Melissa Gaines

017942663

Feb. 26, 2023

Assignment 1

1. Packet-switched networks do not need to rely on a dedicated channel between sender and receiver for data packets to get to its destination which has the advantage of being more cost effective since chennels can be expensive and more reliable since data packets can be resent if they dont reach their destination.

2. The 5 layers of Internet protocol stack are physical, data link, network, transport, and application layer. First, the physical layer is where bits of frames are sent to nodes connect over a communication link. Next the data link layer collects a stream of bits into a frame andsends it to the network layer. The network layer handles routing data packets ebtween nodes to desire destination. The transport layer transports data called messages using end to end communication. The application layer manages communication between application prgramsn over a network.

3. Propogation delay = distance link / propagation speed

$$= (2500*10^3 \text{ m})/(2.5*10^8 \text{ m/s})$$

$$= 0.01 \text{ s}$$

$$= 10 \text{ ms}$$

The delay is not dependent on packet length or transmission rate.

4.

   a. Propagation delay = distance link / propagation speed

      Minimum RTT = propagation time * 2

$$= (385000*10^3 \text{ m})/(3*10^8 \text{ m/s}) *2$$

$$= 2.57 \text{ s}$$

   b. delay × bandwidth product = 2.57s / 1 Gbps

$$= 2.57 \text{ Gb}$$

$$= 321 \text{ MB}$$

   c. delay × bandwidth product represents the amount of data that can send before receiving a response.

   d. minimum amount of time = 25 MB / 1 Gbps + minimum RTT

$$= 200 \text{ Mb} / 1000 \text{ Mbps} + \text{minimum RTT}$$

$$= 0.2 \text{ s} + \text{minimum RTT}$$

$$= 0.2 \text{ s} + 2.57 \text{ s}$$

$$= 2.77 \text{ s}$$

5.
a. Minimum = 5 ms, Maximum = 6 ms, Average = 5 ms

```
C:\WINDOWS\system32>ping www.google.com

Pinging www.google.com [142.250.189.4] with 32 bytes of data:
Reply from 142.250.189.4: bytes=32 time=5ms TTL=115
Reply from 142.250.189.4: bytes=32 time=6ms TTL=115
Reply from 142.250.189.4: bytes=32 time=5ms TTL=115
Reply from 142.250.189.4: bytes=32 time=5ms TTL=115

Ping statistics for 142.250.189.4:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 5ms, Maximum = 6ms, Average = 5ms
```

b. With an increase in pings from 2 to 7, the minimum is slightly lower while the maximum and average are a bit higher.

```
C:\WINDOWS\system32>ping -n 2 www.google.com

Pinging www.google.com [142.250.68.4] with 32 bytes of data:
Reply from 142.250.68.4: bytes=32 time=7ms TTL=60
Reply from 142.250.68.4: bytes=32 time=10ms TTL=60

Ping statistics for 142.250.68.4:
    Packets: Sent = 2, Received = 2, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 7ms, Maximum = 10ms, Average = 8ms
```

```
C:\WINDOWS\system32>ping -n 7 www.google.com

Pinging www.google.com [142.250.68.4] with 32 bytes of data:
Reply from 142.250.68.4: bytes=32 time=9ms TTL=60
Reply from 142.250.68.4: bytes=32 time=11ms TTL=60
Reply from 142.250.68.4: bytes=32 time=8ms TTL=60
Reply from 142.250.68.4: bytes=32 time=12ms TTL=60
Reply from 142.250.68.4: bytes=32 time=10ms TTL=60
Reply from 142.250.68.4: bytes=32 time=10ms TTL=60
Reply from 142.250.68.4: bytes=32 time=17ms TTL=60

Ping statistics for 142.250.68.4:
    Packets: Sent = 7, Received = 7, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 8ms, Maximum = 17ms, Average = 11ms
```

c. The output is "Request timed out." I'm getting this result because the server machine is not able to respond to the request within a time period due interference that between my local machine at the server I'm attempting to ping.

```
C:\WINDOWS\system32>ping 10.0.0.50

Pinging 10.0.0.50 with 32 bytes of data:
Request timed out.
Request timed out.
Request timed out.
Request timed out.

Ping statistics for 10.0.0.50:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
```

d. I did not receive a response. "Request timed out." I could be getting this response because the the website is down or blocked by internet provider.

```
C:\WINDOWS\system32>ping www.imperialequestriancenter.com

Pinging www.imperialequestriancenter.com [64.29.151.209] with 32 bytes of data:
Request timed out.
Request timed out.
Request timed out.
Request timed out.

Ping statistics for 64.29.151.209:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
```

6.

a. There was 11 hops from my computer to www.google.com.

