Lab 1

Jingshi Yang z5110579

EXERCISE 1

1.

Weill % nslookup www.google.com

Server: 129.94.242.2

Address: 129.94.242.2#53

Non-authoritative answer

Name: www.google.com

Address: 216.58.199.68

The reason of having several IP addresses as an output(though here I only got one output) is that www.google .com is usually replicated over multiple servers, with each server running on a different host, and each having a different IP address, when users visit these websites, the several IP address can relieve connection load.

2.

The name of the IP address 127.0.0.1 is localhost

The localhost is used to establish an IP connection to the same machine or computer being used by the end user. 127.0.0.1 is always the IP address of every computer

EXERCISE 2

Unreachable hosts when use ping:

www.getfittest.com.au

www.hola.hp

www.kremlin.ru

Others are reachable

Reason:

www.getfittest.com.au and www.hola.hp are unknown host

www.kremlin.ru can be reachable through the web browser, but not through ping, the reason is that www.kremlin.ru doesn't support ICMP protocol used by ping or maybe blocked by a firewall

EXERCISE 3

1.

i)

traceroute to www.columbia.edu (128.59.105.24), 30 hops max, 60 byte packets

1 cserouter1-server.cse.unsw.EDU.AU (129.94.242.251) 0.158 ms 0.158 ms 0.137 ms

2 129.94.39.17 (129.94.39.17) 1.045 ms 1.016 ms 1.039 ms

3 ombudnex1-vl-3154.gw.unsw.edu.au (149.171.253.35) 1.868 ms 1.618 ms libudnex1-vl-3154.gw.unsw.edu.au (149.171.253.34) 1.583 ms

4 libcr1-po-5.gw.unsw.edu.au (149.171.255.165) 1.299 ms libcr1-po-6.gw.unsw.edu.au (149.171.255.201) 1.326 ms 1.342 ms

5 unswbr1-te-1-9.gw.unsw.edu.au (149.171.255.101) 17.665 ms unswbr1-te-2-13.gw.unsw.edu.au (149.171.255.105) 17.686 ms 17.696 ms

6 138.44.5.0 (138.44.5.0) 1.605 ms 1.496 ms 1.482 ms

7 et-1-3-0.pe1.sxt.bkvl.nsw.aarnet.net.au (113.197.15.149) 2.711 ms 2.247 ms 2.239 ms

8 et-0-0-0.pe1.a.hnl.aarnet.net.au (113.197.15.99) 95.324 ms 95.130 ms 95.151 ms

9 et-2-1-0.bdr1.a.sea.aarnet.net.au (113.197.15.201) 153.112 ms 152.887 ms 152.880 ms

10 abilene-1-lo-jmb-706.sttlwa.pacificwave.net (207.231.240.8) 146.711 ms 146.654 ms 146.660 ms

11 et-4-0-0.4079.rtsw.miss2.net.internet2.edu (162.252.70.0) 157.233 ms 157.252 ms 157.316 ms

12 et-4-0-0.4079.rtsw.minn.net.internet2.edu (162.252.70.58) 180.282 ms 181.015 ms 180.968 ms

13 et-1-1-2.4079.rtsw.eqch.net.internet2.edu (162.252.70.106) 188.436 ms 188.610 ms 188.608 ms

14 ae-1.4079.rtsw.clev.net.internet2.edu (162.252.70.130) 197.008 ms 196.910 ms 197.087 ms

15 buf-9208-I2-CLEV.nysernet.net (199.109.11.33) 201.310 ms 201.297 ms 201.204 ms

16 syr-9208-buf-9208.nysernet.net (199.109.7.193) 205.155 ms 204.951 ms 205.680 ms

17 nyc-9208-syr-9208.nysernet.net (199.109.7.162) 210.472 ms 210.294 ms 210.295 ms

18 columbia.nyc-9208.nysernet.net (199.109.4.14) 210.299 ms 210.238 ms 210.332 ms

19 cc-core-1-x-nyser32-gw-1.net.columbia.edu (128.59.255.5) 210.662 ms 210.675 ms 211.291 ms

20 cc-conc-1-x-cc-core-1.net.columbia.edu (128.59.255.210) 210.928 ms 210.839 ms 210.888 ms

21 ccnmtl.columbia.edu (128.59.105.24) 210.720 ms 210.816 ms 210.758 ms

Hence

21 routers between my workstation and www.columbia.edu

5 routers are part of the UNSW network

ii)

7 et-1-3-0.pe1.sxt.bkvl.nsw.aarnet.net.au (113.197.15.149)
2.443 ms 2.182 ms 2.253 ms

8 et-0-0-0.pe1.a.hnl.aarnet.net.au (113.197.15.99)
95.283 ms 95.401 ms 95.251 ms

There is a huge time difference between the station to the two routers, therefore between 7 and 8, packets cross the Pacific Ocean.

