Lab 1

Exercise 1:

   1. What is the ip address of www.koala.com.au?

104.18.60.21
104.18.61.21

It has 2 addresses for output because it acts a load balancing to help with internet traffic via the gateway as it will speed things and up and reduce load. It can also have multiple addresses because it is hosted in multiple locations (eg: serve web pages based on the user's location).

   2. Find name of 127.0.0.1

name = localhost

It is the default name for describing the local computer IP address. It means that you are communicating with your own computer. Instead of trying to contact another machine on the internet, you are contacting your own computer.

Exercise 2:

Website	Reachable
www.unsw.edu.au	Yes
http://www.getfittest.com.au/	No
www.mit.edu	Yes
www.intel.com.au	Yes
www.tpg.com.au	Yes
www.hola.hp	No
www.amazon.com	Yes
www.tsinghua.edu.cn	Yes
www.kremlin.ru	Yes
8.8.8.8	Yes

Non reachable because it is unknown. Therefore there is no valid route to the desired destination. The host is not stored in the DNS

Exercise 3:

Part 1

- 22 routers
- UNSW has 5 routers
- router 9 and 10 are part of the pacific network

```
z5161709@weber:~/comp3331/wk1$ traceroute www.columbia.edu
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)  0.170 ms  0.172 ms  0.155 ms
 2  129.94.39.17 (129.94.39.17)  0.923 ms  0.940 ms  0.927 ms
 3  libudnex1-vl-3154.gw.unsw.edu.au (149.171.253.34)  1.612 ms  1.363 ms ombudnex1-vl-3154.gw.unsw.edu.au (149.171.25
3.35)  1.547 ms
 4  ombcr1-po-5.gw.unsw.edu.au (149.171.255.197)  1.130 ms ombcr1-po-6.gw.unsw.edu.au (149.171.255.169)  1.234 ms libc
r1-po-5.gw.unsw.edu.au (149.171.255.165)  1.304 ms
 5  unswbr1-te-2-13.gw.unsw.edu.au (149.171.255.105)  1.276 ms  1.316 ms  1.376 ms
 6  138.44.5.0 (138.44.5.0)  1.486 ms  1.304 ms  1.302 ms
 7  et-1-3-0.pe1.sxt.bkvl.nsw.aarnet.net.au (113.197.15.149)  2.163 ms  2.177 ms  2.147 ms
 8  et-0-0-0.pe1.a.hnl.aarnet.net.au (113.197.15.99)  95.169 ms  95.214 ms  95.332 ms
 9  et-2-1-0.bdr1.a.sea.aarnet.net.au (113.197.15.201)  147.005 ms  147.005 ms  146.976 ms
10  abilene-1-lo-jmb-706.sttlwa.pacificwave.net (207.231.240.8)  147.109 ms  147.069 ms  147.036 ms
11  ae-1.4079.rtsw.minn.net.internet2.edu (162.252.70.173)  179.707 ms  179.678 ms  179.656 ms
12  ae-1.4079.rtsw.eqch.net.internet2.edu (162.252.70.106)  187.503 ms  187.570 ms  187.577 ms
13  ae-0.4079.rtsw3.eqch.net.internet2.edu (162.252.70.163)  187.617 ms  187.910 ms  187.964 ms
14  ae-1.4079.rtsw.clev.net.internet2.edu (162.252.70.130)  196.119 ms  196.144 ms  196.099 ms
15  buf-9208-I2-CLEV.nysernet.net (199.109.11.33)  200.684 ms  200.633 ms  200.568 ms
16  syr-9208-buf-9208.nysernet.net (199.109.7.193)  203.780 ms  203.717 ms  203.673 ms
17  nyc111-9204-syr-9208.nysernet.net (199.109.7.94)  212.921 ms  212.875 ms  212.862 ms
18  nyc-9208-nyc111-9204.nysernet.net (199.109.7.165)  212.922 ms  212.893 ms  213.419 ms
19  columbia.nyc-9208.nysernet.net (199.109.4.14)  213.506 ms  213.033 ms  213.147 ms
20  cc-core-1-x-nyser32-gw-1.net.columbia.edu (128.59.255.5)  213.293 ms  213.221 ms  213.413 ms
21  cc-conc-1-x-cc-core-1.net.columbia.edu (128.59.255.21)  217.233 ms  214.059 ms  270.300 ms
22  columbiauniversity.us (128.59.105.24)  213.174 ms  213.255 ms  213.270 ms
z5161709@weber:~/comp3331/wk1$
```

