

ECSE 489

Network Measurement Tools

Experiment 1 - Report

Group 12

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1. Introduction

Some of the main objectives of this experiment were to develop a greater understanding of various applications including ping, traceroute, and Wireshark, take measurements of network traffic, analyze results, and monitor performance. Some of the key tasks that were implemented during this experiment are the following:

1. Observe differences in operation of traceroute between Linux and Windows machines
2. Traceroute to six servers across the world and analyze results
3. Ping to six servers across the world and analyze results
4. Observe and identify YouTube data packets in Wireshark, calculate throughput and packet arrival rate, and analyze results

This experiment also helped us get acquainted with other concepts including time to live (TTL), RTT (round trip time) delay, hops, IP addresses and DNS.

2. Traceroute

During this section of the experiment, the first task was to use traceroute on Windows and Linux to understand differences in operation between them. The second task was to traceroute to six different servers - three in North America and three in different continents - and perform result analysis as described elaborately in section 2.3.

2.1. Windows and Linux Traceroutes and Analysis

The Windows traceroute was performed on a Windows 10 desktop on the 4th floor of Trottier with Ethernet connection to ads.mcgill.ca and the Linux traceroute was performed on Ravi's personal laptop (MacBook Air) with Wi-Fi connection to wpa.mcgill.ca. We executed the traceroutes from both Windows and Linux systems to www.yahoo.ca as the destination point on 18th September 2016 at around 8:45pm.

The output for the Windows traceroute can be seen in Figure 2.1:

```

C:\Users\hdas>tracert www.yahoo.ca

Tracing route to src.g03.yahoodns.net [74.6.50.150]
over a maximum of 30 hops:

  1    26 ms    1 ms    48 ms    gateway [132.206.15.1]
  2    <1 ms    <1 ms    <1 ms    burnside-srp-po104.gw.mcgill.ca [10.0.4.101]
  3    <1 ms    <1 ms    <1 ms    james-core-srp-po20.11.gw.mcgill.ca [132.216.216
.246]
  4    1 ms     <1 ms    <1 ms    internet1-vlan846.gw.mcgill.ca [132.216.255.3]
  5    1 ms     1 ms     1 ms     mcgill-gw-qix.risq.net [206.167.128.57]
  6    1 ms     1 ms     1 ms     mcgill-qix.dmtrl-rq.risq.net [132.202.52.89]
  7    1 ms     1 ms     1 ms     imtrl-uq.risq.net [192.77.55.245]
  8    1 ms     2 ms     1 ms     mtrl2rtr2.canarie.ca [199.212.24.82]
  9    13 ms    13 ms    13 ms    nyiix.bas1-m.nyc.yahoo.com [198.32.160.121]
 10    25 ms    25 ms    26 ms    ae-1.pat2.bfw.yahoo.com [216.115.111.26]
 11    23 ms    24 ms    23 ms    et-18-0-0.pat1.bfz.yahoo.com [74.6.227.154]
 12    25 ms    25 ms    25 ms    et-0-0-1.msr1.bf1.yahoo.com [74.6.227.131]
 13    24 ms    24 ms    23 ms    et-0-1-0.clr1-a-gdc.bf1.yahoo.com [74.6.122.13]

 14    25 ms    26 ms    24 ms    po7.fab8-1-gdc.bf1.yahoo.com [72.30.22.15]
 15    24 ms    24 ms    24 ms    po-16.bas1-10-prd.bf1.yahoo.com [69.147.72.143]

 16    25 ms    25 ms    25 ms    w2.src.vip.bf1.yahoo.com [74.6.50.150]

Trace complete.

```

Figure 2.1: Windows traceroute

The output for Linux traceroute can be seen in Figure 2.2:

```

wpa164080:~ ravikrishna$ date
Sun 18 Sep 2016 20:46:06 EDT
wpa164080:~ ravikrishna$ traceroute www.yahoo.ca
traceroute to src.g03.yahoodns.net (74.6.50.150), 64 hops max, 52 byte packets
 1 gateway (142.157.164.3)  2.040 ms  1.614 ms  1.574 ms
 2 internet1-vlan876.gw.mcgill.ca (132.216.255.97)  1.563 ms  1.589 ms  1.566 ms
 3 mcgill-gw-qix.risq.net (206.167.128.57)  24.644 ms  2.096 ms  1.810 ms
 4 mcgill-qix.dmtrl-rq.risq.net (132.202.52.89)  1.806 ms  2.081 ms  1.929 ms
 5 imtrl-uq.risq.net (192.77.55.245)  2.003 ms  2.182 ms  1.860 ms
 6 mtrl2rtr2.canarie.ca (199.212.24.82)  1.856 ms  1.983 ms  1.769 ms
 7 nyiix.bas1-m.nyc.yahoo.com (198.32.160.121)  14.599 ms  39.973 ms  16.381 ms
 8 ae-1.pat2.bfw.yahoo.com (216.115.111.26)  26.588 ms  26.930 ms  25.025 ms
 9 et-18-0-0.pat1.bfz.yahoo.com (74.6.227.154)  24.745 ms  24.949 ms
   et-18-0-0.pat2.bfz.yahoo.com (74.6.227.158)  26.457 ms
10 et-19-1-1.msr1.bf1.yahoo.com (74.6.227.135)  48.337 ms  25.069 ms  24.738 ms
11 unknown-74-6-122-x.yahoo.com (74.6.122.89)  24.913 ms
   et-0-1-1.clr1-a-gdc.bf1.yahoo.com (74.6.122.15)  24.940 ms
   unknown-74-6-122-x.yahoo.com (74.6.122.59)  26.577 ms
12 po7.fab1-1-gdc.bf1.yahoo.com (72.30.22.1)  25.160 ms
   po8.fab6-1-gdc.bf1.yahoo.com (72.30.22.43)  32.015 ms
   po8.fab1-1-gdc.bf1.yahoo.com (72.30.22.33)  27.156 ms
13 po-9.bas2-10-prd.bf1.yahoo.com (69.147.72.145)  25.503 ms
   po-16.bas2-10-prd.bf1.yahoo.com (69.147.72.161)  25.641 ms  25.708 ms
14 w2.src.vip.bf1.yahoo.com (74.6.50.150)  26.465 ms  26.864 ms  26.412 ms
wpa164080:~ ravikrishna$

```

Figure 2.2: Linux traceroute

Traceroutes for both Windows and Linux show the path travelled by a packet from source (laptop/McGill desktop) to destination (www.yahoo.ca). Both Windows and Linux use three packets that have certain values of time to live (TTL), which increases as the number of hops increases. The maximum number of hops on both Windows and Linux is, by default, 30. As the packets traverse through different routers, the routers decrement TTL values by one and removes data packets when TTL is 0. This is when ICMP time exceeded error occurs [1]. Both versions also show IP addresses at each intermediate route (with reverse DNS lookup).

There are some differences in the operation of traceroutes between Windows and Linux as seen in Table 2.1:

Windows	Linux
Command: 'tracert'	Command: 'traceroute'
Uses ICMP (Internet Control Message Protocol)	Uses UDP (User Datagram Protocol) with higher port number
'-d' used to remove reverse DNS lookup	'-n' used to remove reverse DNS lookup

Table 2.1: Differences between Windows and Linux traceroutes

2.2. Traceroutes to six servers

In this section of the experiment, we used Ravi's personal laptop (MacBook Air) with Wi-Fi connection to wpa.mcgill.ca on two different days: 14th September and 18th September. The six servers chosen were:

1. Carleton University (traceroute.physics.carleton.ca/)
2. Princeton University (net.princeton.edu)
3. Stanford University (slac.stanford.edu)
4. Japan - (www.tumori.nu)
5. Australia - (www.telstra.net)
6. Brazil - (ping.unesp.br)

The traceroute outputs can be seen in Appendix 7.1.

2.3. Analysis of traceroutes to six servers

Overall, 24 measurements were taken during two different days from the laptop to the six servers and vice-versa. The following observations were made from these measurements:

2.3.1. Asymmetrical paths

Both paths (to and from our laptop and servers) were seen to be asymmetrical by observing the paths in Appendix (7.1). However, there are few domain names, which are quite similar and through which paths traverse having different IP addresses. This happens to maintain load balance

of servers on a particular ISP network infrastructure by using different routers. Table 2.2 shows an example of paths to-and-fro Princeton University with similar domain names for ISPs.

To Princeton University	From Princeton University
internet1-vlan876.gw.mcgill.ca (132.216.255.97)	core-87-router (128.112.128.2)
mtrl2rtr1.canarie.ca (205.189.32.250)	local1.princeton.magpi.net (216.27.98.113)
remote1.princeton.magpi.net (216.27.98.114)	mtrl2rtr1.canarie.ca (205.189.32.94)
core-87-router.princeton.edu (128.112.12.130)	access1-vlan876.gw.mcgill.ca (132.216.255.96)

Table 2.2: Similar domain names for paths to-and-fro Princeton University

2.3.2. *Multiple routes to same destination*

By observing the results in Appendix (7.1), we noticed that there were cases where multiple routes were being taken to the same destination. For example, while performing traceroute to-and-fro Australia (www.telstra.net) in Appendix (7.1.e.i.1), we observed that for the 9th and 11th hops, there were multiple routes being taken.

2.3.3. *Completion of traceroutes and unresponsive routers*

From the results in Appendix (7.1), we observed that the paths from our laptop to the six servers completed the routes and paths from the six servers to our laptop did not complete the routes because of McGill's firewalls that block the incoming UDP/ICMP packets. There was also an exception for traceroute from Carleton University where the last observed IP address was 10.30.58.1, which means that the packets did not reach the destination. The following Table 2.3 shows the unresponsive routers to-and-fro all six servers:

	To (Hops)	From (Hops)
Carleton	0	Can't determine
Princeton	0	Minimum 3
Stanford	0	Minimum 4

Japan	1	Minimum 1
Brazil	2	Minimum 1
Australia	0	Minimum 1

Table 2.3: Unresponsive Routers

2.3.4. Servers located on different continents

For servers on different continents, the hops were determined by observing the sudden jump in round-trip time values.

1. Japan:

- a. 8th hop: 100ge4-1.core1.sea1.he.net - 78.316ms (in Seattle, WA)
- b. 9th hop: 111ge8.core1.tyo1.he.net - 172.880ms (in Tokyo, Japan)

2. Australia:

- a. 9th hop: i-0-4-0-12.paix-core01.bi.telstraglobal.net (202.84.251.102) - 84.027ms (in Hong Kong)
- b. 10th hop: i-21.sydp-core04.bx.telstraglobal.net (202.84.136.193) - 218.635ms (in Sydney, Australia)

3. Brazil:

- a. 9th hop: 198.32.252.133 - 77.395 ms (in Florida, Miami)
- b. 12th hop: 200.145.255.46 - 185.332 ms (in Sao Paulo, Brazil)

2.3.5. Changes in traceroutes on different days

We observed some changes in traceroutes to the same destination on different days. For example, traceroutes from Australia (www.telstra.net) had 19 hops on 14th September and 20 hops on 18th September (1 additional route). Also, traceroutes from Japan (www.tumori.nu) had different routes on 14th and 18th September. These measurements can be seen in Appendix (7.1).

3. Ping

Ping is used in computing the final round-trip times from a destination point on an IP network [2]. We used ping to measure the round-trip time (RTT) to each of the six servers using the same laptop (MacBook Air) with the same Wi-Fi network (wpa.mcgill.ca). Ping outputs can be seen in Appendix (section 7.2).

3.1 Summary

Table 3.1 shows the minimum, maximum, mean, median and standard deviation of the round-trip time (RTT) to all six servers while performing ping measurements.