2.

machine to ucla:

weill % traceroute www.ucla.edu

traceroute to www.ucla.edu (164.67.228.152), 30 hops max, 60 byte packets

1 cserouter1-server.cse.unsw.EDU.AU (129.94.242.251)

0.181 ms 0.157 ms 0.134 ms

2 129.94.39.17 (129.94.39.17) 1.095 ms 1.057 ms 1.069 ms

3 libudnex1-vl-3154.gw.unsw.edu.au (149.171.253.34) 1.451 ms ombudnex1-vl-3154.gw.unsw.edu.au (149.171.253.35) 1.881 ms 1.865 ms

4 libcr1-po-6.gw.unsw.edu.au (149.171.255.201) 1.208 ms ombcr1-po-6.gw.unsw.edu.au (149.171.255.169) 1.221 ms 1.224 ms

5 unswbr1-te-2-13.gw.unsw.edu.au (149.171.255.105) 2.421 ms 2.342 ms unswbr1-te-1-9.gw.unsw.edu.au (149.171.255.101) 2.397 ms

6 138.44.5.0 (138.44.5.0) 1.378 ms 1.445 ms 1.425 ms

7 et-1-3-0.pe1.sxt.bkvl.nsw.aarnet.net.au (113.197.15.149)
2.200 ms 2.281 ms 2.285 ms

8 et-0-0-0.pe1.a.hnl.aarnet.net.au (113.197.15.99)
95.340 ms 95.317 ms 95.390 ms

9 et-2-1-0.bdr1.a.sea.aarnet.net.au (113.197.15.201)
146.427 ms 146.448 ms 146.424 ms

10 cenichpr-1-is-jmb-778.snvaca.pacificwave.net (207.231.245.129)
163.049 ms 163.007 ms 162.926 ms

11 hpr-lax-hpr3--svl-hpr3-100ge.cenic.net (137.164.25.73) 170.865 ms
170.709 ms 170.910 ms

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13 bd11f1.anderson--cr001.anderson.ucla.net (169.232.4.6) 171.143 ms
bd11f1.anderson--cr00f2.csb1.ucla.net (169.232.4.4) 171.429 ms
bd11f1.anderson--cr001.anderson.ucla.net (169.232.4.6) 171.244 ms

14 cr00f1.anderson--dr00f2.csb1.ucla.net (169.232.4.55) 171.255 ms
cr00f2.csb1--dr00f2.csb1.ucla.net (169.232.4.53) 171.288 ms 171.248 ms

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machine to u-tokyo:

weill % traceroute www.u-tokyo.ac.jp

traceroute to www.u-tokyo.ac.jp (210.152.243.234), 30 hops max, 60 byte packets

1 cserouter1-server.cse.unsw.EDU.AU (129.94.242.251)
0.119 ms 0.139 ms 0.116 ms

2 129.94.39.17 (129.94.39.17) 1.047 ms 1.088 ms 1.015 ms

3 libudnex1-vl-3154.gw.unsw.edu.au (149.171.253.34)
2.201 ms 2.216 ms 2.196 ms

4 libcr1-po-6.gw.unsw.edu.au (149.171.255.201) 1.285 ms libcr1-po-5.gw.unsw.edu.au (149.171.255.165) 1.211 ms ombcr1-po-5.gw.unsw.edu.au (149.171.255.197) 1.152 ms

5 unswbr1-te-1-9.gw.unsw.edu.au (149.171.255.101) 31.689 ms unswbr1-te-2-13.gw.unsw.edu.au (149.171.255.105) 31.704 ms 31.699 ms

6 138.44.5.0 (138.44.5.0) 1.376 ms 1.466 ms 1.397 ms

7 et-0-3-0.pe1.bkvl.nsw.aarnet.net.au (113.197.15.147)
1.903 ms 1.901 ms 1.908 ms

8 ge-4_0_0.bb1.a.pao.aarnet.net.au (202.158.194.177)
156.270 ms 156.225 ms 156.183 ms

9 paloalto0.iij.net (198.32.176.24) 158.122 ms 158.004 ms 158.093 ms

10 osk004bb00.IIJ.Net (58.138.88.185) 289.981 ms osk004bb01.IIJ.Net (58.138.88.189) 271.219 ms osk004bb00.IIJ.Net (58.138.88.185) 289.955 ms

11 osk004ix51.IIJ.Net (58.138.106.130) 279.731 ms 279.715 ms 279.712 ms

12 210.130.135.130 (210.130.135.130) 288.739 ms 288.844 ms 288.594 ms

13 124.83.228.78 (124.83.228.78) 279.949 ms 271.140 ms 279.985 ms

14 124.83.252.250 (124.83.252.250) 286.447 ms 295.151 ms 295.080 ms

15 158.205.134.26 (158.205.134.26) 286.282 ms 295.215 ms 308.936 ms

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machine to lancaster:

weill % traceroute www.lancaster.ac.uk

traceroute to www.lancaster.ac.uk (148.88.65.80), 30 hops max, 60 byte packets

1 cserouter1-server.cse.unsw.EDU.AU (129.94.242.251)
0.133 ms 0.106 ms 0.103 ms

2 129.94.39.17 (129.94.39.17) 1.109 ms 1.050 ms 1.063 ms

3 ombudnex1-vl-3154.gw.unsw.edu.au (149.171.253.35) 1.809 ms
libudnex1-vl-3154.gw.unsw.edu.au (149.171.253.34) 1.680 ms
ombudnex1-vl-3154.gw.unsw.edu.au (149.171.253.35) 1.778 ms