Part 2:

- last shared router is router 6, diverges at 7
- Router 6 is the Australian Academic and Research Network. They provide internet services to the Australian education and research communities and their research partners.
- No the number of hops is not proportional to the distance

www.ucla.edu

```
z5161709@weber:~/comp3331/wk1$ 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)  0.141 ms  0.122 ms  0.100 ms
 2  129.94.39.17 (129.94.39.17)  0.873 ms  0.886 ms  0.868 ms
 3  libudnex1-vl-3154.gw.unsw.edu.au (149.171.253.34)  1.322 ms ombudnex1-vl-3154.gw.unsw.edu.au (149.171.253.35)  1.4
59 ms libudnex1-vl-3154.gw.unsw.edu.au (149.171.253.34)  1.533 ms
 4  libcr1-po-6.gw.unsw.edu.au (149.171.255.201)  1.186 ms  1.212 ms libcr1-po-5.gw.unsw.edu.au (149.171.255.165)  1.1
88 ms
 5  unswbr1-te-1-9.gw.unsw.edu.au (149.171.255.101)  1.114 ms unswbr1-te-2-13.gw.unsw.edu.au (149.171.255.105)  1.427
ms  1.412 ms
 6  138.44.5.0 (138.44.5.0)  1.429 ms  1.391 ms  1.428 ms
 7  et-1-3-0.pe1.sxt.bkvl.nsw.aarnet.net.au (113.197.15.149)  2.093 ms  2.407 ms  2.346 ms
 8  et-0-0-0.pe1.a.hnl.aarnet.net.au (113.197.15.99)  95.266 ms  95.243 ms  95.295 ms
 9  et-2-1-0.bdr1.a.sea.aarnet.net.au (113.197.15.201)  147.094 ms  146.897 ms  147.019 ms
10  cenichpr-1-is-jmb-778.snvaca.pacificwave.net (207.231.245.129)  164.470 ms  164.302 ms  164.908 ms
11  hpr-lax-hpr3--svl-hpr3-100ge.cenic.net (137.164.25.73)  160.151 ms  160.913 ms  160.252 ms
12  * * *
13  bd11f1.anderson--cr00f2.csb1.ucla.net (169.232.4.4)  162.376 ms  162.395 ms  162.357 ms
14  cr00f2.csb1--rtr12f4.mathsci.ucla.net (169.232.8.183)  161.351 ms cr00f1.anderson--rtr11f4.mathsci.ucla.net (169.2
32.8.185)  160.604 ms cr00f2.csb1--rtr12f4.mathsci.ucla.net (169.232.8.183)  160.506 ms
15  * * *
16  * * *
17  * * *
18  * * *
19  * * *
20  * * *
21  * * *
22  * * *
23  * * *
24  * * *
25  * * *
26  * * *
27  * * *
28  * * *
29  * * *
30  * * *
z5161709@weber:~/comp3331/wk1$
```

```
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)  0.193 ms  0.169 ms  0.160 ms
 2  129.94.39.17 (129.94.39.17)  0.937 ms  0.931 ms  0.919 ms
 3  libudnex1-vl-3154.gw.unsw.edu.au (149.171.253.34)  1.736 ms  1.479 ms ombudnex1-vl-3154.gw.unsw.edu.au (149.171.25
3.35)  20.729 ms
 4  libcr1-po-5.gw.unsw.edu.au (149.171.255.165)  1.252 ms ombcr1-po-6.gw.unsw.edu.au (149.171.255.169)  7.285 ms libc
r1-po-6.gw.unsw.edu.au (149.171.255.201)  1.275 ms
 5  unswbr1-te-1-9.gw.unsw.edu.au (149.171.255.101)  1.310 ms  1.315 ms unswbr1-te-2-13.gw.unsw.edu.au (149.171.255.10
5)  1.361 ms
 6  138.44.5.0 (138.44.5.0)  1.454 ms  1.308 ms  1.299 ms
 7  et-0-3-0.pe1.bkvl.nsw.aarnet.net.au (113.197.15.147)  1.804 ms  1.810 ms  1.810 ms
 8  ge-4_0_0.bb1.a.pao.aarnet.net.au (202.158.194.177)  155.528 ms  155.482 ms  155.498 ms
 9  paloalto0.iij.net (198.32.176.24)  156.339 ms  156.416 ms  156.436 ms
10  osk004bb01.IIJ.Net (58.138.88.189)  269.462 ms  269.381 ms osk004bb00.IIJ.Net (58.138.88.185)  286.916 ms
11  osk004ip57.IIJ.Net (58.138.106.162)  286.890 ms  286.886 ms osk004ip57.IIJ.Net (58.138.106.166)  269.247 ms
12  210.130.135.130 (210.130.135.130)  279.745 ms  279.693 ms  275.476 ms
13  124.83.228.58 (124.83.228.58)  278.317 ms  308.068 ms  308.064 ms
14  124.83.252.178 (124.83.252.178)  275.729 ms  286.093 ms  286.029 ms
15  158.205.134.26 (158.205.134.26)  284.029 ms  293.019 ms  293.275 ms
16  * * *
17  * * *
18  * * *
19  * * *
20  * * *
21  * * *
22  * * *
23  * * *
24  * * *
25  * * *
26  * * *
27  * * *
28  * * *
29  * * *
30  * * *
z5161709@weber:~/comp3331/wk1$
```

