Lab 8 (CN2) CS310 Group 13

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A)
I. sudo traceroute -I www.iitmandi.ac.in 64

1. 192.168.43.203
2. ICMP (1)
3. 20 bytes
4.

5. Identification, Header Checksum, Sequence Number, Checksum
6. Type, Code, Data and Identifier
   Type, Code - because traceroute command sends an ICMP echo request so type remains constant (8 for echo) and code=0 corresponds to echo reply.
7.

Identification changes, TTL also increases by 1 for every 3rd subsequent package.

II. sudo traceroute -I www.iitmandi.ac.in 3000

1. 192.168.43.203
2. ICMP (1)
3. 20 bytes
4.

```
▾ [3 IPv4 Fragments (2980 bytes): #8(1480), #9(1480), #10(20)]
    [Frame: 8, payload: 0-1479 (1480 bytes)]
    [Frame: 9, payload: 1480-2959 (1480 bytes)]
    [Frame: 10, payload: 2960-2979 (20 bytes)]
    [Fragment count: 3]
    [Reassembled IPv4 length: 2980]
    [Reassembled IPv4 data: 0800b9b2296f000148494a4b4c4d4e4f505152535455565758595a5b5c5d5e5f60616263…]
  Internet Control Message Protocol
```

5. Identification, Header Checksum, Sequence Number, Checksum
6. Type, Code, Data and Identifier
   Type, Code - because traceroute command sends an ICMP echo request so type
   remains constant (8 for echo) and code=0 corresponds to echo reply.
7.

```
∨ Internet Protocol Version 4, Src: 172.18.214.103, Dst: 204.197.248.190
      0100 .... = Version: 4
      .... 0101 = Header Length: 20 bytes (5)
    > Differentiated Services Field: 0x00 (DSCP: CS0, ECN: Not-ECT)
      Total Length: 40
      Identification: 0x5bf8 (23544)
    > 000. .... = Flags: 0x0
      ...0 0001 0111 0010 = Fragment Offset: 2960
    > Time to Live: 1
      Protocol: ICMP (1)
      Header Checksum: 0x146d [validation disabled]
      [Header checksum status: Unverified]
```

Identification changes, TTL also increases by 1 for every 3rd subsequent package.

B)

```
27 *REF*            192.168.136.94      192.168.136.12      TCP   70 [TCP Retransmission] 56300 → 9 [PSH, ACK] Seq=8 Ack=1 Win=64256 Len=4
28 0.206676741      192.168.136.94      192.168.136.12      TCP   70 [TCP Retransmission] 56300 → 9 [PSH, ACK] Seq=8 Ack=1 Win=64256 Len=4
29 0.620003954      192.168.136.94      192.168.136.12      TCP   70 [TCP Retransmission] 56300 → 9 [PSH, ACK] Seq=8 Ack=1 Win=64256 Len=4
30 1.446603058      192.168.136.94      192.168.136.12      TCP   70 [TCP Retransmission] 56300 → 9 [PSH, ACK] Seq=8 Ack=1 Win=64256 Len=4
31 3.100003421      192.168.136.94      192.168.136.12      TCP   70 [TCP Retransmission] 56300 → 9 [PSH, ACK] Seq=8 Ack=1 Win=64256 Len=4
32 6.406694672      192.168.136.94      192.168.136.12      TCP   70 [TCP Retransmission] 56300 → 9 [PSH, ACK] Seq=8 Ack=1 Win=64256 Len=4
33 13.020026878     192.168.136.94      192.168.136.12      TCP   70 [TCP Retransmission] 56300 → 9 [PSH, ACK] Seq=8 Ack=1 Win=64256 Len=4
34 26.246693521     192.168.136.94      192.168.136.12      TCP   70 [TCP Retransmission] 56300 → 9 [PSH, ACK] Seq=8 Ack=1 Win=64256 Len=4
35 52.700044426     192.168.136.94      192.168.136.12      TCP   70 [TCP Retransmission] 56300 → 9 [PSH, ACK] Seq=8 Ack=1 Win=64256 Len=4
```

-> tc qdisc add dev wlp8s0 root netem rate 1mbit

```
PING 192.168.136.12 (192.168.136.12) 56(84) bytes of data.
64 bytes from 192.168.136.12: icmp_seq=1 ttl=64 time=5.65 ms
64 bytes from 192.168.136.12: icmp_seq=2 ttl=64 time=4.08 ms
64 bytes from 192.168.136.12: icmp_seq=3 ttl=64 time=7.28 ms
64 bytes from 192.168.136.12: icmp_seq=4 ttl=64 time=1.19 ms
64 bytes from 192.168.136.12: icmp_seq=5 ttl=64 time=4.59 ms
64 bytes from 192.168.136.12: icmp_seq=6 ttl=64 time=8.37 ms
64 bytes from 192.168.136.12: icmp_seq=7 ttl=64 time=6.87 ms
```

While sending large file.

```
PING 192.168.136.12 (192.168.136.12) 56(84) bytes of data.
64 bytes from 192.168.136.12: icmp_seq=1 ttl=64 time=1.14 ms
64 bytes from 192.168.136.12: icmp_seq=2 ttl=64 time=1.60 ms
64 bytes from 192.168.136.12: icmp_seq=3 ttl=64 time=1.64 ms
64 bytes from 192.168.136.12: icmp_seq=4 ttl=64 time=1.62 ms
64 bytes from 192.168.136.12: icmp_seq=5 ttl=64 time=1.64 ms
64 bytes from 192.168.136.12: icmp_seq=6 ttl=64 time=1.52 ms
64 bytes from 192.168.136.12: icmp_seq=7 ttl=64 time=1.62 ms
```

Without sending large file

C)
-> tc qdisc add dev wlp8s0 root netem delay 200ms

$ time ssh root@192.168.136.12
```
root@192.168.136.12's password:

ssh root@192.168.136.12  0.09s user 0.01s system 22% cpu 0.424 total
```

$ sudo tc qdisc add dev wl8s0 root netem delay 200ms
$ time ssh root@192.168.136.12
```
root@192.168.136.12's password:

ssh root@192.168.136.12  0.10s user 0.00s system 4% cpu 2.216 total
```