b. There was 11 hops to www.google.com and 13 hops to www.ieee.org. Hops 1-7 were the same for the two websites.

```
C:\WINDOWS\system32>tracert www.google.com

Tracing route to www.google.com [142.250.188.228]
over a maximum of 30 hops:

  1     3 ms     1 ms     3 ms  dhcp-39-0-1.dhcpint.csulb.edu [10.39.0.1]
  2     3 ms     2 ms     3 ms  10.19.49.83
  3     3 ms     5 ms     3 ms  134.139.197.11
  4    44 ms     4 ms     4 ms  134.139.198.72
  5    12 ms    11 ms     9 ms  lbs-edge-a.nms.csulb.edu [134.139.198.89]
  6     5 ms     4 ms     4 ms  dc-lb-csu-2--longbeachcsu-20ge-1.cenic.net [137.164.34.232]
  7     5 ms     8 ms     5 ms  lax-agg10--lb-csu-2--100g.cenic.net [137.164.13.112]
  8     4 ms     5 ms     4 ms  72.14.222.56
  9     7 ms     7 ms     6 ms  216.239.57.145
 10    10 ms    12 ms    12 ms  142.251.60.127
 11     8 ms     9 ms     7 ms  lax31s15-in-f4.1e100.net [142.250.188.228]

Trace complete.
```

```
C:\WINDOWS\system32>tracert www.ieee.org

Tracing route to e1630.c.akamaiedge.net [23.205.199.88]
over a maximum of 30 hops:

  1     1 ms     2 ms     2 ms  dhcp-39-0-1.dhcpint.csulb.edu [10.39.0.1]
  2     3 ms     4 ms     3 ms  10.19.49.83
  3     6 ms     6 ms     6 ms  134.139.197.11
  4     4 ms     4 ms     4 ms  134.139.198.72
  5     6 ms     4 ms     4 ms  lbs-edge-a.nms.csulb.edu [134.139.198.89]
  6    23 ms     4 ms     5 ms  dc-lb-csu-2--longbeachcsu-20ge-1.cenic.net [137.164.34.232]
  7     6 ms     5 ms     6 ms  lax-agg10--lb-csu-2--100g.cenic.net [137.164.13.112]
  8     5 ms     6 ms     4 ms  198.32.251.219
  9    17 ms    12 ms    12 ms  ae22.r03.border101.lax01.fab.netarch.akamai.com [23.203.155.27]
 10     5 ms     6 ms     6 ms  192.168.224.9
 11    15 ms    13 ms    16 ms  192.168.227.3
 12    12 ms    13 ms    12 ms  192.168.234.151
 13     7 ms     8 ms     7 ms  a23-205-199-88.deploy.static.akamaitechnologies.com [23.205.199.88]

Trace complete.
```

c. The difference is that only the IP address is given, not the location when running tracert -d www.ubc.ca.

```
C:\WINDOWS\system32>tracert www.ubc.ca

Tracing route to d3tie7xuvq1kvm.cloudfront.net [18.154.206.113]
over a maximum of 30 hops:

  1    10 ms     4 ms     5 ms  dhcp-39-0-1.dhcpint.csulb.edu [10.39.0.1]
  2     3 ms    13 ms     6 ms  10.19.49.83
  3    10 ms     4 ms     3 ms  134.139.197.11
  4     9 ms    11 ms     4 ms  134.139.198.72
  5     8 ms    15 ms     4 ms  lbs-edge-a.nms.csulb.edu [134.139.198.89]
  6    46 ms    19 ms     5 ms  dc-lb-csu-2--longbeachcsu-20ge-1.cenic.net [137.164.34.232]
  7     5 ms     8 ms    34 ms  lax-agg10--lb-csu-2--100g.cenic.net [137.164.13.112]
  8     7 ms    10 ms     6 ms  dc-lax-agg8--lax-agg10-300g.cenic.net [137.164.11.71]
  9    14 ms    17 ms    32 ms  99.82.182.178
 10     *        *        *     Request timed out.
 11     *        *        *     Request timed out.
 12     *        *        *     Request timed out.
 13     *        *        *     Request timed out.
 14     *        *        *     Request timed out.
 15     *        *        *     Request timed out.
 16     *        *        *     Request timed out.
 17    35 ms    62 ms    30 ms  150.222.232.226
 18    32 ms    39 ms    10 ms  server-18-154-206-113.lax50.r.cloudfront.net [18.154.206.113]

Trace complete.
```

```
C:\WINDOWS\system32>tracert -d www.ubc.ca

Tracing route to d3tie7xuvq1kvm.cloudfront.net [18.65.25.70]
over a maximum of 30 hops:

  1    34 ms    11 ms     3 ms  10.39.0.1
  2     2 ms     8 ms     2 ms  10.19.49.83
  3    11 ms    14 ms     5 ms  134.139.197.11
  4    19 ms     6 ms     5 ms  134.139.198.72
  5     5 ms    10 ms     6 ms  134.139.198.89
  6     6 ms     6 ms    10 ms  137.164.34.232
  7     8 ms     9 ms    12 ms  137.164.13.112
  8     8 ms    11 ms     8 ms  137.164.11.71
  9    10 ms     9 ms     8 ms  99.82.179.202
 10     *         *         *     Request timed out.
 11     *         *         *     Request timed out.
 12     *         *         *     Request timed out.
 13     *         *         *     Request timed out.
 14     *         *         *     Request timed out.
 15     *         *         *     Request timed out.
 16     *         *         *     Request timed out.
 17    35 ms    15 ms     6 ms  15.230.16.19
 18    15 ms    20 ms    12 ms  18.65.25.70

Trace complete.
```