www.lancaster.ac.uk

```
z5161709@weber:~/comp3331/wk1$ 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)  0.135 ms  0.115 ms  0.102 ms
 2  129.94.39.17 (129.94.39.17)  0.897 ms  0.899 ms  0.882 ms
 3  libudnex1-vl-3154.gw.unsw.edu.au (149.171.253.34)  1.368 ms ombudnex1-vl-3154.gw.unsw.edu.au (149.171.253.35)  1.5
89 ms  1.596 ms
 4  libcr1-po-6.gw.unsw.edu.au (149.171.255.201)  1.209 ms ombcr1-po-5.gw.unsw.edu.au (149.171.255.197)  1.198 ms  1.2
07 ms
 5  unswbr1-te-1-9.gw.unsw.edu.au (149.171.255.101)  1.216 ms  1.261 ms  1.227 ms
 6  138.44.5.0 (138.44.5.0)  5.724 ms  5.337 ms  5.332 ms
 7  et-2-0-5.bdr1.sing.sin.aarnet.net.au (113.197.15.233)  92.567 ms  92.579 ms  92.591 ms
 8  138.44.226.7 (138.44.226.7)  259.992 ms  259.989 ms  260.002 ms
 9  janet-gw.mx1.lon.uk.geant.net (62.40.124.198)  259.996 ms  260.008 ms  260.014 ms
10  ae29.londpg-sbr2.ja.net (146.97.33.2)  260.601 ms  260.615 ms  260.479 ms
11  ae31.erdiss-sbr2.ja.net (146.97.33.22)  264.279 ms  264.413 ms  264.393 ms
12  ae29.manckh-sbr2.ja.net (146.97.33.42)  266.258 ms  266.159 ms  266.183 ms
13  ae24.lanclu-rbr1.ja.net (146.97.38.58)  268.829 ms  268.449 ms  268.388 ms
14  lancaster-university.ja.net (194.81.46.2)  281.252 ms  281.276 ms  281.232 ms
15  is-border01.bfw01.rtr.lancs.ac.uk (148.88.253.202)  269.004 ms  268.880 ms  268.914 ms
16  bfw01.iss-servers.is-core01.rtr.lancs.ac.uk (148.88.250.98)  273.870 ms  270.579 ms  270.615 ms
17  * * *
18  www.lancs.ac.uk (148.88.65.80)  269.099 ms !X  269.025 ms !X  269.199 ms !X
z5161709@weber:~/comp3331/wk1$
```