Location	Maximum (ms)	Minimum (ms)	Mean (ms)	Median (ms)	Standard Deviation (ms)
Princeton	19.636	17.372	18.186	18.1845	0.442
Stanford	184.998	81.833	88.239	82.65	20.079
Carleton	26.989	9.053	10.53	10.013	3.093
Japan	206.193	196.492	198.231	197.7235	1.704
Brazil	195.667	181.507	183.549	182.593	2.996
Australia	348.67	231.553	277.278	275.4505	38.523

Table 3.1: Ping Statistics Summary

3.2. Round Trip Times and Delay Types

Since modern networks generally use high bandwidth links, we assumed transmission delay to be very low. As the processing delay is usually on the order of microseconds, it should also be negligible [3]. Given the small size of an ICMP echo packet, the ping RTTs that we measure usually comprises of both queueing and propagation delay [3].

While pinging to Stanford University, propagation delay takes up a large portion of the average delay. Same observations were made for the servers in Japan, Brazil, and Australia which are across the continent.

For Carleton University and Princeton University, propagation delays were less when compared with respect to their distances from McGill. For these cases, the average delay is likely to be queueing delay. However, for Australia, which has a standard deviation of 38.523ms and assuming that propagation delay is almost constant, variation in RTT is most likely due to the queueing delay.

3.3 Round Trip Times, Time to Live, and Geographic Distances

From Table 3.3-1 and Figure 3.3-2, we can observe an approximately linear relationship between the geographic distance from McGill and the ping RTT. However, we can see a pattern between ping RTT and the distance which is not a perfect correlation. This could be due to queueing and propagation delays and can be concluded that these are the few main factors affecting the overall ping delay.

Location	Distance from McGill (km)	Average Ping RTT (ms)
Carleton	166	10.53
Princeton	581	18.186
Stanford	4087	88.239
Brazil	6999	183.549
Japan	10396	198.231
Australia	16716	277.278

Table 3.3-1: Average Ping RTT vs. Distance from McGill

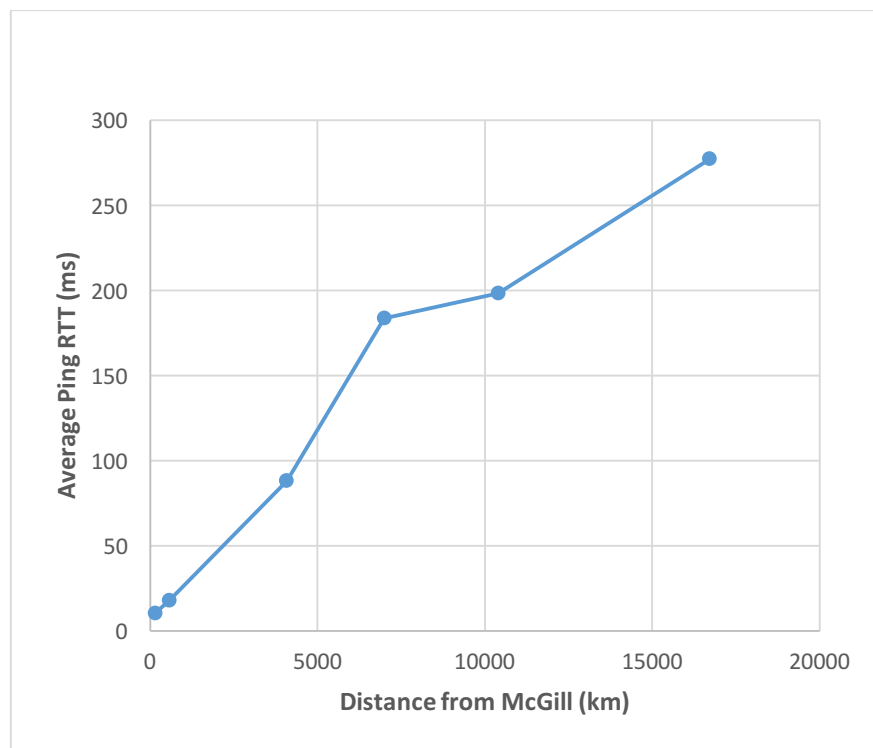


Figure 3.3-2: Average Ping RTT vs. Distance from McGill

3.4 Comparison with Traceroute

From Table 3.4, we can observe that the ping RTT and TTL measurements are similar to those collected from traceroute. We compared geographic distances to the difference between ping TTL and the assumed starting TTL, which was either 64, 128 or 255, depending on the byte headers. However, the values are not exactly the same as the measurements from traceroute. Factors affecting this could be queuing delay and the response time differences for UDP (for traceroute) and ICMP (for ping) packets.

For the TTL measurements, there are few variations because McGill's network gets acknowledged in the ping TTL, but does not show up on the return traceroute. Traceroutes that have McGill's network to be visible, show less issues. For such cases, it is expected that the ping TTL will have a negligible deviation than the traceroute TTL.

Location	Distance from McGill (km)	Ping TTL	Starting Ping TTL (estimated)	Difference in Ping TTL (estimated)	Average Ping RTT (ms)	Average Traceroute RTT (ms)	Number of Traceroute Return Hops (estimated)
Carleton	166	239	255	16	10.53	9.18	8
Princeton	581	245	255	10	18.186	18.51	11
Stanford	4087	237	255	18	88.239	82.07	14
Brazil	6999	52	64	12	183.549	184.11	12
Japan	10396	43	64	21	198.231	197.4	15
Australia	16716	108	128	20	277.278	232.04	15

Table 3.4: Ping-Traceroute RTT and TTL Comparison

4. Wireshark

We used Wireshark as a tool to measure the average throughput for a video. We streamed a YouTube video at different quality levels (360p and 1080p) and statistical analysis were conducted using Microsoft Excel and Wireshark results.

The testing was performed on Ravi's personal laptop (MacBook Air) with Wi-Fi connection to wpa.mcgill.ca, around 1:30pm on 17th September 2016.

4.1 Stream Identification

We ran the video for about 1 minute to 1:30 minutes, which is the capture length. Once we captured the Wireshark statistics, we used the following commands as filters: `ip.dst == 142.157.164.38 && ip.src == 206.167.212.78` to identify YouTube data packets. These filters helped us remove all traffic except traffic destined from 206.167.212.78, which is most likely YouTube's IP address, and to 142.157.164.38, which is the IP address of our machine. We assumed 206.167.212.78 as the source IP as it was using QUIC protocol and most of the packets were of length 1392 bytes.

4.2 Packet Statistics

The HTTP experiments had much lower packet length than those of the YouTube video streaming packets. For the HTTP experiments, the responses from the server usually comprised of a single data packet that had less bytes (between 100-500). On the other hand, the YouTube video had video/audio data packets of around 1392 bytes. The maximum size of an Ethernet frame is 1514 bytes, which consists of a 14-byte header and 1500 bytes of data [3]. Packets that were from YouTube audio/video stream were generally of different sizes, varying from 70 bytes to 1392 bytes, most packets being close to 1392 bytes.

4.3 Throughput

The average throughput statistics are given in table 4.3. We concluded these values by exporting the Wireshark capture data to Excel. Firstly, to deduce the average throughput, we calculated the total YouTube data received over the total time period. Secondly, to calculate the packet arrival rate, we measured the total YouTube packets received over the total time period.

Quality/stream	Average Throughput (Mbps)	Packet arrival rate (packets/sec)
360p	0.4388	302.2
1080p	0.1433	97.2

Table 4.3: Video streaming statistics

4.4 Assumptions for video streaming

Our hypothesis was to assume that the throughput would increase with increase in video quality. Data should be downloaded at a higher rate for higher quality videos to maintain continuous streaming. Therefore, there should be a corresponding increase in packet arrival rate as well with an increase in video quality.

4.5 Results

As mentioned in Table 4.3, the average throughput increased for 1080p (0.4388Mbps) from 360p (0.1433Mbps). The packet arrival rate increased as well for 1080p (302.2 packets/s) from 360p (97.2 packets/s). Hence, our hypothesis for video streaming in section 4.4 was correct as the results collaborate with the assumptions.

5. Discussion

The results and analysis for this experiment are listed and documented in Sections 2, 3 and 4 along with the raw outputs in Appendix 7.1 and 7.2. We were able to successfully perform traceroutes and pings to the six servers on www.traceroute.org and use Wireshark to monitor YouTube data packets to calculate throughput and packet arrival rate.

The main problems we encountered during this experiment were:

- challenges in identifying the YouTube audio/video stream, because of other protocols that were present in the capture,
- failure to execute all the traceroutes from the six servers mentioned on www.traceroute.org to McGill desktop machines due to McGill's network firewall,
- failure to run ping or traceroute using the McGill desktop machines for which we used a personal laptop for the experimentation and measurements.

The lab work was divided according to the following table 5.1:

Haimonti Das	<ul style="list-style-type: none"> ○ Data collection for Traceroute and Ping components ○ HTTP measurements and Ping analysis ○ Documentation: sections of Ping, Wireshark and Discussion
Ravi Chaganti	<ul style="list-style-type: none"> ○ Data collection for Traceroute, Ping and Wireshark; ○ Traceroute and Wireshark data analysis ○ Documentation: sections of Introduction and Traceroute

Table 5.1: Workload breakdown

Upon repeating this experiment, we would prefer to use a public server, which is more accessible without firewalls, to perform traceroutes from the six servers on www.traceroute.org. We would also use a HTML5 video stream rather than a YouTube video to enable an easier identification process of YouTube data packets and its IP address.

6. References

[1] North American Network Operator's Group, 'A Practical Guide to (Correctly) A Practical Guide to (Correctly) Troubleshooting with Traceroute', 2015. [Online]. Available: https://www.nanog.org/meetings/nanog45/presentations/Sunday/RAS_traceroute_N45.pdf. [Accessed: 27-Sep-2015].

[2] J. Kurose and K. Ross, *Computer networking*, 6th ed. Boston: Pearson, 2013.

[3] SpeedGuide, 'Is an Ethernet frame/packet 1500 or 1514 bytes?'. [Online]. Available: <http://www.speedguide.net/faq/is-an-ethernet-framepacket-1500-or-1514-bytes-450>. [Accessed: 27-Sep-2015].

7. Appendix

7.1. Traceroutes to and from six servers

a. Carleton University

i. To Carleton University

1. 14th September

```
wpa164030:~ ravikrishna$ date
Wed 14 Sep 2016 14:56:13 EDT
wpa164030:~ ravikrishna$ traceroute -m 30 134.117.14.1
traceroute to 134.117.14.1 (134.117.14.1), 30 hops max, 52 byte packets
 1 gateway (142.157.164.3)  4.126 ms  1.752 ms  1.604 ms
 2 internet1-vlan876 (132.216.255.97)  1.671 ms  4.625 ms  1.775 ms
 3 mcgill-gw-canet.risq.net (206.167.128.49)  1.967 ms  2.806 ms  1.915 ms
 4 mcgill-canet.dmtrl-rq.risq.net (132.202.32.89)  2.017 ms  1.817 ms  1.929 ms
 5 canet-rq.risq.net (132.202.80.10)  85.033 ms  3.735 ms  4.243 ms
 6 mtrl2rtr1.canarie.ca (205.189.32.250)  2.123 ms  2.320 ms  2.026 ms
 7 be204.pe01-otwa.orion.on.ca (205.189.32.229)  12.066 ms  16.281 ms  16.558 ms
 8 carleton-orion-rne.dist1-otwa.ip.orion.on.ca (66.97.23.142)  12.741 ms  9.553 ms  9.248 ms
 9 * * *
10 * * *
11 * * *
12 * * *
13 * * *
14 * * *
15 * * *
16 * * *
17 * * *
18 * * *
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25 * * *
26 * * *
27 * * *
28 * * *
29 * * *
30 * * *
wpa164030:~ ravikrishna$ █
```