4 ombcr1-po-6.gw.unsw.edu.au (149.171.255.169) 1.319 ms 1.241 ms
libcr1-po-6.gw.unsw.edu.au (149.171.255.201) 1.260 ms

5 unswbr1-te-2-13.gw.unsw.edu.au (149.171.255.105) 1.331 ms unswbr1-te-1-9.gw.unsw.edu.au (149.171.255.101) 1.393 ms unswbr1-te-2-13.gw.unsw.edu.au (149.171.255.105) 1.329 ms

6 138.44.5.0 (138.44.5.0) 1.426 ms 1.420 ms 1.411 ms

7 et-1-3-0.pe1.sxt.bkvl.nsw.aarnet.net.au (113.197.15.149)
2.485 ms 2.209 ms 2.379 ms

8 et-0-0-0.pe1.a.hnl.aarnet.net.au (113.197.15.99)
95.265 ms 95.326 ms 95.256 ms

9 et-2-1-0.bdr1.a.sea.aarnet.net.au (113.197.15.201)
146.444 ms 146.468 ms 146.431 ms

10 abilene-1-lo-jmb-706.sttlwa.pacificwave.net (207.231.240.8)
147.014 ms 146.973 ms 146.429 ms

11 et-4-0-0.4079.rtsw.miss2.net.internet2.edu (162.252.70.0)
157.380 ms 157.396 ms 157.394 ms

12 et-4-0-0.4079.rtsw.minn.net.internet2.edu (162.252.70.58)
180.440 ms 180.438 ms 180.438 ms

13 et-1-1-2.4079.rtsw.eqch.net.internet2.edu (162.252.70.106)
188.338 ms 188.280 ms 188.301 ms

14 ae-1.4079.rtsw.clev.net.internet2.edu (162.252.70.130)
197.444 ms 197.154 ms 197.211 ms

15 et-2-0-0.4079.rtsw.ashb.net.internet2.edu (162.252.70.54)
204.785 ms 204.623 ms 204.649 ms

16 ae-2.4079.rtsw.wash.net.internet2.edu (162.252.70.136)
204.967 ms 205.022 ms 205.062 ms

17 internet2-gw.mx1.lon.uk.geant.net (62.40.124.44)
279.649 ms 279.848 ms 279.844 ms

18 janet-gw.mx1.lon.uk.geant.net (62.40.124.198)
279.887 ms 280.170 ms 279.970 ms

19 ae29.londpg-sbr2.ja.net (146.97.33.2)
280.965 ms 280.138 ms 280.442 ms

20 ae31.erdiss-sbr2.ja.net (146.97.33.22)
283.962 ms 284.045 ms 284.287 ms

21 ae29.manckh-sbr2.ja.net (146.97.33.42)
301.819 ms 298.118 ms 287.091 ms

22 ae24.lanclu-rbr1.ja.net (146.97.38.58)
288.063 ms 288.132 ms 288.356 ms

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24 ismx-issrx.rtr.lancs.ac.uk (148.88.255.17)
289.898 ms 290.003 ms 289.693 ms

25 dc.iss.srv.rtrcloud.lancs.ac.uk (148.88.253.3)
298.441 ms 302.086 ms 305.024 ms

26 www.lancs.ac.uk (148.88.65.80)
289.812 ms !X 289.982 ms !X 289.760 ms !X

At 138.44.5.0. the paths to these destinations diverge because for the three destinations, they all cross 6 same routers, and the routers that they cross are different from the sixth router.

Then by using whois 138.44.5.0, I found the router is in Perth, AU

No, the number of hops on each path isn't proportional the physical distance because

for Tokyo, the physical distance is 5558 miles, the number of hops is 15

But for ucla, the distance is 9379.1 miles, the number of hops is 14 which is smaller than 15.

3.

