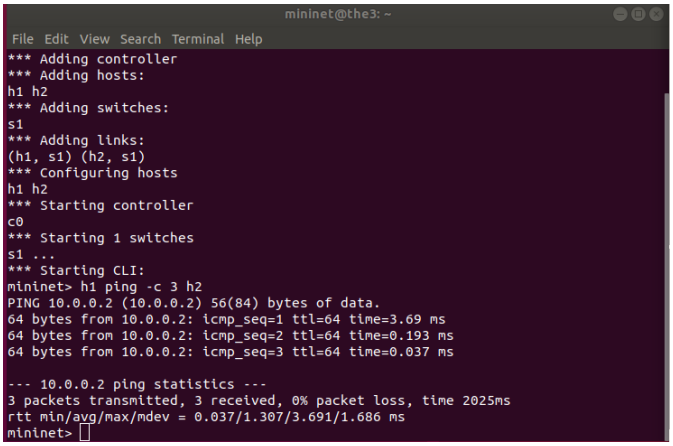

Figure 1: Mininet Command Line Interface

1) IP Address of the Source Host: 10.0.0.1
   IP Address of the Destination Host: 10.0.0.2

2) Because the purpose of the ICMP packet is to establish a communication of network-layer information between hosts and routers, so application layer is not included in this protocol (*CSC358 Introduction to Computer Networks*, 2016). ICMP packets have “Type” and “Code” fields as you can see in the next questions. This pair shows the identity of the message. Port numbers are a feature of transport layer protocols such as TCP and UDP, and ICMP is a part of internetworking layer(IP). So, there is no port number in ICMP.

3) For a ping request, the ICMP type number is 8 and the code number is 0. There are other fields such as checksum, identifier, sequence number, timestamp, and data as seen in the figure below. The checksum is made up of 4 hexadecimal numbers, so 16 bits(2 bytes). Identifier and sequence number fields have two parts (BE and LE) and probably they are like low order and high order parts. Each part is 2 bytes long, and the identifier and the sequence number have two of those 2-byte parts. So both the identifier and the sequence number are 4 bytes long.

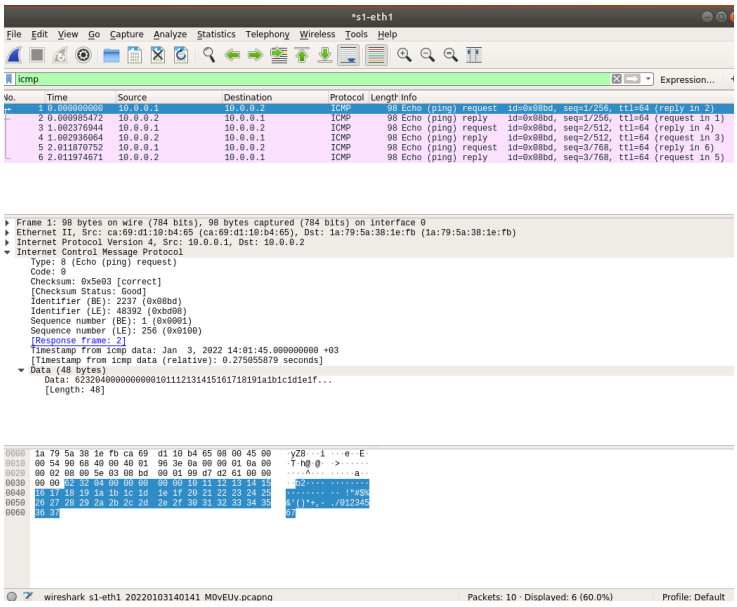

Figure 2: Ping Request

4) For a ping reply, the ICMP type number is 0 and the code number is 0. There are other fields such as checksum, identifier, sequence number, timestamp, response time, and data as seen in the figure below. The checksum, identifier, and sequence number length are similar to the ones in the ping request. The checksum is made up of 4 hexadecimal numbers, so 16 bits(2 bytes). Identifier and sequence number fields have two parts (BE and LE) and probably they are like low order and high order parts. Each part is 2 bytes long, and the identifier and the sequence number have two of those 2-byte parts. So both the identifier and the sequence number are 4 bytes long.