2. 18th September

```
wpa164080:~ ravikrishna$ date
Sun 18 Sep 2016 18:52:36 EDT
wpa164080:~ ravikrishna$ traceroute -m 30 134.117.14.1
traceroute to 134.117.14.1 (134.117.14.1), 30 hops max, 52 byte packets
 1 gateway (142.157.164.3)  2.880 ms  1.636 ms  1.554 ms
 2 internet1-vlan876.gw.mcgill.ca (132.216.255.97)  1.715 ms  1.616 ms  1.575 ms
 3 mcgill-gw-canet.risq.net (206.167.128.49)  1.969 ms  2.125 ms  1.795 ms
 4 mcgill-canet.dmtrl-rq.risq.net (132.202.32.89)  1.885 ms  2.019 ms  1.705 ms
 5 canet-rq.risq.net (132.202.80.10)  2.715 ms  1.859 ms  1.871 ms
 6 mtrl2rtr1.canarie.ca (205.189.32.250)  2.083 ms  2.233 ms  1.876 ms
 7 be204.pe01-otwa.orion.on.ca (205.189.32.229)  9.894 ms  9.591 ms  9.621 ms
 8 carleton-orion-rne.dist1-otwa.ip.orion.on.ca (66.97.23.142)  9.127 ms  9.369 ms  9.055 ms
 9 * * *
10 * * *
11 * * *
12 * * *
13 * * *
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16 * * *
17 * * *
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29 * * *
30 * * *
wpa164080:~ ravikrishna$
```

ii. From Carleton University

1. Time: 15:04:22 Wed 14 Sep 2016

```
traceroute to 142.157.164.15 (142.157.164.15), 30 hops max, 40 byte packets
 1 unix-gate.physics.carleton.ca (134.117.14.1)  2.147 ms  1.543 ms  1.307 ms
 2 10.50.254.3 (10.50.254.3)  1.599 ms  1.714 ms  1.329 ms
 3 10.30.34.1 (10.30.34.1)  1.547 ms  1.311 ms  10.30.33.1 (10.30.33.1)  1.328 ms
 4 10.30.55.1 (10.30.55.1)  1.687 ms  1.548 ms  2.182 ms
 5 134.117.254.242 (134.117.254.242)  2.055 ms  1.713 ms  1.310 ms
 6 10.30.58.1 (10.30.58.1)  45.564 ms  1.431 ms  1.352 ms
 7 * * *
 8 * * *
 9 * * *
```

2. Time: 19:01:12 Sun 18 Sep 2016

```
traceroute to 142.157.164.80 (142.157.164.80), 30 hops max, 40 byte packets
 1 unix-gate.physics.carleton.ca (134.117.14.1)  2.593 ms  1.358 ms  1.177 ms
 2 10.50.254.3 (10.50.254.3)  1.380 ms  1.565 ms  1.275 ms
 3 10.30.34.1 (10.30.34.1)  1.250 ms  0.992 ms  0.580 ms
 4 10.30.53.1 (10.30.53.1)  0.777 ms  0.773 ms  0.687 ms
 5 134.117.254.242 (134.117.254.242)  0.886 ms  1.043 ms  0.804 ms
 6 10.30.58.1 (10.30.58.1)  1.964 ms  1.033 ms  0.947 ms
 7 * * *
 8 * * *
 9 * * *
```

b. Princeton University

i. To Princeton University

1. 14th September

```
wpa164030:~ ravikrishna$ date
Wed 14 Sep 2016 15:27:20 EDT
wpa164030:~ ravikrishna$ traceroute www.net.princeton.edu
traceroute to www.net.princeton.edu (128.112.128.55), 64 hops max, 52 byte packets
 1 gateway (142.157.164.3)  2.303 ms  1.828 ms  1.680 ms
 2 internet1-vlan876 (132.216.255.97)  1.716 ms  1.479 ms  1.408 ms
 3 mcgill-gw-canet.risq.net (206.167.128.49)  3.474 ms  1.856 ms  3.888 ms
 4 mcgill-canet.dmtrl-rq.risq.net (132.202.32.89)  2.293 ms  2.012 ms  1.931 ms
 5 canet-rq.risq.net (132.202.80.10)  2.089 ms  2.420 ms  3.425 ms
 6 mtrl2rtr1.canarie.ca (205.189.32.250)  2.934 ms  2.194 ms  2.015 ms
 7 rtr.newy32aoa.net.internet2.edu (205.189.32.93)  24.888 ms  17.450 ms  15.187 ms
 8 216.27.100.5 (216.27.100.5)  15.877 ms  20.663 ms  16.054 ms
 9 remote1.princeton.magpi.net (216.27.98.114)  18.259 ms  18.391 ms  18.064 ms
10 core-87-router.princeton.edu (128.112.12.130)  18.092 ms  17.922 ms  18.063 ms
11 www.net.princeton.edu_ (128.112.128.55)  17.713 ms  17.883 ms  19.934 ms
```

2. 18th September

```
wpa164080:~ ravikrishna$ date
Sun 18 Sep 2016 19:06:04 EDT
wpa164080:~ ravikrishna$ traceroute www.net.princeton.edu
traceroute to www.net.princeton.edu (128.112.128.55), 64 hops max, 52 byte packets
 1 gateway (142.157.164.3)  2.147 ms  1.480 ms  1.293 ms
 2 internet1-vlan876.gw.mcgill.ca (132.216.255.97)  158.713 ms  2.738 ms  204.663 ms
 3 mcgill-gw-canet.risq.net (206.167.128.49)  1.852 ms  25.593 ms  3.649 ms
 4 mcgill-canet.dmtrl-rq.risq.net (132.202.32.89)  1.750 ms  1.907 ms  3.484 ms
 5 canet-rq.risq.net (132.202.80.10)  1.927 ms  1.859 ms  1.749 ms
 6 mtrl2rtr1.canarie.ca (205.189.32.250)  1.841 ms  1.862 ms  1.800 ms
 7 rtr.newy32aoa.net.internet2.edu (205.189.32.93)  13.643 ms  13.990 ms  13.694 ms
 8 216.27.100.5 (216.27.100.5)  16.332 ms  16.498 ms  15.687 ms
 9 remote1.princeton.magpi.net (216.27.98.114)  17.142 ms  17.259 ms  17.577 ms
10 core-87-router.princeton.edu (128.112.12.130)  18.002 ms  17.810 ms  18.372 ms
11 www.net.princeton.edu (128.112.128.55)  17.681 ms  17.826 ms  18.181 ms
wpa164080:~ ravikrishna$ █
```

ii. From Princeton University
1. Time: 15:23:32 Wed 14 Sep 2016

tracing path from www.net.princeton.edu to 142.157.164.15 ...

```

traceroute to 142.157.164.15 (142.157.164.15), 30 hops max, 40 byte packets
 1 core-87-router (128.112.128.2)  0.596 ms  0.488 ms  0.473 ms
 2 border-87-router (128.112.12.142)  16.785 ms  0.797 ms  0.676 ms
 3 locall.princeton.magpi.net (216.27.98.113)  2.020 ms  1.896 ms  1.798 ms
 4 216.27.100.6 (216.27.100.6)  3.964 ms  3.929 ms  3.915 ms
 5 mtrl2rtrl.canarie.ca (205.189.32.94)  16.051 ms  16.191 ms  15.847 ms
 6 205.189.32.249 (205.189.32.249)  16.131 ms  15.941 ms  16.422 ms
 7 * * *
 8 * * *
 9 * * *
10 access1-vlan876.gw.mcgill.ca (132.216.255.96)  18.846 ms  16.787 ms  16.569 ms
11 * * *
12 * * *
13 * * *
14 * * *
15 * * *
16 * * *
17 * * *
18 * * *
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```

Done.

2. Time: 13:28:17 Wed 21 Sep- 2016

```

traceroute to 142.157.164.15 (142.157.164.15), 30 hops max, 40 byte packets
 1 core-87-router (128.112.128.2)  0.933 ms  0.692 ms  0.425 ms
 2 border-87-router (128.112.12.142)  0.859 ms  0.727 ms  0.734 ms
 3 locall.princeton.magpi.net (216.27.98.113)  1.774 ms  1.879 ms  1.806 ms
 4 216.27.100.6 (216.27.100.6)  31.531 ms  31.498 ms  31.300 ms
 5 mtrl2rtrl.canarie.ca (205.189.32.94)  43.408 ms  43.486 ms  43.668 ms
 6 205.189.32.249 (205.189.32.249)  43.705 ms  44.065 ms  43.517 ms
 7 * * *
 8 * * *
 9 * * *
10 access1-vlan876.gw.mcgill.ca (132.216.255.96)  55.358 ms  168.810 ms  122.514 ms
11 * * *
12 * * *
13 * * *
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```

Done.

c. Stanford University

i. From Stanford University

1. Time: 15:09:18 Wed 14 Sep 2016

```

traceroute to 142.157.164.15 (142.157.164.15), 30 hops max, 40 byte packets
 1  rtr-servcore1-serv01-webserv.slac.stanford.edu (134.79.197.130) 0.944 ms 1.671 ms 0.674 ms
 2  rtr-core1-p2p-serv01-01.slac.stanford.edu (134.79.253.249) 0.508 ms 0.354 ms 0.395 ms
 3  rtr-fwcore2-trust-p2p-core2.slac.stanford.edu (134.79.254.146) 0.805 ms 0.803 ms 0.815 ms
 4  rtr-core2-p2p-fwcore2-untrust.slac.stanford.edu (134.79.254.149) 0.923 ms 0.799 ms 0.816 ms
 5  rtr-border1-p2p-core2.slac.stanford.edu (134.79.252.137) 1.088 ms 0.954 ms rtr-border1-p2p-core1.slac.stanford.edu (134.79.252.133) 1.097 ms
 6  rtr-border2-p2p-border1.slac.stanford.edu (192.68.191.253) 1.576 ms 1.620 ms 1.382 ms
 7  sunncr5-ip-c-slac.slac.stanford.edu (192.68.191.233) 1.764 ms 1.713 ms 1.796 ms
 8  sacrcr5-ip-a-sunncr5.es.net (134.55.40.5) 4.325 ms 4.240 ms 4.623 ms
 9  * denvr5-ip-a-sacrcr5.es.net (134.55.50.202) 25.429 ms 25.361 ms
10  kanscr5-ip-a-denvcr5.es.net (134.55.49.58) 36.199 ms 35.833 ms 35.868 ms
11  chiccr5-ip-a-kanscr5.es.net (134.55.43.81) 46.789 ms 46.811 ms 46.468 ms
12  washcr5-ip-a-chiccr5.es.net (134.55.36.46) 63.998 ms 63.806 ms 63.892 ms
13  * * *
14  198.124.216.198 (198.124.216.198) 80.803 ms 80.806 ms 80.647 ms
15  imtrl-rq.risq.net (205.189.32.249) 80.697 ms 119.400 ms 81.170 ms
16  * * *
17  * * *
18  * * *
19  access1-vlan876.gw.mcgill.ca (132.216.255.96) 82.347 ms 81.447 ms 83.547 ms
20  * * *
21  * * *
22  * * *
23  * * *
24  * * *
25  * * *
26  * * *
27  * * *
28  * * *
29  * * *
30  * * *