Speedtest.com.sg Server to machine:

Traceroute Result:
traceroute to 129.94.242.251 (129.94.242.251), 30 hops max, 60 byte packets
1 ge2-8.r01.sin01.ne.com.sg (202.150.221.169) 0.193 ms 0.216 ms 0.229 ms
2 10.11.33.38 (10.11.33.38) 32.982 ms 33.022 ms 33.044 ms
3 hutchcity3-10g.hkix.net (123.255.90.140) 34.516 ms 34.500 ms 34.556 ms
4 218.189.5.42 (218.189.5.42) 34.481 ms d1-42-238-143-118-on-nets.com (118.143.238.42) 34.521 ms 218.189.5.42 (218.189.5.42) 34.457 ms
5 d1-10-224-143-118-on-nets.com (118.143.224.10) 199.756 ms d1-6-224-143-118-on-nets.com (118.143.224.6) 180.745 ms d1-10-224-143-118-on-nets.com (118.143.224.10) 199.773 ms

6 aarnet.as7575.any2ix.coresite.com (206.72.210.64) 179.430 ms 170.631 ms 171.818 ms
7 xe-0-0-3.pe1.tkpa.akl.aarnet.net.au (202.158.194.172) 304.664 ms 294.607 ms 295.758 ms
8 et-0-1-0.200.pe1.wnpa.akl.aarnet.net.au (113.197.15.68) 294.880 ms 294.853 ms 303.655 ms
9 xe-0-2-2-204.pe1.alxd.nsw.aarnet.net.au (113.197.15.182) 332.847 ms 325.736 ms 325.640 ms
10 et-8-1-0.pe1.brwy.nsw.aarnet.net.au (113.197.15.152) 330.978 ms 339.837 ms 339.380 ms
11 138.44.5.1 (138.44.5.1) 325.935 ms 326.565 ms 317.489 ms
12 ombcr1-te-1-5.gw.unsw.edu.au (149.171.255.106) 326.136 ms 325.817 ms 317.389 ms
13 libudnex1-po-2.gw.unsw.edu.au (149.171.255.198) 338.744 ms 329.946 ms 338.950 ms
14 ufw1-ae-1-3154.gw.unsw.edu.au (149.171.253.36) 318.184 ms 318.106 ms 328.293 ms
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Speedtest.com.sg machine to server:

weber % traceroute www.speedtest.com.sg

traceroute to www.speedtest.com.sg (202.150.221.170), 30 hops max, 60 byte packets

1 cserouter1-server.cse.unsw.EDU.AU (129.94.242.251) 0.199 ms 0.192 ms 0.183 ms

2 129.94.39.17 (129.94.39.17) 1.085 ms 1.087 ms 1.096 ms

3 ombudnex1-vl-3154.gw.unsw.edu.au (149.171.253.35) 1.604 ms libudnex1-vl-3154.gw.unsw.edu.au (149.171.253.34) 2.985 ms 2.919 ms

4 ombcr1-po-6.gw.unsw.edu.au (149.171.255.169) 1.337 ms libcr1-po-6.gw.unsw.edu.au (149.171.255.201) 1.287 ms libcr1-po-5.gw.unsw.edu.au (149.171.255.165) 1.336 ms

5 unswbr1-te-1-9.gw.unsw.edu.au (149.171.255.101) 37.142 ms 37.215 ms unswbr1-te-2-13.gw.unsw.edu.au (149.171.255.105) 37.138 ms

6 138.44.5.0 (138.44.5.0) 1.672 ms 1.579 ms 1.642 ms

7 et-0-3-0.pe1.alxd.nsw.aarnet.net.au (113.197.15.153) 1.919 ms 1.820 ms 1.785 ms

8 xe-0-0-3.pe1.wnpa.akl.aarnet.net.au (113.197.15.67) 24.419 ms xe-0-2-1-204.pe1.wnpa.alxd.aarnet.net.au (113.197.15.183) 24.416 ms 24.330 ms

9 et-0-1-0.200.pe1.tkpa.akl.aarnet.net.au (113.197.15.69) 24.634 ms 24.609 ms 24.616 ms

10 xe-0-2-6.bdr1.a.lax.aarnet.net.au (202.158.194.173) 148.653 ms 148.622 ms 148.310 ms

11 singtel.as7473.any2ix.coresite.com (206.72.210.63) 314.307 ms 314.203 ms 314.840 ms

12 203.208.182.153 (203.208.182.153) 334.637 ms 203.208.151.181 (203.208.151.181) 319.852 ms 203.208.172.173 (203.208.172.173) 317.053 ms

13 203.208.182.41 (203.208.182.41) 318.700 ms 203.208.182.125 (203.208.182.125) 334.676 ms 203.208.177.110 (203.208.177.110) 330.570 ms

14 203.208.182.45 (203.208.182.45) 349.780 ms 202-150-221-170.rev.ne.com.sg (202.150.221.170) 340.648 ms 340.691 ms

Telstra.net server to machine:

1 gigabitethernet3-3.exi2.melbourne.telstra.net (203.50.77.53) 0.312 ms 0.222 ms 0.245 ms
2 bundle-ether3-100.win-core10.melbourne.telstra.net (203.50.80.129) 2.243 ms 1.862 ms 1.869 ms
3 bundle-ether12.ken-core10.sydney.telstra.net (203.50.11.122) 13.364 ms 12.855 ms 12.864 ms
4 bundle-ether1.ken-edge901.sydney.telstra.net (203.50.11.95) 12.238 ms 11.981 ms 11.989 ms
5 aarnet6.lnk.telstra.net (139.130.0.78) 11.614 ms 11.608 ms 11.612 ms
6 ge-6-0-0.bb1.a.syd.aarnet.net.au (202.158.202.17) 11.739 ms 11.733 ms 14.863 ms
7 ae9.pe2.brwy.nsw.aarnet.net.au (113.197.15.56) 11.988 ms 11.982 ms 11.989 ms
8 et-3-1-0.pe1.brwy.nsw.aarnet.net.au (113.197.15.146) 12.364 ms 12.356 ms 12.364 ms
9 138.44.5.1 (138.44.5.1) 12.613 ms 12.608 ms 12.613 ms
10 ombcr1-te-1-5.gw.unsw.edu.au (149.171.255.106) 12.613 ms 12.606 ms 12.612 ms
11 libudnex1-po-2.gw.unsw.edu.au (149.171.255.198) 13.113 ms 13.356 ms 13.113 ms
12 ufw1-ae-1-3154.gw.unsw.edu.au (149.171.253.36) 13.237 ms 13.107 ms 13.237 ms

Telstra.net machine to server:

weber % traceroute www.telstra.net

traceroute to www.telstra.net (203.50.5.178), 30 hops max, 60 byte packets

1 cserouter1-server.cse.unsw.EDU.AU (129.94.242.251) 0.196 ms 0.191 ms 0.182 ms

2 129.94.39.17 (129.94.39.17) 1.073 ms 1.110 ms 1.121 ms

3 libudnex1-vl-3154.gw.unsw.edu.au (149.171.253.34) 1.934 ms ombudnex1-vl-3154.gw.unsw.edu.au (149.171.253.35) 1.920 ms libudnex1-vl-3154.gw.unsw.edu.au (149.171.253.34) 1.912 ms

4 ombcr1-po-6.gw.unsw.edu.au (149.171.255.169) 1.358 ms 1.372 ms 1.401 ms

5 unswbr1-te-2-13.gw.unsw.edu.au (149.171.255.105) 1.814 ms 1.812 ms 1.799 ms

6 138.44.5.0 (138.44.5.0) 1.798 ms 1.615 ms 1.583 ms

7 et-0-3-0.pe1.bkvl.nsw.aarnet.net.au (113.197.15.147) 1.857 ms 1.724 ms 1.660 ms

8 ae9.bb1.a.syd.aarnet.net.au (113.197.15.57) 2.037 ms 2.041 ms 2.051 ms

9 gigabitethernet1-1.pe1.b.syd.aarnet.net.au (202.158.202.18) 2.133 ms 2.167 ms 2.246 ms

10 gigabitethernet3-11.ken37.sydney.telstra.net (139.130.0.77) 3.988 ms 4.017 ms 3.979 ms

11 bundle-ether13.ken-core10.sydney.telstra.net (203.50.11.94) 4.989 ms 3.979 ms 4.873 ms

12 bundle-ether10.win-core10.melbourne.telstra.net (203.50.11.123) 15.582 ms 14.997 ms 14.991 ms

13 gigabitethernet5-0.exi-service2.melbourne.telstra.net (203.50.80.132) 13.879 ms 13.951 ms 14.046 ms

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Taiwan HiNet server to machine:

Tracing the route to cserouter1-server.cse.unsw.EDU.AU (129.94.242.251)

1 TPDB-3516.hinet.net (210.65.161.22) 0 msec 0 msec 0 msec

2 TPDT-3011.hinet.net (220.128.1.146) 4 msec 4 msec 0 msec
3 tpdb-3021.hinet.net (220.128.24.90) 0 msec 4 msec 0 msec
4 r4103-s2.tp.hinet.net (220.128.1.13) 4 msec 0 msec 4 msec
5 r4003-s2.tp.hinet.net (220.128.3.145) 0 msec 0 msec 0 msec
6 xe-0-0-0-3-5.r02.osakjp02.jp.bb.gin.ntt.net (129.250.8.157) 32 msec
xe-0-1-0-3-0.r02.osakjp02.jp.bb.gin.ntt.net (129.250.66.13) 40 msec
xe-0-0-0-3-5.r02.osakjp02.jp.bb.gin.ntt.net (129.250.8.157) 36 msec
7 ae-3.r25.osakjp02.jp.bb.gin.ntt.net (129.250.2.129) 40 msec 36 msec 36 msec
8 ae-0.r20.sngpsi07.sg.bb.gin.ntt.net (129.250.2.66) 84 msec 84 msec 88 msec
9 ae-1.r01.sngpsi03.sg.bb.gin.ntt.net (129.250.4.175) 84 msec 80 msec 84 msec
10 xe-0-0-0-14.r01.sngpsi03.sg.ce.gin.ntt.net (116.51.27.146) 256 msec 260 msec 264 msec
11 xe-3-0-3.pe1.brwy.nsw.aarnet.net.au (113.197.15.206) 264 msec 260 msec 264 msec
12 138.44.5.1 256 msec 260 msec 256 msec
13 libcr1-te-1-5.gw.unsw.edu.au (149.171.255.102) 260 msec 260 msec 288 msec
14 ombudnex1-po-1.gw.unsw.edu.au (149.171.255.202) 256 msec
libudnex1-po-1.gw.unsw.edu.au (149.171.255.166) 264 msec 256 msec
15 ufw1-ae-1-3154.gw.unsw.edu.au (149.171.253.36) 256 msec 260 msec 264 msec
16 * * *
17 * * *
18 * * *
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Taiwan HiNet machine to server:

weber % traceroute www.hinet.net

traceroute to www.hinet.net (175.41.55.4), 30 hops max, 60 byte packets

1 cserouter1-server.cse.unsw.EDU.AU (129.94.242.251) 0.158 ms 0.139 ms 0.127 ms

2 129.94.39.17 (129.94.39.17) 1.038 ms 0.987 ms 1.015 ms

3 ombudnex1-vl-3154.gw.unsw.edu.au (149.171.253.35) 1.902 ms 1.887 ms libudnex1-vl-3154.gw.unsw.edu.au (149.171.253.34) 1.470 ms

4 libcr1-po-5.gw.unsw.edu.au (149.171.255.165) 1.221 ms ombcr1-po-5.gw.unsw.edu.au (149.171.255.197) 1.235 ms libcr1-po-5.gw.unsw.edu.au (149.171.255.165) 1.238 ms

5 unswbr1-te-1-9.gw.unsw.edu.au (149.171.255.101) 1.444 ms unswbr1-te-2-13.gw.unsw.edu.au (149.171.255.105) 1.571 ms 1.500 ms

6 138.44.5.0 (138.44.5.0) 1.692 ms 1.566 ms 1.593 ms

7 et-0-3-0.pe1.bkvl.nsw.aarnet.net.au (113.197.15.147) 1.921 ms 1.833 ms 1.900 ms

8 ge-4_0_0.bb1.a.pao.aarnet.net.au (202.158.194.177) 156.386 ms 156.332 ms 156.357 ms

9 public-peering-twgate.net (198.32.176.160) 156.236 ms 156.227 ms 156.246 ms

10 5-60-41-175.TWGATE-IP.twgate.net (175.41.60.5) 281.049 ms 281.029 ms 280.950 ms

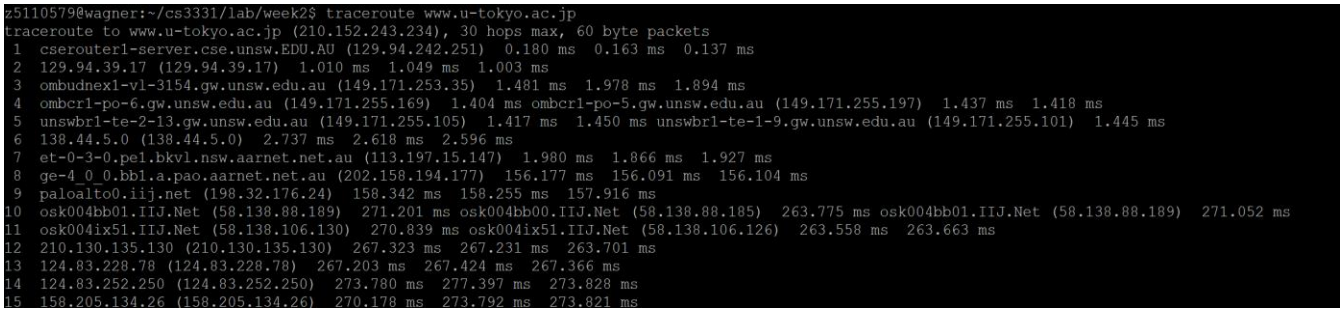
11 218-60-41-175.TWGATE-IP.twgate.net (175.41.60.218) 342.902 ms 309.092 ms 338.498 ms

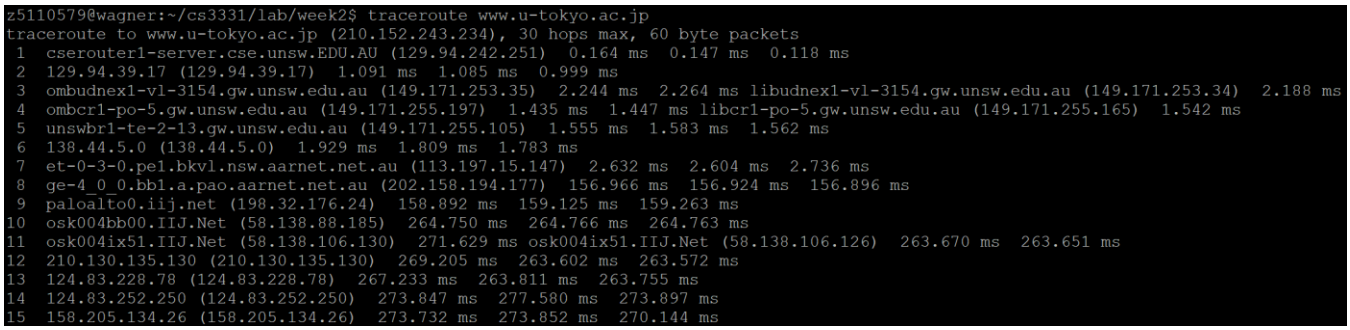
12 218-60-41-175.TWGATE-IP.twgate.net (175.41.60.218) 308.118 ms !X 327.451 ms !X 327.472 ms !X