Router 6:

```
% Information related to '138.44.5.0/24AS7575'

route:          138.44.5.0/24
origin:         AS7575
descr:          Australian Academic and Research Network
                Building 9
                Banks Street
mnt-by:         MAINT-AARNET-AP
last-modified:  2019-04-03T03:55:51Z
source:         APNIC

% This query was served by the APNIC Whois Service version 1.88.15-46 (WHOIS-NODE1)
```

Part 3:
  - IP Addresses of the additional 2 other servers:
    • Argentina
      (https://www.subituweb.com/nettools/traceroute.php?host=129.94.242.118&submit=Traceroute):
      o 200.26.189.177

```
Traceroute 129.94.24  ×  │    Traceroute        ×  │    traceroute        ×  │    Traceroute - til 129.9  ×  │  +        –  □  ×

←  →  C    🔒 subituweb.com/nettools/traceroute.php?host=129.94.242.118&submit=Traceroute                      ☆  🔵  ⋮

Resultado de traza:

traceroute to 129.94.242.118 (129.94.242.118), 30 hops max, 60 byte packets
 1  host127.baires01.com.ar (200.26.189.127)  0.106 ms  0.023 ms  0.022 ms
 2  226.128.61.200.host.ifxnw.com.ar (200.61.128.226)  0.477 ms  0.525 ms *
 3  200.51.235.225 (200.51.235.225)  133.685 ms  133.651 ms  133.633 ms
 4  200.51.208.62 (200.51.208.62)  133.395 ms  133.519 ms  133.487 ms
 5  213.140.39.116 (213.140.39.116)  134.011 ms  133.974 ms  133.778 ms
 6  213.140.39.116 (213.140.39.116)  132.651 ms  132.765 ms  132.740 ms
 7  176.52.249.35 (176.52.249.35)  133.755 ms *  133.646 ms
 8  94.142.118.173 (94.142.118.173)  132.656 ms 84.16.15.172 (84.16.15.172)  135.065 ms 94.142.118.173 (94.142.118.173)  132.7
 9  84.16.15.160 (84.16.15.160)  133.486 ms  133.319 ms 84.16.15.172 (84.16.15.172)  134.589 ms
10  ae-12.r04.miamfl02.us.bb.gin.ntt.net (129.250.9.85)  133.560 ms  133.532 ms  133.511 ms
11  ae-0.r21.miamfl02.us.bb.gin.ntt.net (129.250.4.20)  163.693 ms ae-12.r04.miamfl02.us.bb.gin.ntt.net (129.250.9.85)  132.97
12  ae-2.r24.dllstx09.us.bb.gin.ntt.net (129.250.2.219)  165.461 ms * *
13  ae-5.r22.lsanca07.us.bb.gin.ntt.net (129.250.7.69)  197.770 ms * *
14  ae-1.r01.lsanca07.us.bb.gin.ntt.net (129.250.3.123)  202.292 ms ae-5.r22.lsanca07.us.bb.gin.ntt.net (129.250.7.69)  194.72
15  ae-1.r01.lsanca07.us.bb.gin.ntt.net (129.250.3.123)  200.043 ms ae-1.r00.lsanca07.us.bb.gin.ntt.net (129.250.3.17)  195.08
16  ae-1.a02.lsanca07.us.bb.gin.ntt.net (129.250.3.234)  196.077 ms  198.270 ms  196.348 ms
17  xe-0-0-6-3.a02.lsanca07.us.ce.gin.ntt.net (204.1.253.166)  200.998 ms  198.054 ms xe-0-2-1.pe1.alxd.nsw.aarnet.net.au (202
18  et-8-1-0.pe1.brwy.nsw.aarnet.net.au (113.197.15.152)  360.486 ms xe-0-2-1.pe1.alxd.nsw.aarnet.net.au (202.158.194.172)  34
19  138.44.5.1 (138.44.5.1)  354.685 ms  355.064 ms  357.797 ms
20  138.44.5.1 (138.44.5.1)  354.355 ms  360.202 ms  354.396 ms
21  ombcr1-te-1-5.gw.unsw.edu.au (149.171.255.106)  355.402 ms libudnex1-po-2.gw.unsw.edu.au (149.171.255.198)  355.585 ms omb
22  ufw1-ae-1-3154.gw.unsw.edu.au (149.171.253.36)  358.112 ms  355.075 ms  360.006 ms
23  129.94.39.23 (129.94.39.23)  361.662 ms  358.350 ms  358.478 ms
24  129.94.39.23 (129.94.39.23)  354.827 ms *  356.228 ms
25  * * *
26  * * *
27  * * *
28  * * *
29  * * *
30  * * *

Hecho ...
```