```

2. Time: 19:14:42 Sun 18 Sep 2016

```

traceroute to 142.157.164.80 (142.157.164.80), 30 hops max, 40 byte packets
 1  rtr-servcore1-serv01-webserv.slac.stanford.edu (134.79.197.130) 18.696 ms 0.981 ms 0.674 ms
 2  rtr-core1-p2p-serv01-01.slac.stanford.edu (134.79.253.249) 0.499 ms 0.379 ms 0.524 ms
 3  rtr-fwcore2-trust-p2p-core2.slac.stanford.edu (134.79.254.146) 1.693 ms 0.986 ms 0.820 ms
 4  rtr-core2-p2p-fwcore2-untrust.slac.stanford.edu (134.79.254.149) 1.025 ms 0.902 ms 0.961 ms
 5  rtr-border1-p2p-core2.slac.stanford.edu (134.79.252.137) 1.788 ms 1.010 ms *
 6  sunncr5-ip-c-slac.slac.stanford.edu (192.68.191.233) 1.682 ms 1.702 ms 1.660 ms
 7  sacrcr5-ip-a-sunncr5.es.net (134.55.40.5) 4.176 ms 4.288 ms 4.179 ms
 8  denvr5-ip-a-sacrcr5.es.net (134.55.50.202) 25.161 ms 25.280 ms 25.161 ms
 9  kanscr5-ip-a-denvcr5.es.net (134.55.49.58) 35.802 ms 35.742 ms 35.734 ms
10  chiccr5-ip-a-kanscr5.es.net (134.55.43.81) 46.846 ms 46.756 ms 46.718 ms
11  chiccr5-ip-a-kanscr5.es.net (134.55.43.81) 46.920 ms 46.877 ms 46.564 ms
12  washcr5-ip-a-chiccr5.es.net (134.55.36.46) 63.947 ms 63.915 ms 63.897 ms
13  * * 198.124.216.198 (198.124.216.198) 80.663 ms
14  imtrl-rq.risq.net (205.189.32.249) 81.773 ms 80.512 ms 80.571 ms
15  * * *
16  * * *
17  * * *
18  * * *
19  access1-vlan876.gw.mcgill.ca (132.216.255.96) 81.493 ms 81.464 ms *
20  * * *
21  * * *
22  * * *
23  * * *
24  * * *
25  * * *
26  * * *
27  * * *
28  * * *
29  * * *
30  * * *

```

ii. To Stanford University
1. 14th September

```
wpa164030:~ ravikrishna$ date
Wed 14 Sep 2016 15:18:50 EDT
wpa164030:~ ravikrishna$ traceroute -m 25 134.79.197.230
traceroute to 134.79.197.230 (134.79.197.230), 25 hops max, 52 byte packets
 1 gateway (142.157.164.3) 2.118 ms 2.489 ms 2.306 ms
 2 internet1-vlan876 (132.216.255.97) 1.809 ms 2.562 ms 2.292 ms
 3 mcgill-gw-canet.risq.net (206.167.128.49) 2.325 ms 1.890 ms 1.991 ms
 4 mcgill-canet.dmtl-rq.risq.net (132.202.32.89) 2.945 ms 9.113 ms 2.791 ms
 5 canet-rq.risq.net (132.202.80.10) 14.264 ms 3.865 ms 2.519 ms
 6 mtr12rtr1.canarie.ca (205.189.32.250) 2.589 ms 2.626 ms 2.172 ms
 7 aofacr5-canet-montreal.es.net (198.124.216.197) 14.823 ms 15.166 ms 14.758 ms
 8 washcr5-ip-a-aofacr5.es.net (134.55.36.34) 21.396 ms 19.494 ms 21.204 ms
 9 chiccr5-ip-a-washcr5.es.net (134.55.36.45) 36.661 ms 37.433 ms 38.720 ms
10 kanscr5-ip-a-chiccr5.es.net (134.55.43.82) 49.991 ms 47.541 ms 47.546 ms
11 denvcr5-ip-a-kanscr5.es.net (134.55.49.57) 58.036 ms 58.192 ms 57.935 ms
12 sacrcr5-ip-a-denvcr5.es.net (134.55.50.201) 78.909 ms 82.850 ms 79.366 ms
13 sunnecr5-ip-a-sacrcr5.es.net (134.55.40.6) 81.734 ms 81.610 ms 81.949 ms
14 rtr-border2-p2p-sunn-cr5.slac.stanford.edu (192.68.191.234) 82.064 ms 82.190 ms 81.981 m
15 * * *
16 * * *
17 * * *
18 * * *
19 * * *
20 * * *
21 * * *
22 * * *
23 * * *
24 * * *
25 * * *
```

2. 18th September

```
wpa164080:~ ravikrishna$ date
Sun 18 Sep 2016 19:27:17 EDT
wpa164080:~ ravikrishna$ traceroute -m 25 134.79.197.230
traceroute to 134.79.197.230 (134.79.197.230), 25 hops max, 52 byte packets
 1 gateway (142.157.164.3) 3.263 ms 2.061 ms 4.527 ms
 2 internet1-vlan876.gw.mcgill.ca (132.216.255.97) 1.625 ms 1.482 ms 1.501 ms
 3 mcgill-gw-canet.risq.net (206.167.128.49) 1.846 ms 2.038 ms 1.874 ms
 4 mcgill-canet.dmtl-rq.risq.net (132.202.32.89) 1.930 ms 2.148 ms 1.883 ms
 5 canet-rq.risq.net (132.202.80.10) 2.031 ms 2.020 ms 1.723 ms
 6 mtr12rtr1.canarie.ca (205.189.32.250) 1.815 ms 2.144 ms 1.927 ms
 7 aofacr5-canet-montreal.es.net (198.124.216.197) 14.304 ms 14.190 ms 13.877 ms
 8 washcr5-ip-a-aofacr5.es.net (134.55.36.34) 19.063 ms 20.085 ms 19.907 ms
 9 chiccr5-ip-a-washcr5.es.net (134.55.36.45) 36.235 ms 36.607 ms 36.282 ms
10 kanscr5-ip-a-chiccr5.es.net (134.55.43.82) 47.175 ms 47.574 ms 47.340 ms
11 denvcr5-ip-a-kanscr5.es.net (134.55.49.57) 58.749 ms 58.390 ms 58.024 ms
12 sacrcr5-ip-a-denvcr5.es.net (134.55.50.201) 78.816 ms 78.955 ms 78.862 ms
13 sunnecr5-ip-a-sacrcr5.es.net (134.55.40.6) 81.356 ms 81.507 ms 81.291 ms
14 rtr-border2-p2p-sunn-cr5.slac.stanford.edu (192.68.191.234) 82.009 ms 85.440 ms 82.162 ms
15 * * *
16 * * *
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21 * * *
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25 * * *
wpa164080:~ ravikrishna$
```

d. Japan - www.tumori.nu**i. From Japan****1. Time: 15:31:12 Wed 14 Sep 2016**

```

traceroute:
 1 [AS4685] hirnij31.asahi-net.or.jp (124.155.65.228) 1.997 ms 2.190 ms 1.943 ms
 2 [AS4685] hirnirb-ge0.asahi-net.or.jp (124.155.65.254) 2.476 ms 2.634 ms 2.550 ms
 3 [AS4685] tkybi5-v9.asahi-net.or.jp (124.155.64.1) 18.424 ms 14.822 ms 24.306 ms
 4 [AS4685] tkyni92.asahi-net.or.jp (202.224.32.92) 15.953 ms 16.223 ms 16.359 ms
 5 [AS2914] xe-0-2-0-30.r01.tokyojp05.jp.bb.gin.ntt.net (61.120.145.165) 16.865 ms 17.099 ms 16.442 ms
 6 [AS2914] ae-7.r31.tokyojp05.jp.bb.gin.ntt.net (129.250.7.88) 15.924 ms
   [AS2914] ae-7.r30.tokyojp05.jp.bb.gin.ntt.net (129.250.7.84) 16.510 ms
   [AS2914] ae-7.r31.tokyojp05.jp.bb.gin.ntt.net (129.250.7.88) 16.464 ms
 7 [AS2914] ae-1.r23.snjsca04.us.bb.gin.ntt.net (129.250.2.46) 117.493 ms 122.567 ms
   [AS2914] ae-4.r23.lsanca07.us.bb.gin.ntt.net (129.250.3.193) 124.039 ms
 8 [AS2914] ae-2.r01.lsanca07.us.bb.gin.ntt.net (129.250.4.107) 126.009 ms
   [AS2914] ae-41.r02.snjsca04.us.bb.gin.ntt.net (129.250.6.119) 132.257 ms 123.938 ms
 9 [AS174] be2914.ccr41.lax04.atlas.cogentco.com (154.54.10.29) 125.807 ms
   [AS174] be3052.ccr21.sjc03.atlas.cogentco.com (154.54.10.41) 133.012 ms
   [AS174] be2914.ccr41.lax04.atlas.cogentco.com (154.54.10.29) 123.947 ms
10 [AS174] be2964.ccr21.lax01.atlas.cogentco.com (154.54.44.77) 136.926 ms
   [AS174] be2000.ccr21.sjc01.atlas.cogentco.com (154.54.6.105) 124.076 ms
   [AS174] be2047.ccr22.sjc01.atlas.cogentco.com (154.54.5.113) 116.899 ms
11 [AS174] be2164.ccr21.sfo01.atlas.cogentco.com (154.54.28.33) 135.462 ms 127.659 ms 133.713 ms
12 [AS174] be2930.ccr21.elp01.atlas.cogentco.com (154.54.42.78) 143.922 ms
   [AS174] be2087.ccr21.slc01.atlas.cogentco.com (154.54.5.102) 141.057 ms 133.335 ms
13 [AS174] be2927.ccr21.iah01.atlas.cogentco.com (154.54.29.221) 165.096 ms 164.865 ms
   [AS174] be3037.ccr21.den01.atlas.cogentco.com (154.54.41.146) 176.794 ms
14 [AS174] be3035.ccr21.mci01.atlas.cogentco.com (154.54.5.90) 159.498 ms
   [AS174] be2687.ccr41.atl01.atlas.cogentco.com (154.54.28.69) 172.975 ms
   [AS174] be3035.ccr21.mci01.atlas.cogentco.com (154.54.5.90) 158.913 ms
15 [AS174] be2112.ccr41.dca01.atlas.cogentco.com (154.54.7.157) 189.511 ms 188.120 ms
   [AS174] be2831.ccr41.ord01.atlas.cogentco.com (154.54.42.166) 168.664 ms
16 [AS174] be2806.ccr41.jfk02.atlas.cogentco.com (154.54.40.105) 188.327 ms 188.312 ms 188.227 ms
17 [AS174] be2094.ccr21.bos01.atlas.cogentco.com (154.54.30.14) 193.796 ms 194.855 ms
   [AS174] be2878.ccr21.alb02.atlas.cogentco.com (154.54.26.130) 180.174 ms
18 [AS174] be2299.ccr21.bos01.atlas.cogentco.com (154.54.43.9) 177.805 ms
   [AS174] 38.99.222.138 (38.99.222.138) 182.769 ms 183.751 ms
19 [AS174] 38.99.222.138 (38.99.222.138) 175.929 ms 176.885 ms
   [AS0] vtelinnet-216-66-110-107.vermontel.net (216.66.110.107) 195.932 ms
20 [AS0] vtelinnet-216-66-110-107.vermontel.net (216.66.110.107) 196.254 ms
   [AS15318] access1-vlan677.gw.mcgill.ca (132.216.255.106) 195.022 ms 195.589 ms
21 [AS15318] access1-vlan677.gw.mcgill.ca (132.216.255.106) 205.173 ms 194.547 ms 195.663 ms
22 * * *
23 * * *
24 * * *
25 * * *

```

Completed.