www.speedtest.com.sg (202.150.221.170)

www.telstra.net (203.50.5.178)

No, the reverse path doesn't go through the same routers as the forward path because there are many paths between two end points. I run traceroute www.u-tokyo.ac.jp twice, below are two difference outputs





If observe common routers, the IP address may be not same because one host may have several IP addresses, they are similar.

EXERCISE 4

1.

The distance between UNSW and UQ is 734.06 km, with RTT = 16.564

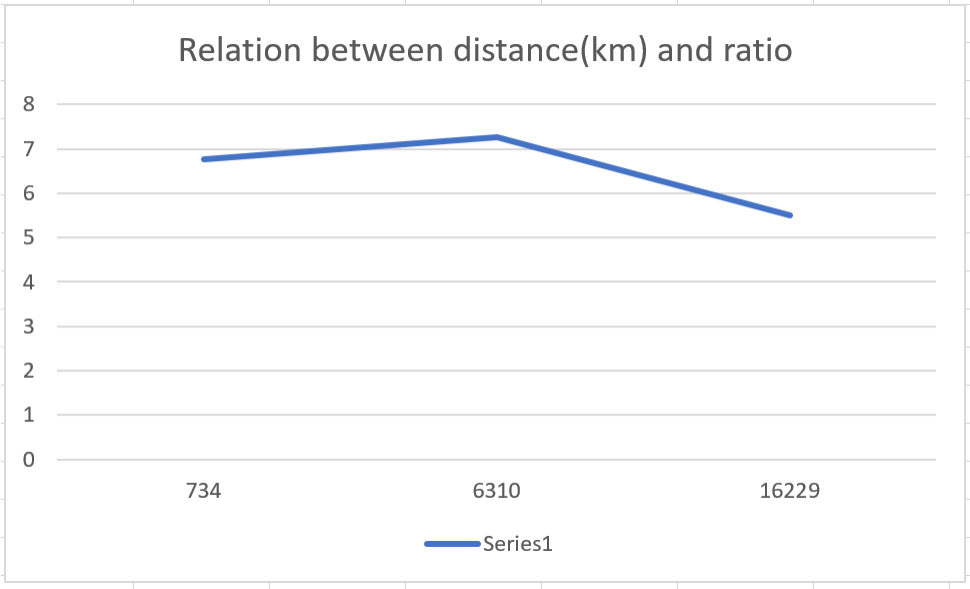
The distance between UNSW and NUS is 6309.93 km, with RTT = 152.806

The distance between UNSW and the university in Berlin is 16229.1 km, with RTT = 297.447

After calculation, we get the ratios for the 3 places, they are

6.77 7.26 5.5

Then draw the chart,

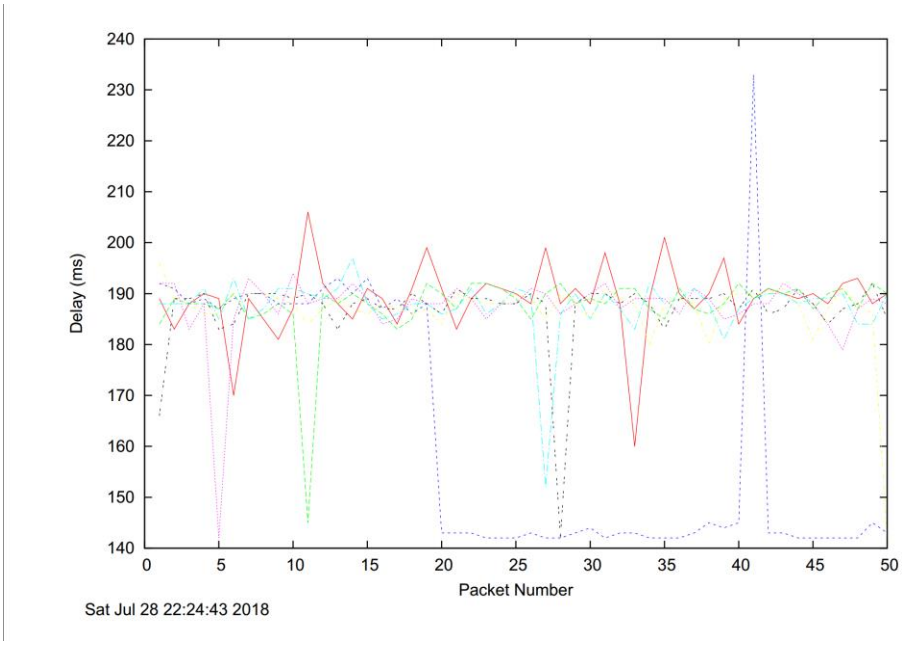


Because for any packets, RTT is they reach the destination from UNSW then come back, but the distance is from UNSW to the destination, hence the ratio is at least 2