    • Iceland (https://www.rhnet.is/cgi-bin/rh-traceroute?ip=129.94.242.118):
      o 130.208.16.31

```
Leið frá www.rhnet.is til 129.94.242.118


traceroute to 129.94.242.118 (129.94.242.118), 64 hops max, 40 byte packets
 1  ndn-gw1-ge2-0-0.rhnet.is (130.208.16.13)  0.166 ms  0.137 ms  0.134 ms
 2  is-rey.nordu.net (109.105.102.1)  0.233 ms  0.559 ms  0.254 ms
 3  uk-hex.nordu.net (109.105.97.41)  37.999 ms  38.154 ms  37.859 ms
 4  nl-sar.nordu.net (109.105.97.124)  42.763 ms  42.743 ms  42.749 ms
 5  us-man.nordu.net (109.105.97.64)  127.778 ms  127.731 ms  127.999 ms
 6  xe-2-3-0.118.rtr.newy32aoa.net.internet2.edu (109.105.98.10)  127.992 ms  127.735 ms  127.990 ms
 7  ae-3.4079.rtsw.wash.net.internet2.edu (162.252.70.138)  133.033 ms  134.640 ms  133.477 ms
 8  ae-0.4079.rtsw2.ashb.net.internet2.edu (162.252.70.137)  133.603 ms  133.547 ms  136.634 ms
 9  ae-2.4079.rtsw.ashb.net.internet2.edu (162.252.70.74)  133.712 ms  133.849 ms  133.659 ms
10  ae-20.4079.rtsw.clev.net.internet2.edu (162.252.70.129)  141.403 ms  141.287 ms  141.298 ms
11  ae-3.4079.rtsw3.eqch.net.internet2.edu (162.252.70.131)  155.284 ms  152.311 ms  150.957 ms
12  ae-5.4079.rtsw.eqch.net.internet2.edu (162.252.70.162)  153.784 ms  193.339 ms  183.253 ms
13  ae-0.4079.rtsw.minn.net.internet2.edu (162.252.70.107)  158.072 ms  158.036 ms  157.884 ms
14  ae-1.4079.rtsw.seat.net.internet2.edu (162.252.70.172)  190.082 ms  190.028 ms  190.115 ms
15  aarnet-2-lo-jmb-706.sttlwa.pacificwave.net (207.231.240.4)  190.053 ms  190.218 ms  190.054 ms
16  et-2-0-0.pe1.a.hnl.aarnet.net.au (113.197.15.200)  242.441 ms  242.574 ms  242.567 ms
17  et-2-1-0.pe1.sxt.bkvl.nsw.aarnet.net.au (113.197.15.98)  335.689 ms  335.674 ms  335.749 ms
18  et-3-3-0.pe1.brwy.nsw.aarnet.net.au (113.197.15.148)  314.302 ms  314.723 ms  314.282 ms
19  138.44.5.1 (138.44.5.1)  314.457 ms  314.706 ms  314.546 ms
20  libcr1-te-1-5.gw.unsw.edu.au (149.171.255.102)  314.583 ms  314.460 ms  314.493 ms
21  libudnex1-po-1.gw.unsw.edu.au (149.171.255.166)  314.990 ms  315.210 ms  323.990 ms
22  ufw1-ae-1-3154.gw.unsw.edu.au (149.171.253.36)  315.195 ms  315.385 ms  315.229 ms
23  129.94.39.23 (129.94.39.23)  315.434 ms  315.466 ms  315.371 ms
24  * * *
25  * * *
26  * * *
```

