CS536 Homework1(Spring 23)

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1 Answer to Q1

(b) The number of hops and average round trip delays to each destination are summarized below.

Destination	Number of Hops	Average Round Trip Delay
www.cs.purdue.edu	7	3.104
www.google.com	16	49.2775
www.ntu.edu.sg	15	29.567

Table 1: Number of Hops and Average Round Trip Delay to Destination

(c) The hops in common after comparing all the hops to all the destinations are listed below.

Hop Name	IP Address
lamb-20-c7710-03-vlan1329.tcom.purdue.edu	10.186.176.10
tel-210-c7710-03-vlan3301.tcom.purdue.edu	172.28.163.66
lamb-20-c7710-03-vlan3014.tcom.purdue.edu	172.28.160.195

Table 2: Common Hops to the Destinations

Explanation: The traceroute was run from the **ARMS** building **B061** classroom. To reach each destination (www.cs.purdue.edu, www.google.com, and www.ntu.edu.sg) a packet has to leave the ARMS building and follow its path to destination. In the path to the three destinations, the listed three hops are common because the starting point and initial route is the same because its the the local gateway for our subnet. After that the paths diverges and we do not find any more hops in common.

(d) In the traceroute experiment to www.ntu.edu.sg, the largest delay on one hop occurs at the **lo-0.1.rtr.star.indiana.gigapop.net** (**149.165.255.9**) hop. In line 8 of the traceroute it takes **86.185** ms and in line 9 it takes **86.151** ms. This is because it can be visited in two different routes to the destination. The average delay is $(86.185 + 86.151)/2 =$ **86.168** ms.

2 Answer to Q2

(b) For this task, the google.pcap packet trace was picked and Wireshark was used to locate the records to each traceroute's response by filtering the ICMP packets. These records are shown in Figure 1.

(c) 172.28.160.195 was the intermediate router selected with three delay values and all the packets to/from this router were located by the filter **"ip.src == 172.28.160.195"** in Wireshark. These records are shown in Figure 2.

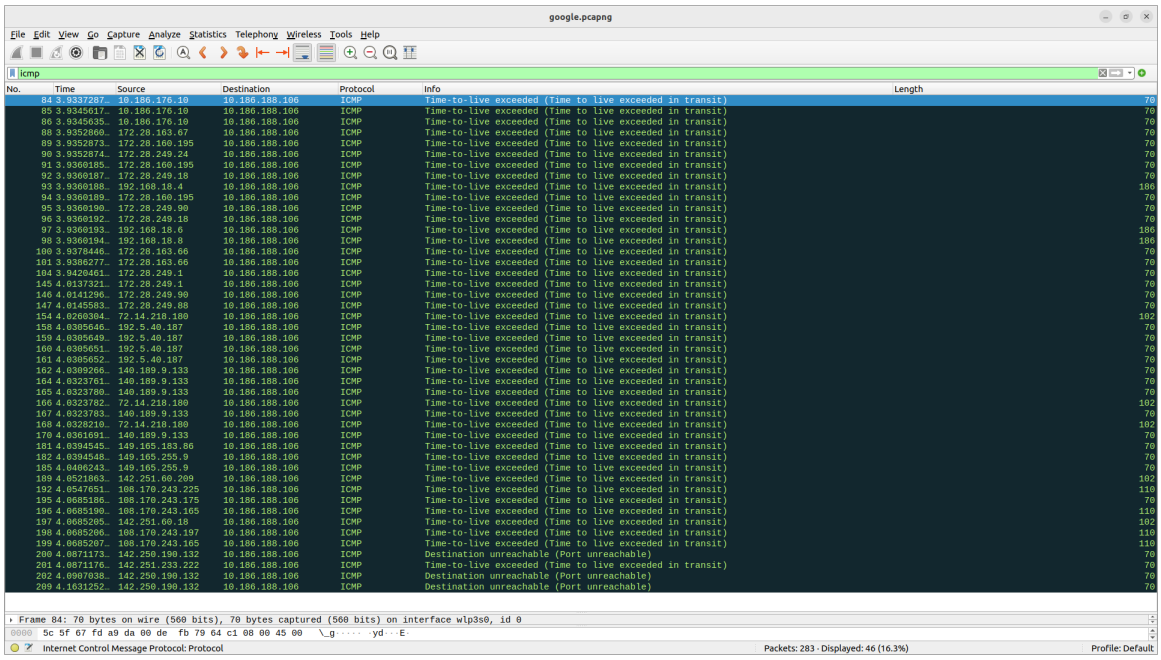

Figure 1: Each traceroute's response in Google.pcap

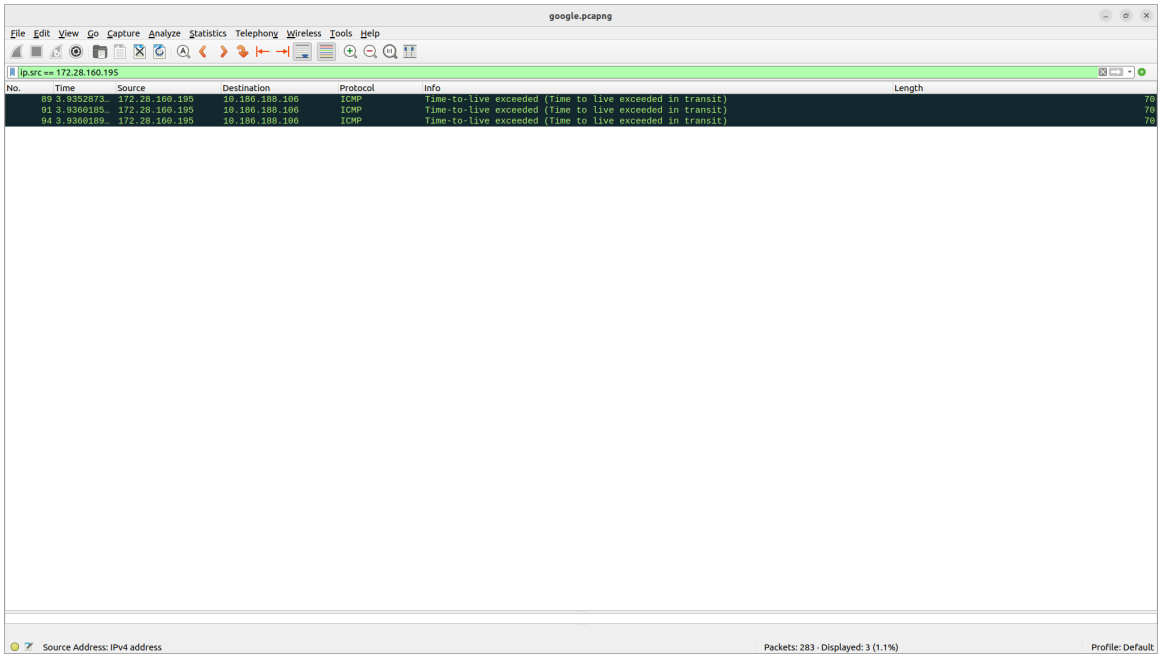

Figure 2: Packets to/from intermediate router 172.28.160.195

3 Bonus

I picked **172.28.160.195** (lamb-20-c7710-03-vlan3014.tcom.purdue.edu) as intermediate router and used Wireshark to capture packet traces while running ping.

Protocols Used: Protocol used for ping is **ICMP**.