d. In different times of day, 2 websites had a constant number of hops while the tsinghua website
    that had 8 less hops in the morning. Tsinghua and usyd websites had a high number of hops
    and Tsinghua specificalaly had the while the highest average round trip time. The harvard
    website had the least number of hops, had the fastest round trip time, and never had a request
    time out.

    i.   Morning

```
Administrator: Command Prompt                                              —    □    X

C:\WINDOWS\system32>ping www.harvard.edu

Pinging pantheon-systems.map.fastly.net [2a04:4e42::645] with 32 bytes of data:
Reply from 2a04:4e42::645: time=6ms
Reply from 2a04:4e42::645: time=7ms
Reply from 2a04:4e42::645: time=6ms
Reply from 2a04:4e42::645: time=7ms

Ping statistics for 2a04:4e42::645:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 6ms, Maximum = 7ms, Average = 6ms

C:\WINDOWS\system32>tracert www.harvard.edu

Tracing route to pantheon-systems.map.fastly.net [2a04:4e42::645]
over a maximum of 30 hops:

  1     2 ms     2 ms     2 ms  2607:7e80:2f0e:bb00:ea9f:80ff:fe85:ef65
  2     *         *         *     Request timed out.
  3     *         *         *     Request timed out.
  4     8 ms     9 ms    10 ms  2620:11a:c000:803:fa57::
  5     8 ms     9 ms     9 ms  2a04:4e42::645

Trace complete.
```

                                                                         8:48 AM
                                                                         2/26/2023

```
 Administrator: Command Prompt                                    —    □    ✕

C:\WINDOWS\system32>ping www.tsinghua.edu.cn

Pinging www.tsinghua.edu.cn [166.111.4.100] with 32 bytes of data:
Reply from 166.111.4.100: bytes=32 time=578ms TTL=45
Reply from 166.111.4.100: bytes=32 time=283ms TTL=45
Reply from 166.111.4.100: bytes=32 time=297ms TTL=45
Reply from 166.111.4.100: bytes=32 time=304ms TTL=45

Ping statistics for 166.111.4.100:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 283ms, Maximum = 578ms, Average = 365ms

C:\WINDOWS\system32>tracert www.tsinghua.edu.cn

Tracing route to www.tsinghua.edu.cn [166.111.4.100]
over a maximum of 30 hops:

  1     4 ms     2 ms     1 ms  Linksys05324 [192.168.1.1]
  2    10 ms     8 ms     9 ms  8-3-88-1.starry-inc.net [8.3.88.1]
  3     *        *        *     Request timed out.
  4    76 ms    75 ms    73 ms  100.64.2.33
  5    79 ms    79 ms    73 ms  205-201-16-130.starry-inc.net [205.201.16.130]
  6     *        *        *     Request timed out.
  7     *        *        *     Request timed out.
  8    75 ms    73 ms    76 ms  100.64.3.1
  9    78 ms    73 ms     *     100ge0-58.core2.den1.he.net [184.105.222.114]
 10     *        *        *     Request timed out.
 11   134 ms    74 ms    88 ms  100ge16-2.core1.lax2.he.net [184.104.188.29]
 12   110 ms    76 ms    75 ms  erx-cernet-bkb-as4538.10gigabitethernet3-2.core1
.lax2.he.net [216.218.244.106]
 13    81 ms    80 ms    81 ms  101.4.117.185
 14   330 ms   306 ms   307 ms  101.4.117.213
 15     *        *        *     Request timed out.
 16   308 ms   306 ms   305 ms  101.4.118.213
 17   288 ms   303 ms   306 ms  101.4.113.234
 18   290 ms   307 ms   304 ms  202.112.38.6
 19   284 ms   315 ms   294 ms  118.229.4.78
 20   303 ms   304 ms   306 ms  118.229.2.78
 21   323 ms   305 ms   304 ms  118.229.9.6
 22   297 ms   304 ms   303 ms  www.tsinghua.edu.cn [166.111.4.100]

Trace complete.
```