Argentina

```
traceroute to 200.26.189.177 (200.26.189.177), 30 hops max, 60 byte packets
 1  cserouter1-server.cse.unsw.EDU.AU (129.94.242.251)  0.142 ms  0.132 ms  0.118 ms
 2  129.94.39.17 (129.94.39.17)  0.927 ms  0.877 ms  0.905 ms
 3  ombudnex1-vl-3154.gw.unsw.edu.au (149.171.253.35)  1.491 ms libudnex1-vl-3154.gw.unsw.edu.au (149.171.253.34)  1.3
94 ms ombudnex1-vl-3154.gw.unsw.edu.au (149.171.253.35)  1.478 ms
 4  libcr1-po-6.gw.unsw.edu.au (149.171.255.201)  2.233 ms ombcr1-po-5.gw.unsw.edu.au (149.171.255.197)  1.093 ms libc
r1-po-6.gw.unsw.edu.au (149.171.255.201)  2.225 ms
 5  unswbr1-te-2-13.gw.unsw.edu.au (149.171.255.105)  1.204 ms  1.225 ms unswbr1-te-1-9.gw.unsw.edu.au (149.171.255.10
1)  1.295 ms
 6  138.44.5.0 (138.44.5.0)  1.355 ms  1.249 ms  1.315 ms
 7  et-0-3-0.pe1.bkvl.nsw.aarnet.net.au (113.197.15.147)  1.787 ms  1.697 ms  1.756 ms
 8  xe-0-2-5.bdr1.b.sea.aarnet.net.au (202.158.194.121)  144.239 ms  144.258 ms  144.222 ms
 9  ge3-0.cr02.sea01.pccwbtn.net (206.81.80.13)  144.765 ms  144.960 ms  144.912 ms
10  HundredGE0-4-0-0.br03.mia02.pccwbtn.net (63.223.46.26)  223.961 ms  224.317 ms HundredGE0-4-0-1.br03.mia02.pccwbtn
.net (63.223.46.42)  226.576 ms
11  HundredGE0-4-0-1.br03.mia02.pccwbtn.net (63.223.46.42)  223.843 ms  226.364 ms  223.640 ms
12  63-218-113-42.static.pccwglobal.net (63.218.113.42)  226.642 ms  226.662 ms  226.718 ms
13  host-186-148-109-85.ufinetlatam.net (186.148.109.85)  220.462 ms  220.440 ms  220.441 ms
14  * * *
15  * 247.128.61.200.host.ifxnw.com.ar (200.61.128.247)  354.332 ms  354.294 ms
16  host127.baires01.com.ar (200.26.189.127)  358.265 ms  355.633 ms  355.732 ms
17  mail.subituweb.com (200.26.189.177)  357.793 ms  357.731 ms  357.801 ms
```