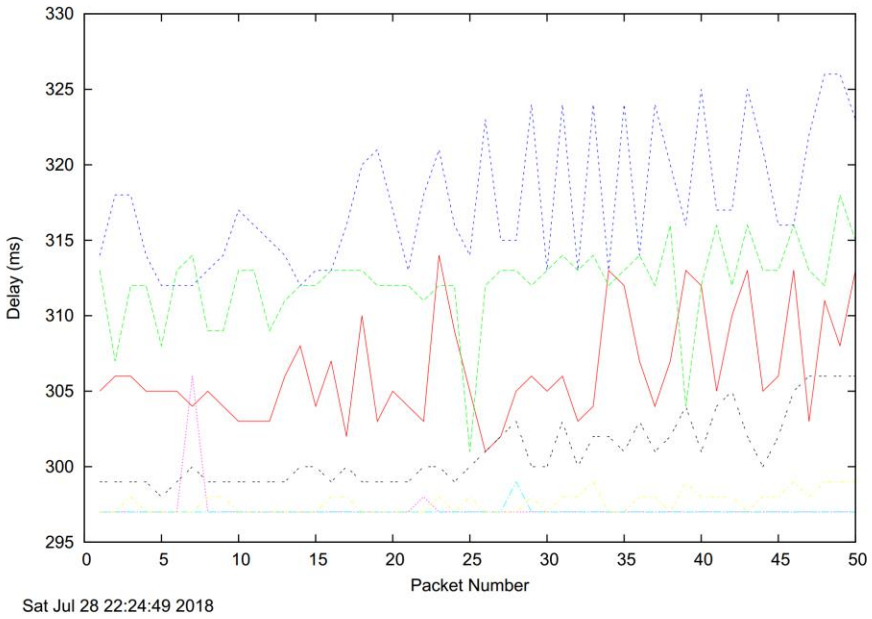
Second during the transmission, there are 3 delays except propagation delay, processing delay which check bit errors, transmission delay which depends on the size of the packets, queueing delay which depends on the congestion at the routers. Hence the overall ratio is greater than 2.

2.

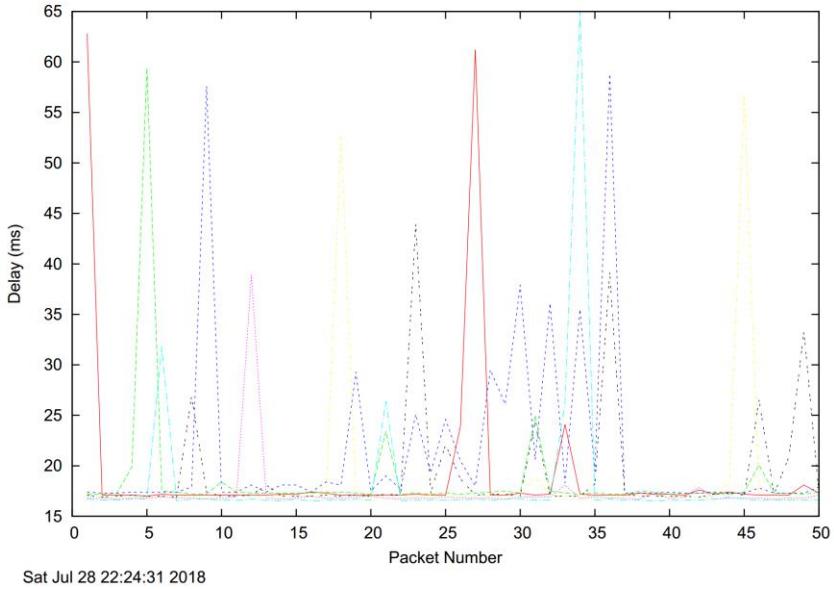
Below connecting to www.nus.edu.sg



Below connecting to www.tu-berlin



Below connecting to www.uq.edu.au



The delay to the destination is not constant, the reason is that processing delay and queueing delay are not constant, especially queueing delay which depends on the congestion of routers, it cannot be constant at most time.

3.

The processing delay depend on the packet size, but it varies little with different packet size.

The queueing delay doesn’t depend on the packet size, it only depends on the congestion of routers.

The transmission delay depends on the packet size, the transmission delay in constant if packet size is fixed.

The propagation delay doesn’t depend on the packet size, it depends on the length of physical link.