                                              8:23 AM
                                              2/26/2023

```
Administrator: Command Prompt                                    —    □    ✕

C:\WINDOWS\system32>ping www.usyd.edu.au

Pinging rpxy-loadb-1thwdg5gwm0fm-2097141603.ap-southeast-2.elb.amazonaws.com [54
.79.20.9] with 32 bytes of data:
Request timed out.
Request timed out.
Request timed out.
Request timed out.

Ping statistics for 54.79.20.9:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

C:\WINDOWS\system32>tracert www.usyd.edu.au

Tracing route to rpxy-loadb-1thwdg5gwm0fm-2097141603.ap-southeast-2.elb.amazonaw
s.com [54.79.20.9]
over a maximum of 30 hops:

  1     5 ms     1 ms     1 ms  Linksys05324 [192.168.1.1]
  2     8 ms     7 ms     5 ms  8-3-88-1.starry-inc.net [8.3.88.1]
  3     7 ms     7 ms     8 ms  8-3-86-20.starry-inc.net [8.3.86.20]
  4     8 ms     9 ms     6 ms  206.72.211.146.any2ix.coresite.com [206.72.211.1
46]
  5    32 ms    10 ms     8 ms  52.93.92.44
  6    32 ms    25 ms    29 ms  52.93.92.53
  7     *        *        *     Request timed out.
  8     5 ms     6 ms     7 ms  52.93.92.33
  9     *        *        *     Request timed out.
 10     *        *        *     Request timed out.
 11   282 ms   201 ms   201 ms  52.95.36.118
 12   178 ms   168 ms   163 ms  150.222.112.141
 13   222 ms   201 ms   187 ms  150.222.112.138
 14   270 ms   200 ms   203 ms  52.95.39.26
 15   264 ms   203 ms   172 ms  52.95.39.7
 16     *        *        *     Request timed out.
 17     *        *        *     Request timed out.
 18     *        *        *     Request timed out.
 19     *        *        *     Request timed out.
 20     *        *        *     Request timed out.
 21     *        *        *     Request timed out.
 22     *        *        *     Request timed out.
 23     *        *        *     Request timed out.
 24     *        *        *     Request timed out.
 25     *        *        *     Request timed out.
 26     *        *        *     Request timed out.
 27     *        *        *     Request timed out.
 28     *        *        *     Request timed out.
 29     *        *        *     Request timed out.
 30     *        *        *     Request timed out.

Trace complete.
```
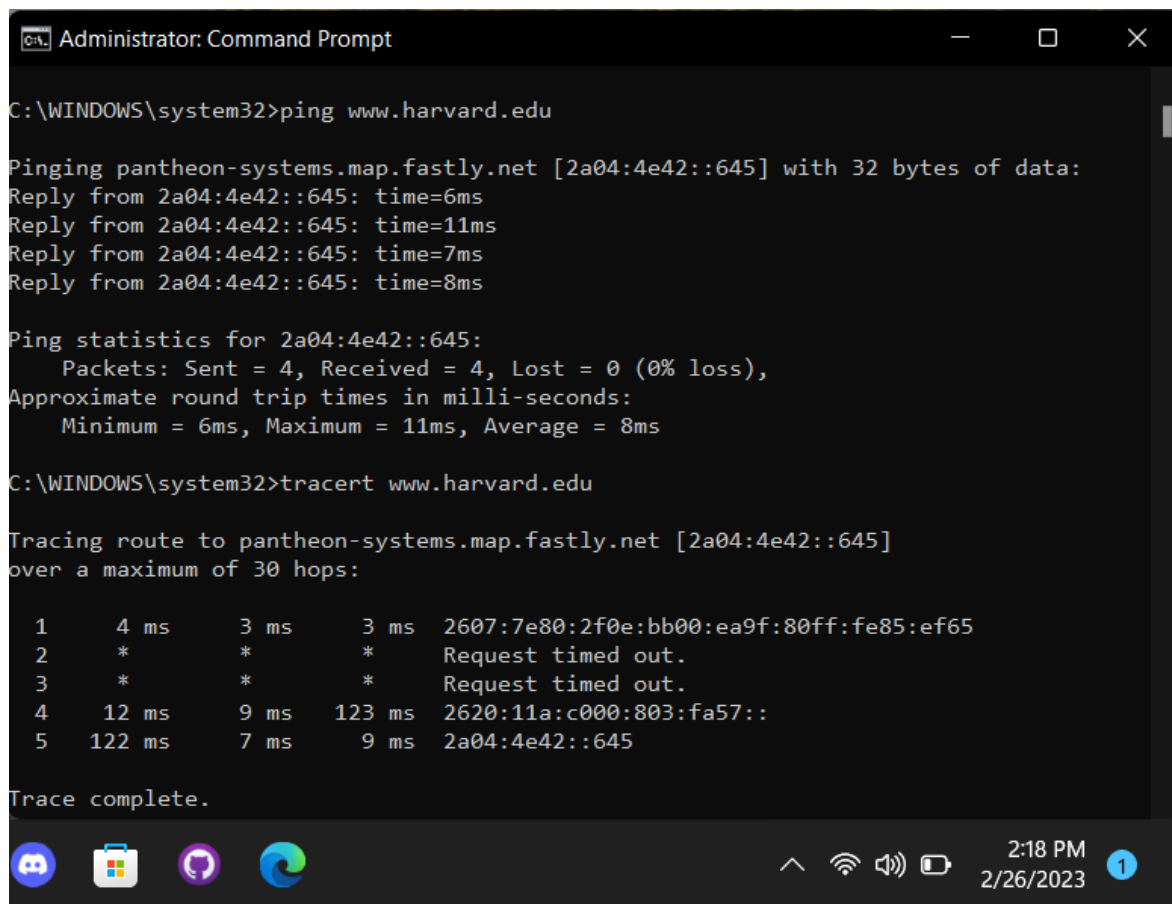
8:40 AM
2/26/2023