Iceland

```
traceroute to 130.208.16.31 (130.208.16.31), 30 hops max, 60 byte packets
 1  cserouter1-server.cse.unsw.EDU.AU (129.94.242.251)  0.192 ms  0.170 ms  0.142 ms
 2  129.94.39.17 (129.94.39.17)  0.939 ms  0.958 ms  0.914 ms
 3  libudnex1-vl-3154.gw.unsw.edu.au (149.171.253.34)  1.459 ms ombudnex1-vl-3154.gw.unsw.edu.au (149.171.253.35)  1.4
01 ms libudnex1-vl-3154.gw.unsw.edu.au (149.171.253.34)  1.420 ms
 4  ombcr1-po-6.gw.unsw.edu.au (149.171.255.169)  29.562 ms ombcr1-po-5.gw.unsw.edu.au (149.171.255.197)  29.542 ms li
bcr1-po-6.gw.unsw.edu.au (149.171.255.201)  1.149 ms
 5  unswbr1-te-2-13.gw.unsw.edu.au (149.171.255.105)  34.306 ms unswbr1-te-1-9.gw.unsw.edu.au (149.171.255.101)  34.29
5 ms unswbr1-te-2-13.gw.unsw.edu.au (149.171.255.105)  34.279 ms
 6  138.44.5.0 (138.44.5.0)  1.320 ms  1.373 ms  1.349 ms
 7  et-2-0-5.bdr1.sing.sin.aarnet.net.au (113.197.15.233)  92.651 ms  92.690 ms  92.681 ms
 8  sg-sts.nordu.net (109.105.98.234)  337.952 ms  337.925 ms  337.821 ms
 9  uk-hex.nordu.net (109.105.97.168)  278.065 ms  278.041 ms  277.989 ms
10  is-rey.nordu.net (109.105.97.42)  315.196 ms  315.159 ms  315.303 ms
11  ndn-gw1.rhnet.is (109.105.102.2)  315.365 ms  344.823 ms  344.822 ms
12  virvir.rhnet.is (130.208.16.31)  315.250 ms  315.320 ms  315.238 ms
```
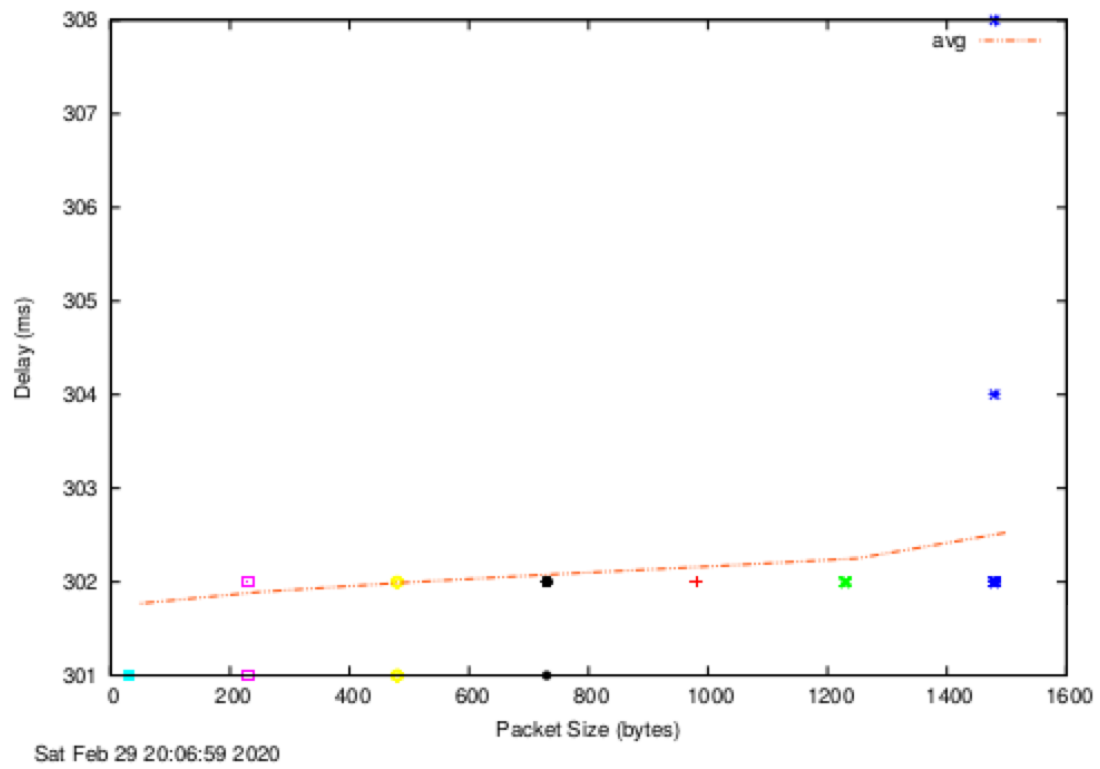
- Going forward and backwards does not share the same router path.
  - Some of the forward and backward path share the same routers IP address. Some IP address match (when closer to destination) because there might only just be the one server to connect to and didn't implement more than one IP address for load balancing
- Packet switching in the router network is why it is different going forward/backward. The packet travels independently and does not belong in a circuit and can find the best router to go to for efficiency purposes (load balancing).

