This part is done based on the following files:

1. group1-trace1.pcap
2. group1-trace2.pcap
3. group1-trace3.pcap
4. group1-trace4.pcap
5. group1-trace5.pcap

**Question 1:** Probes per ttl used in each trace file?

**Ans 1**: The probes per ttl for this file is 3 for the range of ttls from 1-17 but for ttl 18 its 1.

**Question 2:** Determine whether or not the sequence of intermediate routers is the same in different trace files?

**Ans 2:** The sequence of intermediate routers for all five files is inconsistent.

**Question 3:** List the difference and explain why?

**Ans:** The routers that change are as follows:

1. 74.125.37.91
2. 72.14.237.123
3. 209.85.249.155
4. 209.85.250.121
5. 209.85.249.153

Essentially, only last 4-5 routers change with every trace file in this group.

Using multiple probes adds a level of randomness to the packet going from source to destination and so, because routing isn’t fixed, the packet can be forwarded to different routers each time when being sent from source to ultimate destination which results in a different sequence of intermediate routers.

This part is done based on the following files:

1. group2-trace1.pcap
2. group2-trace2.pcap
3. group2-trace3.pcap
4. group2-trace4.pcap
5. group2-trace5.pcap

**Question 1:** Probes per ttl used in each trace file?

**Ans 1**: The probes used per ttl is 3 for this set of five files

**Question 2:** Determine whether or not the sequence of intermediate routers is the same in different trace files?

**Ans 2:** The sequence of intermediate routers for all five files is the same.

**Question 3:**

**Ans 3:**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **TTL** | **Average RTT in trace1 (ms)** | **Average RTT in trace2 (ms)** | **Average RTT in trace3 (ms)** | **Average RTT in trace4 (ms)** | **Average RTT in trace5 (ms)** |
| **1** | 3.329754 | 2.71066 | 7.853985 | 3.415346 | 1.745621 |
| **2** | 15.811682 | 17.118295 | 11.835416 | 13.245026 | 16.153574 |
| **3** | 18.869321 | 20.09662 | 22.579352 | 21.672249 | 21.601677 |
| **4** | 22.843043 | 19.420067 | 19.460201 | 19.754648 | 18.558343 |
| **5** | 26.502053 | 21.555344 | 20.321369 | 35.77129 | 20.717065 |
| **6** | 24.2637 | 19.982338 | 21.849712 | 22.67464 | 43.472052 |
| **7** | 18.407901 | 51.657995 | 22.763332 | 18.337329 | 26.921272 |
| **8** | 22.970756 | 108.737628 | 20.591974 | 24.57428 | 25.623401 |
| **9** | 18.099705 | 21.911065 | 23.139954 | 19.942602 | 21.441936 |

The hop which is most likely to incur the maximum delay is ttl 8 as it is the furthest away from the source and required more transmissions.