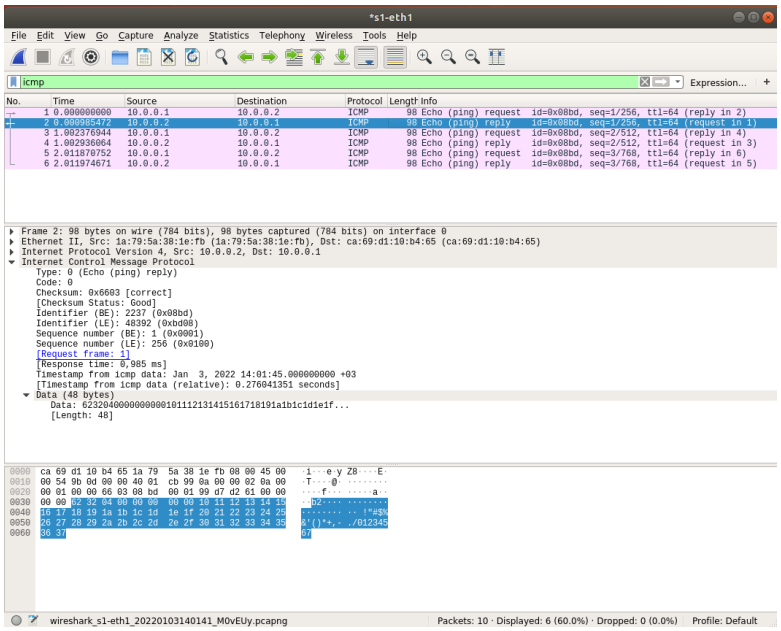

Figure 3: Ping Reply

PART 2:

1)

```
mininet> pingall
*** Ping: testing ping reachability
alice -> bob evilCorp ezekiel frank hannah r1 r2 r3
bob -> alice evilCorp ezekiel frank hannah r1 r2 r3
evilCorp -> alice bob ezekiel frank hannah r1 r2 r3
ezekiel -> alice bob evilCorp frank hannah r1 r2 r3
frank -> alice bob evilCorp ezekiel hannah r1 r2 r3
hannah -> alice bob evilCorp ezekiel frank r1 r2 r3
r1 -> alice bob evilCorp ezekiel frank hannah r2 r3
r2 -> alice bob evilCorp ezekiel frank hannah r1 r3
r3 -> alice bob evilCorp ezekiel frank hannah r1 r2
*** Results: 0% dropped (72/72 received)
```

Figure 4: pingall

2)

```
mininet> ezekiel traceroute hannah
traceroute to 10.1.0.201 (10.1.0.201), 64 hops max
  1   10.0.0.1  1,676ms  2,177ms  0,369ms
  2   10.100.0.2  0,699ms  0,519ms  2,672ms
  3   10.1.0.201  1,472ms  1,310ms  0,750ms
mininet>
```

Figure 5: ezekiel traceroute hannah

3)

```
mininet> alice traceroute bob
traceroute to 10.0.0.251 (10.0.0.251), 64 hops max
  1   10.1.0.1  0,003ms  0,499ms  0,368ms
  2   10.100.0.1  0,600ms  2,294ms  0,898ms
  3   10.0.0.251  8,943ms  1,398ms  1,591ms
mininet>
```

Figure 6: alice traceroute bob

4)

```
mininet> frank traceroute evilCorp
traceroute to 10.0.1.101 (10.0.1.101), 64 hops max
  1   10.0.0.1  0,003ms  0,472ms  0,363ms
  2   10.200.0.2  0,594ms  1,849ms  1,012ms
  3   10.0.1.101  6,249ms  3,805ms  0,709ms
mininet>
```

Figure 7: frank traceroute evilCorp

5)

```
mininet> evilCorp traceroute frank
traceroute to 10.0.0.250 (10.0.0.250), 64 hops max
  1   10.0.1.1  1,085ms  0,680ms  0,634ms
  2   10.200.0.1  11,671ms  4,168ms  0,615ms
  3   10.0.0.250  4,005ms  0,850ms  1,802ms
mininet>
```

Figure 8: evilCorp traceroute frank

6)

```
mininet> evilCorp traceroute alice
traceroute to 10.1.0.144 (10.1.0.144), 64 hops max
  1   10.0.1.1  3,706ms  0,593ms  3,378ms
  2   10.150.0.1  4,307ms  0,640ms  0,497ms
  3   10.1.0.144  1,386ms  2,045ms  3,955ms
mininet>
```

Figure 9: evilCorp traceroute alice

7)

```
mininet> hannah traceroute evilCorp
traceroute to 10.0.1.101 (10.0.1.101), 64 hops max
  1   10.1.0.1  0,004ms  0,473ms  0,365ms
  2   10.150.0.2  0,611ms  1,893ms  0,975ms
  3   10.0.1.101  6,303ms  3,283ms  0,674ms
mininet>
```

Figure 10: hannah traceroute evilCorp

REFERENCES

1) *CSC358 Introduction to Computer Networks*. (2016). UofT. http://www.cs.toronto.edu/~ahchinaei/teaching/2016jan/csc358/