2. Time: 19:33:47 Sun 18 Sep 2016

```

traceroute:
 1 [AS4685] hirnij31.asahi-net.or.jp (124.155.65.228) 2.228 ms 1.884 ms 2.001 ms
 2 [AS4685] hirnirb-ge0.asahi-net.or.jp (124.155.65.254) 2.394 ms 2.221 ms 2.517 ms
 3 [AS4685] tkybi5-v9.asahi-net.or.jp (124.155.64.1) 14.916 ms 15.940 ms 24.740 ms
 4 [AS4685] tkyini92.asahi-net.or.jp (202.224.32.92) 20.698 ms 16.486 ms 21.782 ms
 5 [AS2914] xe-0-2-0-30.r01.tokyjp05.jp.bb.gin.ntt.net (61.120.145.165) 16.767 ms 18.304 ms 16.785 ms
 6 [AS2914] ae-7.r30.tokyjp05.jp.bb.gin.ntt.net (129.250.7.84) 16.648 ms
 [AS2914] ae-7.r31.tokyjp05.jp.bb.gin.ntt.net (129.250.7.88) 16.874 ms
 [AS2914] ae-7.r30.tokyjp05.jp.bb.gin.ntt.net (129.250.7.84) 16.592 ms
 7 [AS2914] ae-4.r23.lsanca07.us.bb.gin.ntt.net (129.250.3.193) 123.693 ms 122.856 ms
 [AS2914] ae-1.r23.snjsca04.us.bb.gin.ntt.net (129.250.2.46) 124.397 ms
 8 [AS2914] ae-41.r02.snjsca04.us.bb.gin.ntt.net (129.250.6.119) 124.072 ms 118.665 ms
 [AS2914] ae-2.r01.lsanca07.us.bb.gin.ntt.net (129.250.4.107) 125.441 ms
 9 [AS174] be3052.ccr21.sjc03.atlas.cogentco.com (154.54.10.41) 122.065 ms
 [AS174] be2914.ccr41.lax04.atlas.cogentco.com (154.54.10.29) 125.088 ms
 [AS174] be3052.ccr21.sjc03.atlas.cogentco.com (154.54.10.41) 125.661 ms
10 [AS174] be2047.ccr22.sjc01.atlas.cogentco.com (154.54.5.113) 124.537 ms
 [AS174] be2965.ccr22.lax01.atlas.cogentco.com (154.54.45.1) 123.485 ms 123.643 ms
11 [AS174] be2165.ccr22.sfo01.atlas.cogentco.com (154.54.28.65) 125.824 ms 125.716 ms
 [AS174] be2931.ccr21.phx02.atlas.cogentco.com (154.54.44.85) 136.401 ms
12 [AS174] be2087.ccr21.slc01.atlas.cogentco.com (154.54.5.102) 136.828 ms
 [AS174] be2929.ccr21.elp01.atlas.cogentco.com (154.54.42.66) 144.368 ms
 [AS174] be2930.ccr21.elp01.atlas.cogentco.com (154.54.42.78) 143.717 ms
13 [AS174] be3037.ccr21.den01.atlas.cogentco.com (154.54.41.146) 166.288 ms
 [AS174] be2927.ccr21.iah01.atlas.cogentco.com (154.54.29.221) 163.885 ms 162.889 ms
14 [AS174] be2687.ccr41.atl01.atlas.cogentco.com (154.54.28.69) 181.133 ms 180.232 ms 180.700 ms
15 [AS174] be2831.ccr41.ord01.atlas.cogentco.com (154.54.42.166) 164.644 ms 160.272 ms
 [AS174] be2112.ccr41.dca01.atlas.cogentco.com (154.54.7.157) 186.790 ms
16 [AS174] be2806.ccr41.jfk02.atlas.cogentco.com (154.54.40.105) 175.033 ms
 [AS174] be2717.ccr21.cle04.atlas.cogentco.com (154.54.6.222) 174.630 ms 164.263 ms
17 [AS174] be2094.ccr21.bos01.atlas.cogentco.com (154.54.30.14) 194.680 ms
 [AS174] be2878.ccr21.alb02.atlas.cogentco.com (154.54.26.130) 185.651 ms
 [AS174] be2094.ccr21.bos01.atlas.cogentco.com (154.54.30.14) 193.202 ms
18 [AS174] 38.99.222.138 (38.99.222.138) 190.099 ms
 [AS174] be2299.ccr21.bos01.atlas.cogentco.com (154.54.43.9) 183.501 ms 182.276 ms
19 [AS174] 38.99.222.138 (38.99.222.138) 199.561 ms
 [AS0] vtelinet-216-66-110-107.vermontel.net (216.66.110.107) 195.989 ms
 [AS174] 38.99.222.138 (38.99.222.138) 201.374 ms
20 [AS15318] access1-vlan677.gw.mcgill.ca (132.216.255.106) 195.246 ms
 [AS0] vtelinet-216-66-110-107.vermontel.net (216.66.110.107) 196.860 ms 192.346 ms
21 * * [AS15318] access1-vlan677.gw.mcgill.ca (132.216.255.106) 219.201 ms
22 * * *
23 * * *
24 * * *
25 * * *

```

Completed.

ii. To Japan

1. 14th September

```

wpa164030:~ ravikrishna$ date
Wed 14 Sep 2016 15:35:15 EDT
wpa164030:~ ravikrishna$ traceroute www.tumori.nu
traceroute to vogue.tumori.nu (118.243.41.111), 64 hops max, 52 byte packets
 1 gateway (142.157.164.3) 3.285 ms 2.525 ms 1.818 ms
 2 internet2-vlan677 (132.216.255.107) 1.770 ms 2.506 ms 1.983 ms
 3 vteline2-216-66-110-108.vermontel.net (216.66.110.108) 14.718 ms 16.192 ms 14.313 ms
 4 10ge3-4.core1.nyc5.he.net (209.51.172.25) 14.679 ms 15.665 ms 16.965 ms
 5 10ge5-7.core1.nyc4.he.net (184.105.213.217) 14.788 ms 15.843 ms 18.921 ms
 6 100ge5-1.core1.chi1.he.net (184.105.223.161) 39.109 ms 31.329 ms 39.705 ms
 7 100ge14-2.core1.msp1.he.net (184.105.223.178) 39.284 ms 40.163 ms 49.670 ms
 8 100ge4-1.core1.sea1.he.net (184.105.223.193) 71.703 ms 72.401 ms 71.835 ms
 9 100ge8-1.core1.tyo1.he.net (184.105.213.118) 173.906 ms 176.523 ms 170.832 ms
10 * * *
11 tkyrt1.asahi-net.or.jp (202.224.32.67) 181.672 ms 181.981 ms 181.351 ms
12 tkybi5.asahi-net.or.jp (202.224.32.85) 182.030 ms 180.614 ms 180.602 ms
13 hirnr1b.asahi-net.or.jp (124.155.64.19) 194.183 ms 194.028 ms 194.292 ms
14 hirnrj31.asahi-net.or.jp (124.155.65.228) 195.160 ms 194.955 ms 194.726 ms
15 y041111.ppp.asahi-net.or.jp (118.243.41.111) 193.006 ms 197.658 ms 192.763 ms
wpa164030:~ ravikrishna$ █

```

2. 18th September

```

wpa164080:~ ravikrishna$ date
Sun 18 Sep 2016 19:39:05 EDT
wpa164080:~ ravikrishna$ traceroute www.tumori.nu
traceroute to vogue.tumori.nu (118.243.41.111), 64 hops max, 52 byte packets
 1 gateway (142.157.164.3) 1.928 ms 1.608 ms 1.583 ms
 2 internet2-vlan677.gw.mcgill.ca (132.216.255.107) 1.566 ms 1.581 ms 1.551 ms
 3 vteline2-216-66-110-108.vermontel.net (216.66.110.108) 14.264 ms 14.587 ms 14.574 ms
 4 10ge3-4.core1.nyc5.he.net (209.51.172.25) 14.843 ms 14.781 ms 18.213 ms
 5 10ge5-7.core1.nyc4.he.net (184.105.213.217) 14.607 ms 16.803 ms 19.604 ms
 6 100ge5-1.core1.chi1.he.net (184.105.223.161) 32.485 ms 31.357 ms 31.025 ms
 7 100ge14-2.core1.msp1.he.net (184.105.223.178) 41.446 ms 45.091 ms 49.628 ms
 8 100ge4-1.core1.sea1.he.net (184.105.223.193) 78.316 ms 81.525 ms 74.540 ms
 9 100ge8-1.core1.tyo1.he.net (184.105.213.118) 172.880 ms 169.456 ms 169.178 ms
10 * * *
11 tkyrt1.asahi-net.or.jp (202.224.32.67) 181.421 ms 180.875 ms 180.409 ms
12 tkybi5.asahi-net.or.jp (202.224.32.85) 182.222 ms 181.953 ms 182.426 ms
13 hirnr1b.asahi-net.or.jp (124.155.64.19) 194.284 ms 194.019 ms 193.615 ms
14 hirnrj31.asahi-net.or.jp (124.155.65.228) 195.441 ms 195.289 ms 195.339 ms
15 y041111.ppp.asahi-net.or.jp (118.243.41.111) 196.970 ms 198.150 ms 197.088 ms
wpa164080:~ ravikrishna$ █

```

e. Australia - www.telstra.net

i. To Australia

1. 14th September

```
wpa164030:~ ravikrishna$ date
Wed 14 Sep 2016 15:40:16 EDT
wpa164030:~ ravikrishna$ traceroute www.telstra.net -m 25
Version 1.4a12+Darwin
Usage: traceroute [-adDeFIInrSvx] [-A as_server] [-f first_ttl] [-g gateway] [-i iface]
      [-M first_ttl] [-m max_ttl] [-p port] [-P proto] [-q nqueries] [-s src_addr]
      [-t tos] [-w waittime] [-z pausesecs] host [packetlen]
wpa164030:~ ravikrishna$ traceroute -m 25 www.telstra.net
traceroute to www.telstra.net (203.50.5.178), 25 hops max, 52 byte packets
 1 gateway (142.157.164.3) 6.404 ms 2.078 ms 1.596 ms
 2 internet2-vlan677 (132.216.255.107) 2.224 ms 1.604 ms 1.516 ms
 3 vtelinet-216-66-110-108.vermontel.net (216.66.110.108) 24.359 ms 14.634 ms 14.788 ms
 4 10ge3-4.core1.nyc5.he.net (209.51.172.25) 18.096 ms 21.751 ms 24.973 ms
 5 10ge5-7.core1.nyc4.he.net (184.105.213.217) 14.629 ms 15.792 ms 48.222 ms
 6 100ge14-2.core1.sjc2.he.net (184.105.81.213) 82.756 ms 76.678 ms 76.477 ms
 7 10ge3-3.core1.pao1.he.net (72.52.92.69) 82.095 ms 77.684 ms 76.885 ms
 8 i-5-peer.paix02.pr.telstraglobal.net (134.159.61.21) 80.487 ms 81.128 ms 80.819 ms
 9 i-0-4-0-11.paix-core01.bi.telstraglobal.net (202.84.251.102) 84.027 ms
   i-0-4-0-9.paix-core01.bi.telstraglobal.net (202.40.149.49) 82.647 ms
   i-0-3-0-7.paix-core01.bi.telstraglobal.net (202.40.149.53) 82.971 ms
10 i-21.sydp-core04.bx.telstraglobal.net (202.84.136.193) 218.635 ms 220.260 ms 219.083 ms
11 i-0-1-0-47.sydp-core03.bi.telstraglobal.net (202.84.222.25) 224.428 ms
   i-0-1-0-46.sydp-core03.bi.telstraglobal.net (202.84.222.21) 222.829 ms
   i-0-1-0-45.sydp-core03.bi.telstraglobal.net (202.84.222.17) 223.611 ms
12 bundle-ether3.pad-gw10.sydney.telstra.net (203.50.13.85) 223.719 ms 223.407 ms 224.039 ms
13 bundle-ether3.chw-core10.sydney.telstra.net (203.50.6.56) 219.845 ms 219.761 ms 217.992 ms
14 bundle-ether8.exi-core10.melbourne.telstra.net (203.50.11.125) 234.621 ms 234.952 ms 233.229 ms
15 gigabitethernet5-0.exi-service1.melbourne.telstra.net (203.50.80.7) 232.209 ms 232.379 ms 232.289 ms
16 * * *
17 * * *
18 * * *
19 * * *
20 * * *
21 * * *
22 * * *
23 * * *
24 * * *
25 * * *
wpa164030:~ ravikrishna$
```