ii.   Afternoon

```
Administrator: Command Prompt                                          —     □     ✕

C:\WINDOWS\system32>ping www.harvard.edu

Pinging pantheon-systems.map.fastly.net [2a04:4e42::645] with 32 bytes of data:
Reply from 2a04:4e42::645: time=6ms
Reply from 2a04:4e42::645: time=11ms
Reply from 2a04:4e42::645: time=7ms
Reply from 2a04:4e42::645: time=8ms

Ping statistics for 2a04:4e42::645:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 6ms, Maximum = 11ms, Average = 8ms

C:\WINDOWS\system32>tracert www.harvard.edu

Tracing route to pantheon-systems.map.fastly.net [2a04:4e42::645]
over a maximum of 30 hops:

  1     4 ms     3 ms     3 ms  2607:7e80:2f0e:bb00:ea9f:80ff:fe85:ef65
  2     *        *        *     Request timed out.
  3     *        *        *     Request timed out.
  4    12 ms     9 ms   123 ms  2620:11a:c000:803:fa57::
  5   122 ms     7 ms     9 ms  2a04:4e42::645

Trace complete.
```

2:18 PM
2/26/2023

```
Administrator: Command Prompt                                          —    □    ✕

C:\WINDOWS\system32>ping www.tsinghua.edu.cn

Pinging www.tsinghua.edu.cn [2402:f000:1:404:166:111:4:100] with 32 bytes of data:
Request timed out.
Request timed out.
Request timed out.
Request timed out.

Ping statistics for 2402:f000:1:404:166:111:4:100:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

C:\WINDOWS\system32>tracert www.tsinghua.edu.cn

Tracing route to www.tsinghua.edu.cn [2402:f000:1:404:166:111:4:100]
over a maximum of 30 hops:

  1     3 ms     3 ms     3 ms  2607:7e80:2f0e:bb00:ea9f:80ff:fe85:ef65
  2      *        *        *     Request timed out.
  3      *        *        *     Request timed out.
  4      *        *        *     Request timed out.
  5      *        *        *     Request timed out.
  6      *        *        *     Request timed out.
  7      *        *        *     Request timed out.
  8      *        *        *     Request timed out.
  9      *        *        *     Request timed out.
 10      *        *        *     Request timed out.
 11      *        *        *     Request timed out.
 12      *        *        *     Request timed out.
 13      *        *        *     Request timed out.
 14      *        *        *     Request timed out.
 15      *        *        *     Request timed out.
 16      *        *        *     Request timed out.
 17      *        *        *     Request timed out.
 18      *        *        *     Request timed out.
 19      *        *        *     Request timed out.
 20      *        *        *     Request timed out.
 21      *        *        *     Request timed out.
 22      *        *        *     Request timed out.
 23      *        *        *     Request timed out.
 24      *        *        *     Request timed out.
 25      *        *        *     Request timed out.
 26      *        *        *     Request timed out.
 27      *        *        *     Request timed out.
 28      *        *        *     Request timed out.
 29      *        *        *     Request timed out.
 30      *        *        *     Request timed out.

Trace complete.
```

```
Select Administrator: Command Prompt                              —    □    ✕

C:\WINDOWS\system32>ping www.usyd.edu.au

Pinging rpxy-loadb-1thwdg5gwm0fm-2097141603.ap-southeast-2.elb.amazonaws.com [54.79.
20.9] with 32 bytes of data:
Request timed out.
Request timed out.
Request timed out.
Request timed out.

Ping statistics for 54.79.20.9:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

C:\WINDOWS\system32>tracert www.usyd.edu.au

Tracing route to rpxy-loadb-1thwdg5gwm0fm-2097141603.ap-southeast-2.elb.amazonaws.co
m [54.79.14.167]
over a maximum of 30 hops:

  1     5 ms     2 ms     2 ms  Linksys05324 [192.168.1.1]
  2     8 ms    11 ms     9 ms  8-3-88-1.starry-inc.net [8.3.88.1]
  3    24 ms    35 ms    31 ms  8-3-86-20.starry-inc.net [8.3.86.20]
  4    11 ms     8 ms     9 ms  206.72.211.146.any2ix.coresite.com [206.72.211.146]

  5     9 ms     8 ms     8 ms  52.93.92.42
  6    27 ms    27 ms    21 ms  52.93.92.51
  7     *        *        *     Request timed out.
  8     9 ms     8 ms    12 ms  52.93.92.37
  9     *        *        *     Request timed out.
 10     *        *        *     Request timed out.
 11   252 ms   200 ms   201 ms  52.95.36.166
 12   174 ms   189 ms   201 ms  150.222.112.157
 13   185 ms   203 ms   203 ms  150.222.112.146
 14   275 ms   176 ms   227 ms  52.95.38.114
 15   282 ms   203 ms   200 ms  52.95.38.33
 16     *        *        *     Request timed out.
 17     *        *        *     Request timed out.
 18     *        *        *     Request timed out.
 19     *        *        *     Request timed out.
 20     *        *        *     Request timed out.
 21     *        *        *     Request timed out.
 22     *        *        *     Request timed out.
 23     *        *        *     Request timed out.
 24     *        *        *     Request timed out.
 25     *        *        *     Request timed out.
 26     *        *        *     Request timed out.
 27     *        *        *     Request timed out.
 28     *        *        *     Request timed out.
 29     *        *        *     Request timed out.
 30     *        *        *     Request timed out.

Trace complete.
```

