CS 224(M): Tutorial 7

IP Service Model, Packet Format

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1.
The packet received at a router at the physical layer, passes through to the link layer and then to the network layer, from where it is retransmitted for the next hop. Including physical layer, it passes through ***3 layers***.

2.
Max. ethernet payload = 1500 B
Total Header Size = 40 B
Application Data = 1 MB

This would allow maximum payload of 1460 B. For the IP layer, application data passed is 1480 B, from the TCP such that no further fragmentation occurs.
Thus, total datagrams = [1M/1460]+1 = [684.9]+1 = ***685***

The last datagram has a pending ethernet payload of 1360 B. Thus, the required IP packet size is ***1400 B***.

3.
IP datagram size 5000 B ⇒ 4 ethernet datagrams (1500B each)
Thus, probability of loss of each packet = 1%
Thus, P(successful) = 0.99

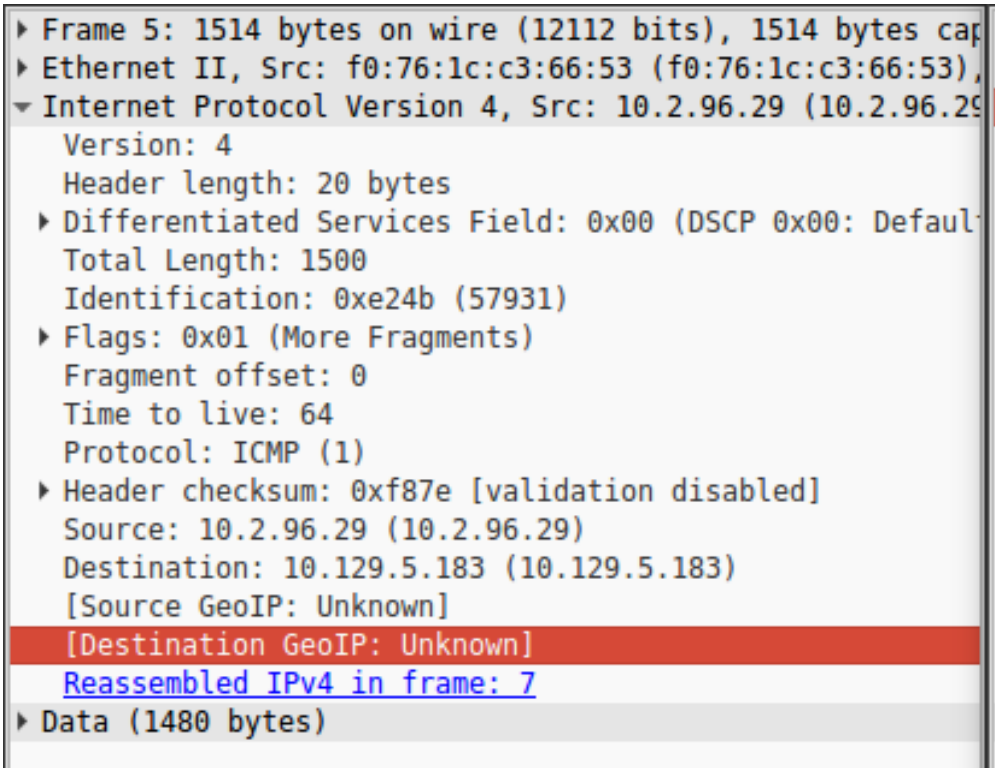
P(all_success) = 0.99^4
Thus, P(loss) = $1-0.99^4$
(This is because loss of any one frame results in loss of complete datagram)