2. 18th September

```
wpa164080:~ ravikrishna$ date
Sun 18 Sep 2016 19:41:30 EDT
wpa164080:~ ravikrishna$ traceroute -m 25 www.telstra.net
traceroute to www.telstra.net (203.50.5.178), 25 hops max, 52 byte packets
 1 gateway (142.157.164.3) 2.480 ms 1.598 ms 1.526 ms
 2 internet2-vlan677.gw.mcgill.ca (132.216.255.107) 1.742 ms 1.596 ms 1.552 ms
 3 vtelinet-216-66-110-108.vermontel.net (216.66.110.108) 14.395 ms 14.958 ms 14.645 ms
 4 10ge3-4.core1.nyc5.he.net (209.51.172.25) 14.783 ms 20.231 ms 24.650 ms
 5 10ge5-7.core1.nyc4.he.net (184.105.213.217) 14.773 ms 17.736 ms 19.229 ms
 6 100ge14-2.core1.sjc2.he.net (184.105.81.213) 75.957 ms 89.560 ms 76.133 ms
 7 10ge3-3.core1.pao1.he.net (72.52.92.69) 85.585 ms 80.002 ms 76.770 ms
 8 i-5-peer.paix02.pr.telstraglobal.net (134.159.61.21) 81.169 ms 81.298 ms 80.972 ms
 9 i-0-6-0-13.paix-core01.bi.telstraglobal.net (202.40.149.125) 82.086 ms
   i-0-1-0-11.paix-core01.bi.telstraglobal.net (202.40.149.105) 82.756 ms
   i-0-1-0-12.paix-core01.bi.telstraglobal.net (202.40.149.109) 80.397 ms
10 i-21.sydp-core04.bx.telstraglobal.net (202.84.136.193) 219.351 ms 218.066 ms 219.330 ms
11 i-0-1-0-45.sydp-core03.bi.telstraglobal.net (202.84.222.17) 246.838 ms
   i-0-1-0-47.sydp-core03.bi.telstraglobal.net (202.84.222.25) 224.481 ms
   i-0-1-0-45.sydp-core03.bi.telstraglobal.net (202.84.222.17) 332.369 ms
12 bundle-ether3.pad-gw10.sydney.telstra.net (203.50.13.85) 307.034 ms 223.930 ms 223.272 ms
13 bundle-ether3.chw-core10.sydney.telstra.net (203.50.6.56) 218.102 ms 220.315 ms 218.382 ms
14 bundle-ether8.exi-core10.melbourne.telstra.net (203.50.11.125) 332.697 ms 234.639 ms 233.441 ms
15 gigabitethernet5-0.exi-service1.melbourne.telstra.net (203.50.80.7) 231.689 ms 232.312 ms 232.118 ms
16 * * *
17 * * *
18 * * *
19 * * *
20 * * *
21 * * *
22 * * *
23 * * *
24 * * *
25 * * *
wpa164080:~ ravikrishna$
```

ii. From Australia

1. Time: 15:36:52 Wed 14 Sep 2016

```

1 gigabitethernet3-3.exil.melbourne.telstra.net (203.50.77.49) 0.335 ms 0.267 ms 0.240 ms
2 bundle-ether3-100.exi-core10.melbourne.telstra.net (203.50.80.1) 2.613 ms 1.666 ms 1.992 ms
3 bundle-ether12.chw-core10.sydney.telstra.net (203.50.11.124) 15.983 ms 16.409 ms 17.106 ms
4 bundle-ether1.oxf-gw11.sydney.telstra.net (203.50.6.93) 16.733 ms 16.408 ms 17.358 ms
5 bundle-ether1.sydo-core03.sydney.reach.com (203.50.13.98) 16.610 ms 16.533 ms 17.233 ms
6 i-0-1-0-15.sydo-core04.bi.telstraglobal.net (202.84.222.54) 17.605 ms
7 i-0-7-0-4.lwlt-core01.bx.telstraglobal.net (202.84.144.82) 160.027 ms 159.450 ms 160.025 ms
8 i-0-5-0-4.eqla01.bi.telstraglobal.net (202.84.253.26) 157.150 ms 156.949 ms
9 be4637.ccr41.lax05.atlas.cogentco.com (154.54.10.133) 157.324 ms 157.081 ms 156.898 ms
10 be3032.ccr21.lax01.atlas.cogentco.com (154.54.31.53) 158.523 ms
11 be2932.ccr22.phx02.atlas.cogentco.com (154.54.45.161) 168.943 ms
12 be2929.ccr21.elp01.atlas.cogentco.com (154.54.42.66) 176.316 ms 176.192 ms
13 be2927.ccr21.iah01.atlas.cogentco.com (154.54.29.221) 193.178 ms 193.455 ms 193.987 ms
14 be2687.ccr41.atl01.atlas.cogentco.com (154.54.28.69) 206.719 ms 206.668 ms 206.117 ms
15 be2112.ccr41.dca01.atlas.cogentco.com (154.54.7.157) 217.617 ms 217.166 ms 217.620 ms
16 be2806.ccr41.jfk02.atlas.cogentco.com (154.54.40.105) 223.734 ms 228.780 ms 223.736 ms
17 be2094.ccr21.bos01.atlas.cogentco.com (154.54.30.14) 226.859 ms 225.162 ms 224.860 ms
18 38.99.222.138 (38.99.222.138) 223.985 ms 224.041 ms 223.986 ms
19 vtelinet-216-66-110-107.vermontel.net (216.66.110.107) 230.238 ms

```

2. Time: 19:45:21 Sun 18 Sep 2016

```

1 gigabitethernet3-3.exil.melbourne.telstra.net (203.50.77.49) 0.366 ms 0.284 ms 0.356 ms
2 bundle-ether3-100.exi-core10.melbourne.telstra.net (203.50.80.1) 1.377 ms 1.422 ms 2.116 m
3 bundle-ether12.chw-core10.sydney.telstra.net (203.50.11.124) 15.484 ms 16.666 ms 15.227 ms
4 bundle-ether1.oxf-gw11.sydney.telstra.net (203.50.6.93) 15.735 ms 16.538 ms 17.109 ms
5 bundle-ether1.sydo-core03.sydney.reach.com (203.50.13.98) 15.980 ms 16.413 ms 17.107 ms
6 i-0-1-0-18.sydo-core04.bi.telstraglobal.net (202.84.222.66) 17.231 ms
7 i-0-7-0-4.lwlt-core01.bx.telstraglobal.net (202.84.144.82) 157.212 ms 157.951 ms 165.017 m
8 i-0-4-0-4.eqla01.bi.telstraglobal.net (202.40.149.234) 156.775 ms
9 be4637.ccr41.lax05.atlas.cogentco.com (154.54.10.133) 157.084 ms 157.332 ms 157.152 ms
10 be3033.ccr22.lax01.atlas.cogentco.com (154.54.26.41) 158.027 ms
11 be2931.ccr21.phx02.atlas.cogentco.com (154.54.44.85) 169.953 ms
12 be2930.ccr21.elp01.atlas.cogentco.com (154.54.42.78) 176.572 ms 177.199 ms 176.642 ms
13 be2927.ccr21.iah01.atlas.cogentco.com (154.54.29.221) 193.504 ms 192.937 ms 193.005 ms
14 be2687.ccr41.atl01.atlas.cogentco.com (154.54.28.69) 207.122 ms 206.432 ms 206.496 ms
15 be2112.ccr41.dca01.atlas.cogentco.com (154.54.7.157) 217.242 ms 217.426 ms 217.490 ms
16 be2806.ccr41.jfk02.atlas.cogentco.com (154.54.40.105) 224.111 ms 223.671 ms 223.737 ms
17 be2094.ccr21.bos01.atlas.cogentco.com (154.54.30.14) 224.740 ms 224.792 ms 224.863 ms
18 38.99.222.138 (38.99.222.138) 224.112 ms 223.920 ms 227.737 ms
19 vtelinet-216-66-110-107.vermontel.net (216.66.110.107) 230.488 ms 230.414 ms 230.237 ms
20 access1-vlan677.gw.mcgill.ca (132.216.255.106) 230.356 ms 230.416 ms 235.857 ms

```

f. Brazil - ping.unesp.br

i. From Brazil

1. Time: 15:54:20 Wed 14 Sep 2016

```

Executing exec(traceroute -m 30 -q 3 142.157.164.15 140)
traceroute to 142.157.164.15 (142.157.164.15), 30 hops max, 140 byte packets
 1 gw-pinger.unesp.br (200.145.255.42)  0.622 ms  0.689 ms  0.796 ms
 2 200.145.255.45 (200.145.255.45)  0.670 ms  0.761 ms  0.990 ms
 3 186.217.255.218 (186.217.255.218)  0.992 ms  1.080 ms  1.094 ms
 4 as6939.saopaulo.sp.ix.br (187.16.221.197)  2.654 ms  2.754 ms  2.736 ms
 5 10ge9-16.corel.mial.he.net (184.105.81.233)  112.701 ms  112.531 ms  112.680 ms
 6 100gell-1.corel.atl1.he.net (184.105.213.25)  126.545 ms  126.828 ms  126.634 ms
 7 100gell-1.corel.ash1.he.net (184.105.213.70)  143.279 ms  143.299 ms  143.300 ms
 8 100ge3-1.corel.nyc4.he.net (184.105.223.166)  146.615 ms  146.334 ms  146.571 ms
 9 10ge4-1.corel.nyc5.he.net (184.105.213.218)  143.582 ms  143.699 ms  143.676 ms
10 vermont-telephone-company-inc.10gigabitethernet3-4.corel.nyc5.he.net (209.51.172.26)  143.639 ms  143.739 ms  143.598 ms
11 vtelinet-216-66-110-107.vermontel.net (216.66.110.107)  156.537 ms  156.668 ms  156.627 ms
12 access1-vlan677.gw.mcgill.ca (132.216.255.106)  191.545 ms  192.697 ms  192.749 ms
13 * * *
14 * * *
15 * * *
16 * * *
17 * * *
18 * * *
19 * * *
20 * * *
21 * * *
22 * * *
23 * * *
24 * * *
25 * * *
26 * * *
27 * * *
28 * * *
29 * * *
30 * * *
traceroute -m 30 -q 3 142.157.164.15 140 took 20secs. Total time=20secs. user=www-data

```

2. Time: 19:49:17 Wed 14 Sep 2016

```

Executing exec(traceroute -m 30 -q 3 142.157.164.80 140)
traceroute to 142.157.164.80 (142.157.164.80), 30 hops max, 140 byte packets
 1 gw-pinger.unesp.br (200.145.255.42)  0.637 ms  0.698 ms  0.807 ms
 2 200.145.255.45 (200.145.255.45)  0.680 ms  0.788 ms  1.008 ms
 3 186.217.255.218 (186.217.255.218)  1.113 ms  1.107 ms  1.099 ms
 4 as6939.saopaulo.sp.ix.br (187.16.221.197)  2.547 ms  2.656 ms  2.626 ms
 5 10ge9-16.corel.mial.he.net (184.105.81.233)  115.914 ms  115.979 ms  115.957 ms
 6 100gell-1.corel.atl1.he.net (184.105.213.25)  127.560 ms  127.602 ms  127.516 ms
 7 100gell-1.corel.ash1.he.net (184.105.213.70)  140.055 ms  139.917 ms  140.192 ms
 8 100ge3-1.corel.nyc4.he.net (184.105.223.166)  152.249 ms  152.258 ms  152.373 ms
 9 10ge4-1.corel.nyc5.he.net (184.105.213.218)  144.717 ms  150.903 ms  144.634 ms
10 vermont-telephone-company-inc.10gigabitethernet3-4.corel.nyc5.he.net (209.51.172.26)  144.693 ms  144.639 ms  144.685 ms
11 vtelinet-216-66-110-107.vermontel.net (216.66.110.107)  157.657 ms  157.743 ms  157.492 ms
12 access1-vlan677.gw.mcgill.ca (132.216.255.106)  180.681 ms  180.690 ms  181.078 ms
13 * * *
14 * * *
15 * * *
16 * * *
17 * * *
18 * * *
19 * * *
20 * * *
21 * * *
22 * * *
23 * * *
24 * * *
25 * * *
26 * * *
27 * * *
28 * * *
29 * * *
30 * * *
traceroute -m 30 -q 3 142.157.164.80 140 took 25secs. Total time=25secs. user=www-data