2:16 PM
2/26/2023

iii.   Evening

```
Administrator: Command Prompt                                    —    □    ✕

Pinging rpxy-loadb-1thwdg5gwm0fm-2097141603.ap-southeast-2.elb.amazonaws.com [54.253
.226.225] with 32 bytes of data:
Request timed out.
Request timed out.
Request timed out.
Request timed out.

Ping statistics for 54.253.226.225:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

C:\WINDOWS\system32>tracert www.usyd.edu.au

Tracing route to rpxy-loadb-1thwdg5gwm0fm-2097141603.ap-southeast-2.elb.amazonaws.co
m [54.253.226.225]
over a maximum of 30 hops:

  1     7 ms     2 ms     1 ms  Linksys05324 [192.168.1.1]
  2    11 ms     6 ms     8 ms  8-3-88-1.starry-inc.net [8.3.88.1]
  3    18 ms    18 ms    29 ms  8-3-86-20.starry-inc.net [8.3.86.20]
  4    25 ms     5 ms     6 ms  206.72.211.146.any2ix.coresite.com [206.72.211.146]

  5     7 ms     5 ms     6 ms  52.93.92.40
  6    20 ms    20 ms    17 ms  52.93.92.41
  7     *         *        *    Request timed out.
  8    10 ms    10 ms     6 ms  52.93.92.25
  9     *         *        *    Request timed out.
 10     *         *        *    Request timed out.
 11     *         *        *    Request timed out.
 12   173 ms   200 ms   203 ms  150.222.112.165
 13   175 ms   202 ms   176 ms  150.222.112.166
 14   363 ms   203 ms   202 ms  52.95.39.198
 15   387 ms   201 ms   202 ms  52.95.39.191
 16     *         *        *    Request timed out.
 17     *         *        *    Request timed out.
 18     *         *        *    Request timed out.
 19     *         *        *    Request timed out.
 20     *         *        *    Request timed out.
 21     *         *        *    Request timed out.
 22     *         *        *    Request timed out.
 23     *         *        *    Request timed out.
 24     *         *        *    Request timed out.
 25     *         *        *    Request timed out.
 26     *         *        *    Request timed out.
 27     *         *        *    Request timed out.