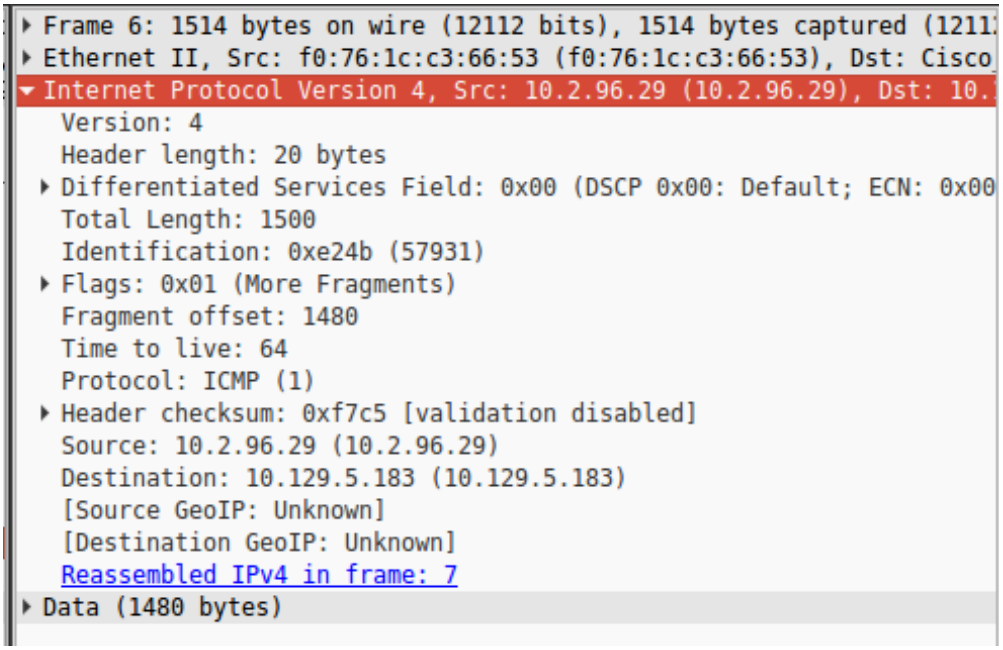
4.
We have MSL = 60s and maximum datagram size = 1000B. Let's assume this rate is uniform, and at time **'t'** one datagram is released. After time **'t+v'**, the next datagram is released into the network. If v<60, then there can be confusion at the receiver's end. Thus,

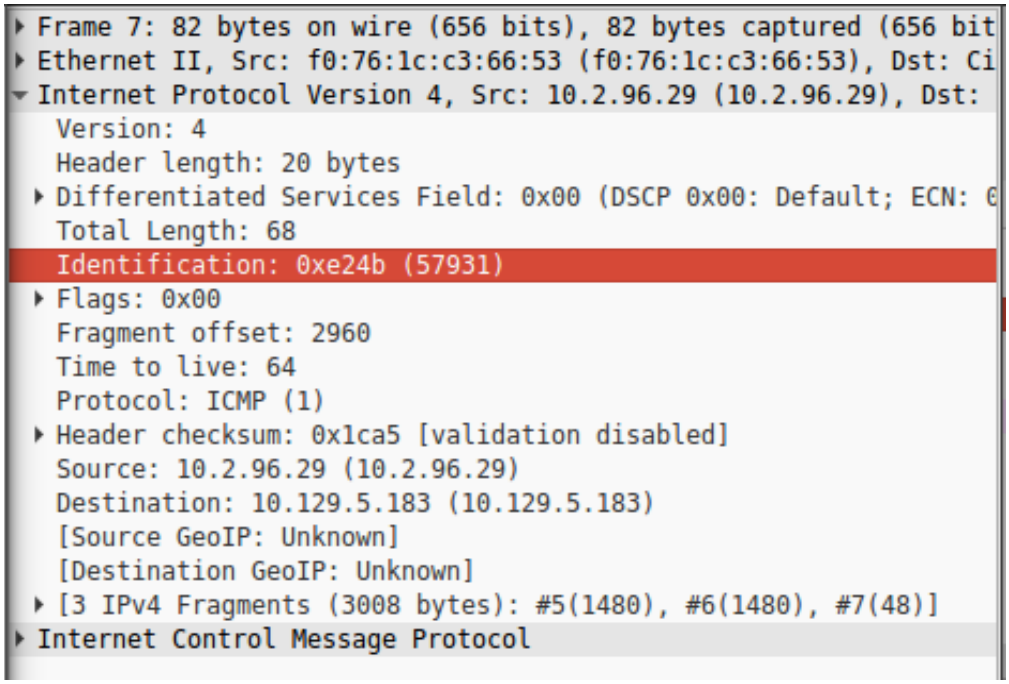
we have **v>60s** as a bottleneck. Now rate = 1000/v has an upper bound and thus we have ***16B/s*** on the network.

5, 6. Following is the response of

ping -s 3000 palantir.cse.iitb.ac.in






Frame 7: 82 bytes on wire (656 bits), 82 bytes captured (656 bit
Ethernet II, Src: f0:76:1c:c3:66:53 (f0:76:1c:c3:66:53), Dst: Ci
Internet Protocol Version 4, Src: 10.2.96.29 (10.2.96.29), Dst:
Version: 4
Header length: 20 bytes
Differentiated Services Field: 0x00 (DSCP 0x00: Default; ECN: 0
Total Length: 68
Identification: 0xe24b (57931)
Flags: 0x00
Fragment offset: 2960
Time to live: 64
Protocol: ICMP (1)
Header checksum: 0x1ca5 [validation disabled]
Source: 10.2.96.29 (10.2.96.29)
Destination: 10.129.5.183 (10.129.5.183)
[Source GeoIP: Unknown]
[Destination GeoIP: Unknown]
[3 IPv4 Fragments (3008 bytes): #5(1480), #6(1480), #7(48)]
Internet Control Message Protocol