```


ii. To Brazil

1. 14th September

```
wpa164030:~ ravikrishna$ date
Wed 14 Sep 2016 15:54:38 EDT
wpa164030:~ ravikrishna$ -m 25 www.ping.unesp.br
-bash: -m: command not found
wpa164030:~ ravikrishna$ traceroute -m 25 www.ping.unesp.br
traceroute: unknown host www.ping.unesp.br
wpa164030:~ ravikrishna$ traceroute -m 25 ping.unesp.br
traceroute to ping.unesp.br (200.145.255.41), 25 hops max, 52 byte packets
 1 gateway (142.157.164.3) 3.120 ms 2.222 ms 1.672 ms
 2 internet1-vlan876 (132.216.255.97) 1.680 ms 1.669 ms 1.630 ms
 3 mcgill-gw-canet.risq.net (206.167.128.49) 1.808 ms 2.036 ms 1.862 ms
 4 mcgill-canet.dmtrl-rq.risq.net (132.202.32.89) 2.123 ms 3.273 ms 1.969 ms
 5 canet-rq.risq.net (132.202.80.10) 3.478 ms 7.811 ms 2.158 ms
 6 mtrl2rtrl.canarie.ca (205.189.32.250) 2.084 ms 3.210 ms 2.990 ms
 7 toro1rtrl.canarie.ca (205.189.32.192) 8.592 ms 8.711 ms 28.712 ms
 8 198.32.252.133 (198.32.252.133) 77.395 ms 51.798 ms 51.503 ms
 9 xe-1-0-0-2012.ansp-vrf-acad.j480.ampath.net (190.103.184.99) 186.100 ms 187.944 ms 187.987 m
10 * * *
11 * * *
12 200.145.255.46 (200.145.255.46) 185.332 ms 187.220 ms 185.833 ms
13 * * *
14 * * *
15 * * *
16 * * *
17 * * *
18 * * *
19 * * *
20 * * *
21 * * *
22 * * *
23 * * *
24 * * *
25 * * *
wpa164030:~ ravikrishna$ █
```

2. 18th September

```
wpa164080:~ ravikrishna$ date
Sun 18 Sep 2016 19:51:28 EDT
wpa164080:~ ravikrishna$ traceroute -m 25 ping.unesp.br
traceroute to ping.unesp.br (200.145.255.41), 25 hops max, 52 byte packets
 1 gateway (142.157.164.3) 3.453 ms 1.829 ms 1.588 ms
 2 internet1-vlan876.gw.mcgill.ca (132.216.255.97) 2.130 ms 1.800 ms 1.591 ms
 3 mcgill-gw-canet.risq.net (206.167.128.49) 1.941 ms 2.114 ms 2.397 ms
 4 mcgill-canet.dmtrl-rq.risq.net (132.202.32.89) 2.228 ms 2.856 ms 2.962 ms
 5 canet-rq.risq.net (132.202.80.10) 2.157 ms 2.923 ms 1.914 ms
 6 mtrl2rtrl.canarie.ca (205.189.32.250) 2.119 ms 2.357 ms 6.531 ms
 7 toro1rtrl.canarie.ca (205.189.32.192) 8.879 ms 9.921 ms 9.272 ms
 8 198.32.252.133 (198.32.252.133) 52.233 ms 67.650 ms 51.387 ms
 9 xe-1-0-0-2012.ansp-vrf-acad.j480.ampath.net (190.103.184.99) 181.515 ms 181.935 ms 181.455 ms
10 * * *
11 * * *
12 200.145.255.46 (200.145.255.46) 182.553 ms 182.003 ms 187.776 ms
13 * * *
14 * * *
15 * * *
16 * * *
17 * * *
18 * * *
19 * * *
20 * * *
21 * * *
22 * * *
23 * * *
24 * * *
25 * * *
wpa164080:~ ravikrishna$ █
```

7.2 Ping outputs to six servers

CARLETON

```
wpa164080:~ ravikrishna$ date
Sun 18 Sep 2016 20:37:38 EDT
wpa164080:~ ravikrishna$ ping netmon.physics.carleton.ca
PING netmon.physics.carleton.ca (134.117.14.93): 56 data bytes
64 bytes from 134.117.14.93: icmp_seq=0 ttl=239 time=9.502 ms
64 bytes from 134.117.14.93: icmp_seq=1 ttl=239 time=10.033 ms
64 bytes from 134.117.14.93: icmp_seq=2 ttl=239 time=9.053 ms
64 bytes from 134.117.14.93: icmp_seq=3 ttl=239 time=12.054 ms
64 bytes from 134.117.14.93: icmp_seq=4 ttl=239 time=9.995 ms
64 bytes from 134.117.14.93: icmp_seq=5 ttl=239 time=9.626 ms
64 bytes from 134.117.14.93: icmp_seq=6 ttl=239 time=10.078 ms
64 bytes from 134.117.14.93: icmp_seq=7 ttl=239 time=10.042 ms
64 bytes from 134.117.14.93: icmp_seq=8 ttl=239 time=10.123 ms
64 bytes from 134.117.14.93: icmp_seq=9 ttl=239 time=10.024 ms
64 bytes from 134.117.14.93: icmp_seq=10 ttl=239 time=10.126 ms
64 bytes from 134.117.14.93: icmp_seq=11 ttl=239 time=10.090 ms
64 bytes from 134.117.14.93: icmp_seq=12 ttl=239 time=9.544 ms
64 bytes from 134.117.14.93: icmp_seq=13 ttl=239 time=9.917 ms
64 bytes from 134.117.14.93: icmp_seq=14 ttl=239 time=10.010 ms
64 bytes from 134.117.14.93: icmp_seq=15 ttl=239 time=9.994 ms
64 bytes from 134.117.14.93: icmp_seq=16 ttl=239 time=9.908 ms
64 bytes from 134.117.14.93: icmp_seq=17 ttl=239 time=10.082 ms
64 bytes from 134.117.14.93: icmp_seq=18 ttl=239 time=10.016 ms
64 bytes from 134.117.14.93: icmp_seq=19 ttl=239 time=10.062 ms
64 bytes from 134.117.14.93: icmp_seq=20 ttl=239 time=9.917 ms
64 bytes from 134.117.14.93: icmp_seq=21 ttl=239 time=9.706 ms
64 bytes from 134.117.14.93: icmp_seq=22 ttl=239 time=9.988 ms
64 bytes from 134.117.14.93: icmp_seq=23 ttl=239 time=9.314 ms
64 bytes from 134.117.14.93: icmp_seq=24 ttl=239 time=9.915 ms
64 bytes from 134.117.14.93: icmp_seq=25 ttl=239 time=26.989 ms
64 bytes from 134.117.14.93: icmp_seq=26 ttl=239 time=9.420 ms
64 bytes from 134.117.14.93: icmp_seq=27 ttl=239 time=10.066 ms
64 bytes from 134.117.14.93: icmp_seq=28 ttl=239 time=10.188 ms
64 bytes from 134.117.14.93: icmp_seq=29 ttl=239 time=10.127 ms
^C
--- netmon.physics.carleton.ca ping statistics ---
30 packets transmitted, 30 packets received, 0.0% packet loss
round-trip min/avg/max/stddev = 9.053/10.530/26.989/3.093 ms
```

PRINCETON

```
wpa164080:~ ravikrishna$ date
Sun 18 Sep 2016 20:31:00 EDT
wpa164080:~ ravikrishna$ ping www.net.princeton.edu
PING www.net.princeton.edu (128.112.128.55): 56 data bytes
64 bytes from 128.112.128.55: icmp_seq=0 ttl=245 time=18.234 ms
64 bytes from 128.112.128.55: icmp_seq=1 ttl=245 time=18.380 ms
64 bytes from 128.112.128.55: icmp_seq=2 ttl=245 time=18.162 ms
64 bytes from 128.112.128.55: icmp_seq=3 ttl=245 time=18.973 ms
64 bytes from 128.112.128.55: icmp_seq=4 ttl=245 time=18.218 ms
64 bytes from 128.112.128.55: icmp_seq=5 ttl=245 time=18.187 ms
64 bytes from 128.112.128.55: icmp_seq=6 ttl=245 time=17.573 ms
64 bytes from 128.112.128.55: icmp_seq=7 ttl=245 time=18.842 ms
64 bytes from 128.112.128.55: icmp_seq=8 ttl=245 time=18.078 ms
64 bytes from 128.112.128.55: icmp_seq=9 ttl=245 time=18.566 ms
64 bytes from 128.112.128.55: icmp_seq=10 ttl=245 time=17.521 ms
64 bytes from 128.112.128.55: icmp_seq=11 ttl=245 time=18.407 ms
64 bytes from 128.112.128.55: icmp_seq=12 ttl=245 time=17.592 ms
64 bytes from 128.112.128.55: icmp_seq=13 ttl=245 time=18.315 ms
64 bytes from 128.112.128.55: icmp_seq=14 ttl=245 time=18.349 ms
64 bytes from 128.112.128.55: icmp_seq=15 ttl=245 time=18.052 ms
64 bytes from 128.112.128.55: icmp_seq=16 ttl=245 time=18.127 ms
64 bytes from 128.112.128.55: icmp_seq=17 ttl=245 time=18.092 ms
64 bytes from 128.112.128.55: icmp_seq=18 ttl=245 time=17.954 ms
64 bytes from 128.112.128.55: icmp_seq=19 ttl=245 time=17.498 ms
64 bytes from 128.112.128.55: icmp_seq=20 ttl=245 time=18.306 ms
64 bytes from 128.112.128.55: icmp_seq=21 ttl=245 time=18.195 ms
64 bytes from 128.112.128.55: icmp_seq=22 ttl=245 time=18.136 ms
64 bytes from 128.112.128.55: icmp_seq=23 ttl=245 time=18.121 ms
64 bytes from 128.112.128.55: icmp_seq=24 ttl=245 time=18.182 ms
64 bytes from 128.112.128.55: icmp_seq=25 ttl=245 time=17.372 ms
64 bytes from 128.112.128.55: icmp_seq=26 ttl=245 time=18.215 ms
64 bytes from 128.112.128.55: icmp_seq=27 ttl=245 time=19.636 ms
64 bytes from 128.112.128.55: icmp_seq=28 ttl=245 time=18.105 ms
64 bytes from 128.112.128.55: icmp_seq=29 ttl=245 time=18.206 ms
^C
--- www.net.princeton.edu ping statistics ---
30 packets transmitted, 30 packets received, 0.0% packet loss
round-trip min/avg/max/stddev = 17.372/18.186/19.636/0.442 ms
```