 28     *         *        *    Request timed out.
 29     *         *        *    Request timed out.
 30     *         *        *    Request timed out.

Trace complete.

C:\WINDOWS\system32>Z

                                                              10:16 PM
                                                              2/26/2023
```

```
Administrator: Command Prompt                                    —    □    X

C:\WINDOWS\system32>ping www.harvard.edu

Pinging pantheon-systems.map.fastly.net [2a04:4e42::645] with 32 bytes of data:
Reply from 2a04:4e42::645: time=11ms
Reply from 2a04:4e42::645: time=7ms
Reply from 2a04:4e42::645: time=13ms
Reply from 2a04:4e42::645: time=6ms

Ping statistics for 2a04:4e42::645:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 6ms, Maximum = 13ms, Average = 9ms

C:\WINDOWS\system32>tracert www.harvard.edu

Tracing route to pantheon-systems.map.fastly.net [2a04:4e42::645]
over a maximum of 30 hops:

  1     3 ms     3 ms     2 ms  2607:7e80:2f0e:bb00:ea9f:80ff:fe85:ef65
  2     *        *        *     Request timed out.
  3     *        *        *     Request timed out.
  4     8 ms     7 ms     6 ms  2620:11a:c000:803:fa57::
  5     7 ms     7 ms     7 ms  2a04:4e42::645

Trace complete.
```
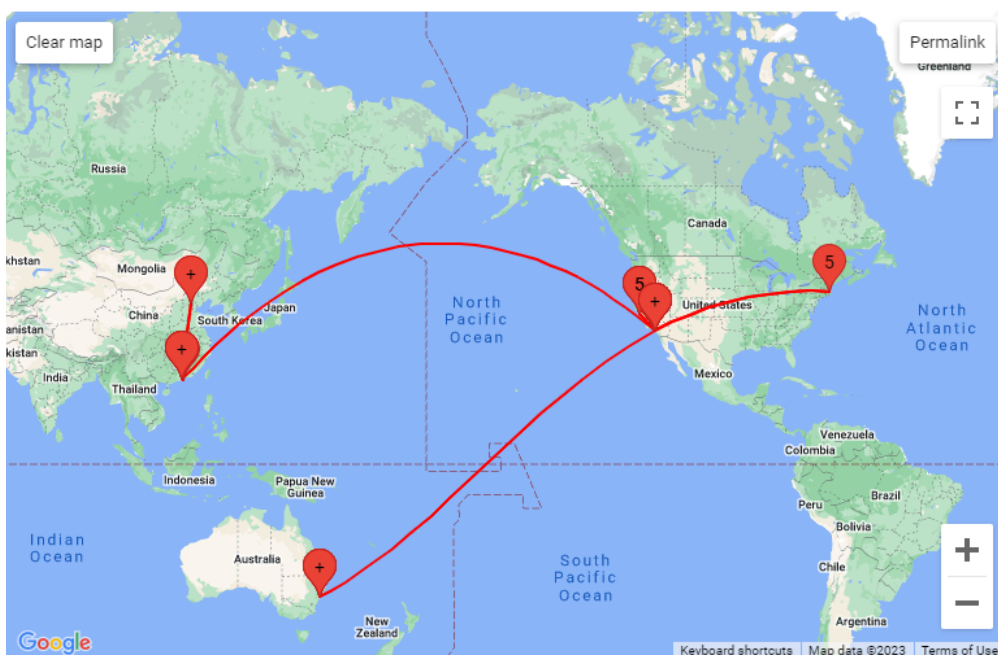
10:18 PM
2/26/2023

e. The international wesbties took a longer trip with more indirect hop locations while the harvard website route was minimal and more direct.

   i. tracert www.tsinghua.edu.cn

```
15      *         *         *       Request timed out.
16    405 ms    404 ms    306 ms   101.4.118.213
17    300 ms    305 ms    254 ms   101.4.113.234
18    452 ms    407 ms    289 ms   202.112.38.6
19    493 ms    306 ms    407 ms   118.229.4.78
20    397 ms    408 ms    407 ms   118.229.2.78
21    392 ms    408 ms    407 ms   118.229.9.6
22    409 ms    410 ms    406 ms   www.tsinghua.edu.cn [166.111.4.100]
```
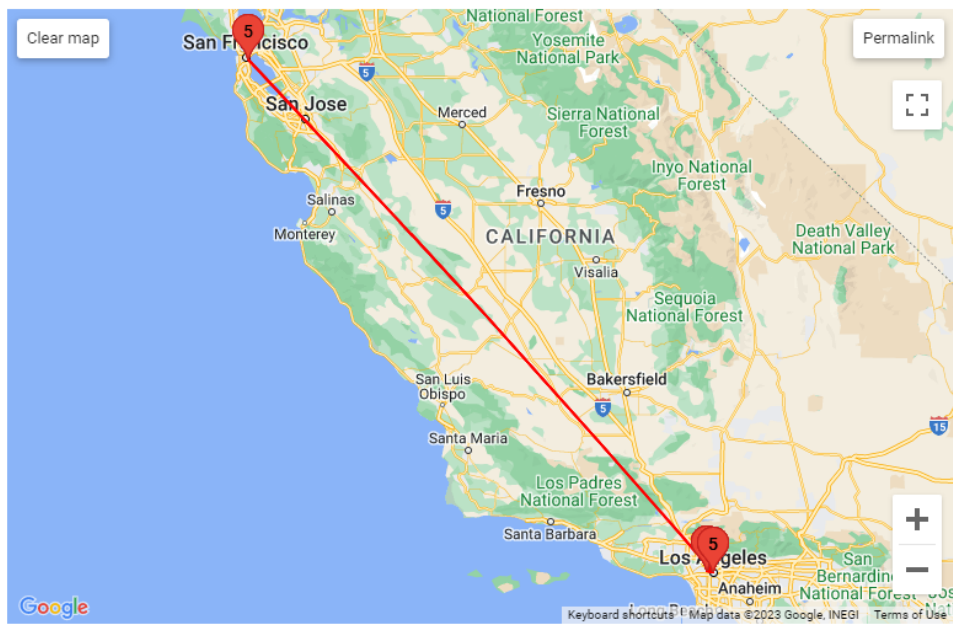
Error: Invalid field 'loc' requested for a bogon address

ii.   tracert www.harvard.edu
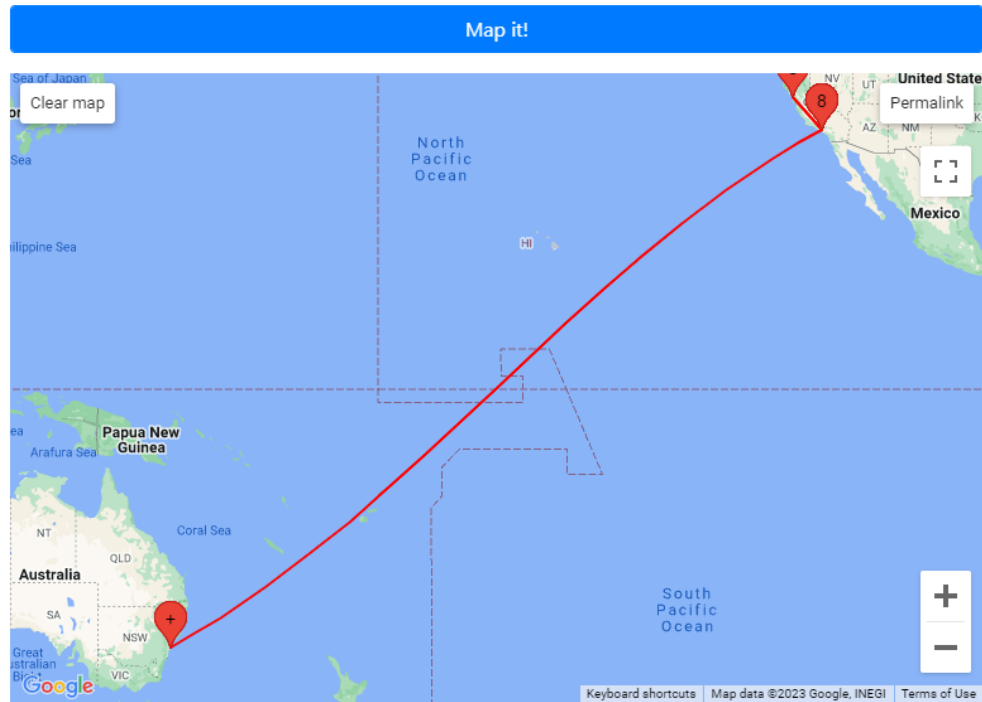
```
1     5 ms     1 ms     2 ms   Linksys05324 [192.168.1.1]
2     7 ms     8 ms     6 ms   8-3-88-1.starry-inc.net [8.3.88.1]
3     5 ms     6 ms     6 ms   8-3-86-20.starry-inc.net [8.3.86.20]
4     9 ms     8 ms     9 ms   140.248.64.68
5   137 ms   119 ms    69 ms   151.101.2.133
```

iii.   tracert www.usyd.edu.au

```
1     5 ms     1 ms     1 ms  Linksys05324 [192.168.1.1]
2     7 ms     5 ms     7 ms  8-3-88-1.starry-inc.net [8.3.88.1]
3     6 ms     6 ms     6 ms  8-3-86-20.starry-inc.net [8.3.86.20]
4     7 ms     6 ms     6 ms  206.72.211.146.any2ix.coresite.com
[206.72.211.146]
5     9 ms     7 ms     7 ms  52.93.92.40
6     9 ms    24 ms    19 ms  52.93.92.41
7     *        *        *     Request timed out.
```

Map it!

7.

    a. Public IP address for www.cisco.com is 72.163.4.185.

    b. Facebook Inc. uses the the IP address 185.60.216.35

8.

    d. Dynamic Host Configuration Protocol handles those responsibilities.