STANFORD

```
wpa164080:~ ravikrishna$ date
Sun 18 Sep 2016 20:33:33 EDT
wpa164080:~ ravikrishna$ ping slac.stanford.edu
PING slac.stanford.edu (134.79.197.200): 56 data bytes
64 bytes from 134.79.197.200: icmp_seq=0 ttl=237 time=82.562 ms
64 bytes from 134.79.197.200: icmp_seq=1 ttl=237 time=83.032 ms
64 bytes from 134.79.197.200: icmp_seq=2 ttl=237 time=82.724 ms
64 bytes from 134.79.197.200: icmp_seq=3 ttl=237 time=81.919 ms
64 bytes from 134.79.197.200: icmp_seq=4 ttl=237 time=184.998 ms
64 bytes from 134.79.197.200: icmp_seq=5 ttl=237 time=82.756 ms
64 bytes from 134.79.197.200: icmp_seq=6 ttl=237 time=82.846 ms
64 bytes from 134.79.197.200: icmp_seq=7 ttl=237 time=81.833 ms
64 bytes from 134.79.197.200: icmp_seq=8 ttl=237 time=82.585 ms
64 bytes from 134.79.197.200: icmp_seq=9 ttl=237 time=82.650 ms
64 bytes from 134.79.197.200: icmp_seq=10 ttl=237 time=82.011 ms
64 bytes from 134.79.197.200: icmp_seq=11 ttl=237 time=82.459 ms
64 bytes from 134.79.197.200: icmp_seq=12 ttl=237 time=82.763 ms
64 bytes from 134.79.197.200: icmp_seq=13 ttl=237 time=82.615 ms
64 bytes from 134.79.197.200: icmp_seq=14 ttl=237 time=82.628 ms
64 bytes from 134.79.197.200: icmp_seq=15 ttl=237 time=83.082 ms
64 bytes from 134.79.197.200: icmp_seq=16 ttl=237 time=82.741 ms
64 bytes from 134.79.197.200: icmp_seq=17 ttl=237 time=82.626 ms
64 bytes from 134.79.197.200: icmp_seq=18 ttl=237 time=82.105 ms
64 bytes from 134.79.197.200: icmp_seq=19 ttl=237 time=105.947 ms
64 bytes from 134.79.197.200: icmp_seq=20 ttl=237 time=82.559 ms
64 bytes from 134.79.197.200: icmp_seq=21 ttl=237 time=82.688 ms
64 bytes from 134.79.197.200: icmp_seq=22 ttl=237 time=82.776 ms
64 bytes from 134.79.197.200: icmp_seq=23 ttl=237 time=82.117 ms
Request timeout for icmp_seq 24
64 bytes from 134.79.197.200: icmp_seq=25 ttl=237 time=122.350 ms
64 bytes from 134.79.197.200: icmp_seq=26 ttl=237 time=82.844 ms
64 bytes from 134.79.197.200: icmp_seq=27 ttl=237 time=82.694 ms
64 bytes from 134.79.197.200: icmp_seq=28 ttl=237 time=82.074 ms
64 bytes from 134.79.197.200: icmp_seq=29 ttl=237 time=81.957 ms
^C
--- slac.stanford.edu ping statistics ---
30 packets transmitted, 29 packets received, 3.3% packet loss
round-trip min/avg/max/stddev = 81.833/88.239/184.998/20.079 ms
```

JAPAN

wpa164080:~ ravikrishna\$ date

Sun 18 Sep 2016 20:38:54 EDT

wpa164080:~ ravikrishna\$ ping www.tumori.nu

PING vogue.tumori.nu (118.243.41.111): 56 data bytes

64 bytes from 118.243.41.111: icmp_seq=0 ttl=43 time=197.891 ms

64 bytes from 118.243.41.111: icmp_seq=1 ttl=43 time=199.259 ms

64 bytes from 118.243.41.111: icmp_seq=2 ttl=43 time=197.782 ms

64 bytes from 118.243.41.111: icmp_seq=3 ttl=43 time=198.662 ms

64 bytes from 118.243.41.111: icmp_seq=4 ttl=43 time=198.059 ms

64 bytes from 118.243.41.111: icmp_seq=5 ttl=43 time=200.743 ms

64 bytes from 118.243.41.111: icmp_seq=6 ttl=43 time=197.280 ms

64 bytes from 118.243.41.111: icmp_seq=7 ttl=43 time=197.514 ms

64 bytes from 118.243.41.111: icmp_seq=8 ttl=43 time=196.492 ms

64 bytes from 118.243.41.111: icmp_seq=9 ttl=43 time=198.203 ms

64 bytes from 118.243.41.111: icmp_seq=10 ttl=43 time=197.644 ms

64 bytes from 118.243.41.111: icmp_seq=11 ttl=43 time=197.606 ms

64 bytes from 118.243.41.111: icmp_seq=12 ttl=43 time=197.296 ms

64 bytes from 118.243.41.111: icmp_seq=13 ttl=43 time=197.719 ms

64 bytes from 118.243.41.111: icmp_seq=14 ttl=43 time=197.958 ms

64 bytes from 118.243.41.111: icmp_seq=15 ttl=43 time=198.915 ms

64 bytes from 118.243.41.111: icmp_seq=16 ttl=43 time=199.368 ms

64 bytes from 118.243.41.111: icmp_seq=17 ttl=43 time=199.553 ms

64 bytes from 118.243.41.111: icmp_seq=18 ttl=43 time=197.768 ms

64 bytes from 118.243.41.111: icmp_seq=19 ttl=43 time=197.643 ms

64 bytes from 118.243.41.111: icmp_seq=20 ttl=43 time=197.729 ms

64 bytes from 118.243.41.111: icmp_seq=21 ttl=43 time=197.528 ms

64 bytes from 118.243.41.111: icmp_seq=22 ttl=43 time=206.193 ms

64 bytes from 118.243.41.111: icmp_seq=23 ttl=43 time=197.517 ms

64 bytes from 118.243.41.111: icmp_seq=24 ttl=43 time=197.084 ms

64 bytes from 118.243.41.111: icmp_seq=25 ttl=43 time=197.728 ms

64 bytes from 118.243.41.111: icmp_seq=26 ttl=43 time=197.372 ms

64 bytes from 118.243.41.111: icmp_seq=27 ttl=43 time=197.711 ms

64 bytes from 118.243.41.111: icmp_seq=28 ttl=43 time=197.225 ms

64 bytes from 118.243.41.111: icmp_seq=29 ttl=43 time=197.492 ms

^C

--- vogue.tumori.nu ping statistics ---

30 packets transmitted, 30 packets received, 0.0% packet loss

round-trip min/avg/max/stddev = 196.492/198.231/206.193/1.704 ms

BRAZIL

```
wpa164080:~ ravikrishna$ ping ping.unesp.br
PING ping.unesp.br (200.145.255.41): 56 data bytes
64 bytes from 200.145.255.41: icmp_seq=0 ttl=52 time=182.018 ms
64 bytes from 200.145.255.41: icmp_seq=1 ttl=52 time=184.064 ms
64 bytes from 200.145.255.41: icmp_seq=2 ttl=52 time=181.833 ms
64 bytes from 200.145.255.41: icmp_seq=3 ttl=52 time=183.370 ms
64 bytes from 200.145.255.41: icmp_seq=4 ttl=52 time=181.967 ms
64 bytes from 200.145.255.41: icmp_seq=5 ttl=52 time=182.166 ms
64 bytes from 200.145.255.41: icmp_seq=6 ttl=52 time=182.385 ms
64 bytes from 200.145.255.41: icmp_seq=7 ttl=52 time=182.513 ms
64 bytes from 200.145.255.41: icmp_seq=8 ttl=52 time=182.743 ms
64 bytes from 200.145.255.41: icmp_seq=9 ttl=52 time=182.674 ms
64 bytes from 200.145.255.41: icmp_seq=10 ttl=52 time=182.359 ms
64 bytes from 200.145.255.41: icmp_seq=11 ttl=52 time=182.409 ms
64 bytes from 200.145.255.41: icmp_seq=12 ttl=52 time=181.507 ms
64 bytes from 200.145.255.41: icmp_seq=13 ttl=52 time=181.760 ms
64 bytes from 200.145.255.41: icmp_seq=14 ttl=52 time=189.724 ms
64 bytes from 200.145.255.41: icmp_seq=15 ttl=52 time=182.557 ms
64 bytes from 200.145.255.41: icmp_seq=16 ttl=52 time=182.687 ms
64 bytes from 200.145.255.41: icmp_seq=17 ttl=52 time=195.667 ms
64 bytes from 200.145.255.41: icmp_seq=18 ttl=52 time=182.692 ms
64 bytes from 200.145.255.41: icmp_seq=19 ttl=52 time=190.148 ms
64 bytes from 200.145.255.41: icmp_seq=20 ttl=52 time=182.655 ms
64 bytes from 200.145.255.41: icmp_seq=21 ttl=52 time=182.467 ms
64 bytes from 200.145.255.41: icmp_seq=22 ttl=52 time=182.674 ms
64 bytes from 200.145.255.41: icmp_seq=23 ttl=52 time=182.822 ms
64 bytes from 200.145.255.41: icmp_seq=24 ttl=52 time=182.625 ms
64 bytes from 200.145.255.41: icmp_seq=25 ttl=52 time=185.951 ms
64 bytes from 200.145.255.41: icmp_seq=26 ttl=52 time=182.322 ms
64 bytes from 200.145.255.41: icmp_seq=27 ttl=52 time=182.648 ms
64 bytes from 200.145.255.41: icmp_seq=28 ttl=52 time=182.495 ms
64 bytes from 200.145.255.41: icmp_seq=29 ttl=52 time=182.561 ms
^C
--- ping.unesp.br ping statistics ---
30 packets transmitted, 30 packets received, 0.0% packet loss
round-trip min/avg/max/stddev = 181.507/183.549/195.667/2.996 ms
```

AUSTRALIA

wpa164080:~ ravikrishna\$ date

Sun 18 Sep 2016 20:43:18 EDT

wpa164080:~ ravikrishna\$ ping www.telstra.net

PING www.telstra.net (203.50.5.178): 56 data bytes

64 bytes from 203.50.5.178: icmp_seq=0 ttl=108 time=232.360 ms
64 bytes from 203.50.5.178: icmp_seq=1 ttl=108 time=231.997 ms
64 bytes from 203.50.5.178: icmp_seq=2 ttl=108 time=281.252 ms
64 bytes from 203.50.5.178: icmp_seq=3 ttl=108 time=300.353 ms
64 bytes from 203.50.5.178: icmp_seq=4 ttl=108 time=318.812 ms
64 bytes from 203.50.5.178: icmp_seq=5 ttl=108 time=337.848 ms
64 bytes from 203.50.5.178: icmp_seq=6 ttl=108 time=258.580 ms
64 bytes from 203.50.5.178: icmp_seq=7 ttl=108 time=281.865 ms
64 bytes from 203.50.5.178: icmp_seq=8 ttl=108 time=305.802 ms
64 bytes from 203.50.5.178: icmp_seq=9 ttl=108 time=248.289 ms
64 bytes from 203.50.5.178: icmp_seq=10 ttl=108 time=348.670 ms
64 bytes from 203.50.5.178: icmp_seq=11 ttl=108 time=269.649 ms
64 bytes from 203.50.5.178: icmp_seq=12 ttl=108 time=232.349 ms
64 bytes from 203.50.5.178: icmp_seq=13 ttl=108 time=232.253 ms
64 bytes from 203.50.5.178: icmp_seq=14 ttl=108 time=326.014 ms
64 bytes from 203.50.5.178: icmp_seq=15 ttl=108 time=233.004 ms
64 bytes from 203.50.5.178: icmp_seq=16 ttl=108 time=261.542 ms
64 bytes from 203.50.5.178: icmp_seq=17 ttl=108 time=283.230 ms
64 bytes from 203.50.5.178: icmp_seq=18 ttl=108 time=302.156 ms
64 bytes from 203.50.5.178: icmp_seq=19 ttl=108 time=231.926 ms
64 bytes from 203.50.5.178: icmp_seq=20 ttl=108 time=345.201 ms
64 bytes from 203.50.5.178: icmp_seq=21 ttl=108 time=261.848 ms
64 bytes from 203.50.5.178: icmp_seq=22 ttl=108 time=232.280 ms
64 bytes from 203.50.5.178: icmp_seq=23 ttl=108 time=304.447 ms
64 bytes from 203.50.5.178: icmp_seq=24 ttl=108 time=322.769 ms
64 bytes from 203.50.5.178: icmp_seq=25 ttl=108 time=231.553 ms
64 bytes from 203.50.5.178: icmp_seq=26 ttl=108 time=258.157 ms
64 bytes from 203.50.5.178: icmp_seq=27 ttl=108 time=232.417 ms
64 bytes from 203.50.5.178: icmp_seq=28 ttl=108 time=295.759 ms
64 bytes from 203.50.5.178: icmp_seq=29 ttl=108 time=315.952 ms
^C

--- www.telstra.net ping statistics ---

30 packets transmitted, 30 packets received, 0.0% packet loss

round-trip min/avg/max/stddev = 231.553/277.278/348.670/38.523 ms