Graphs

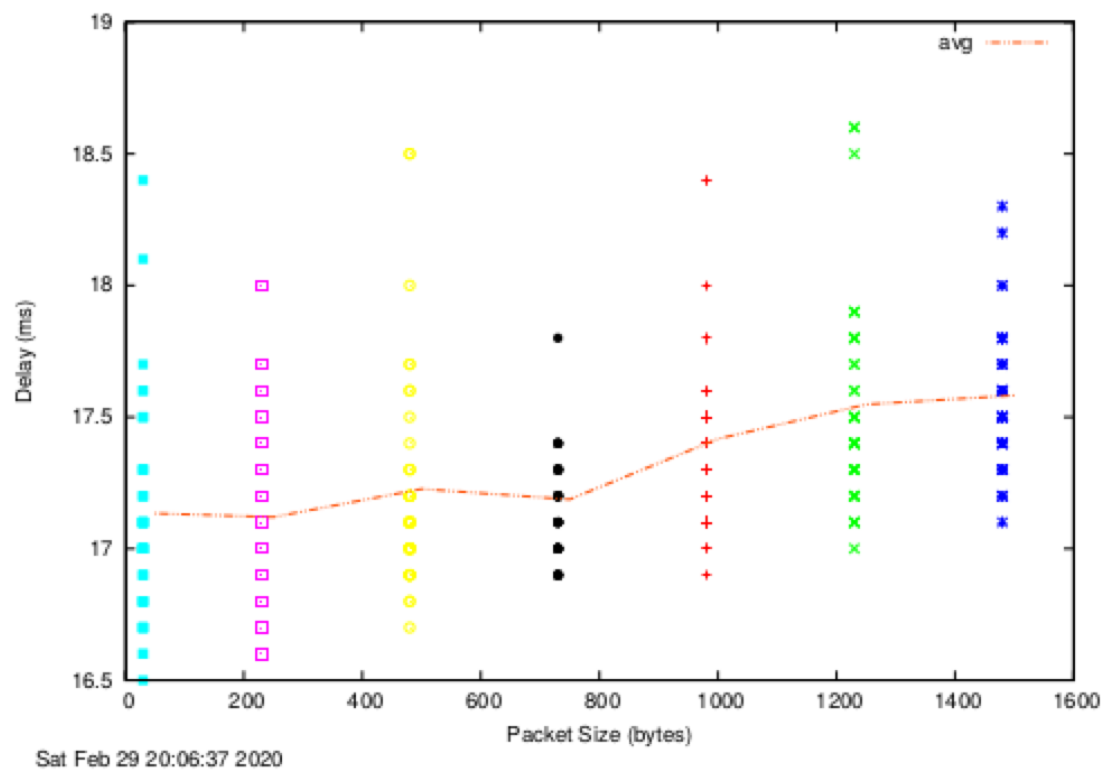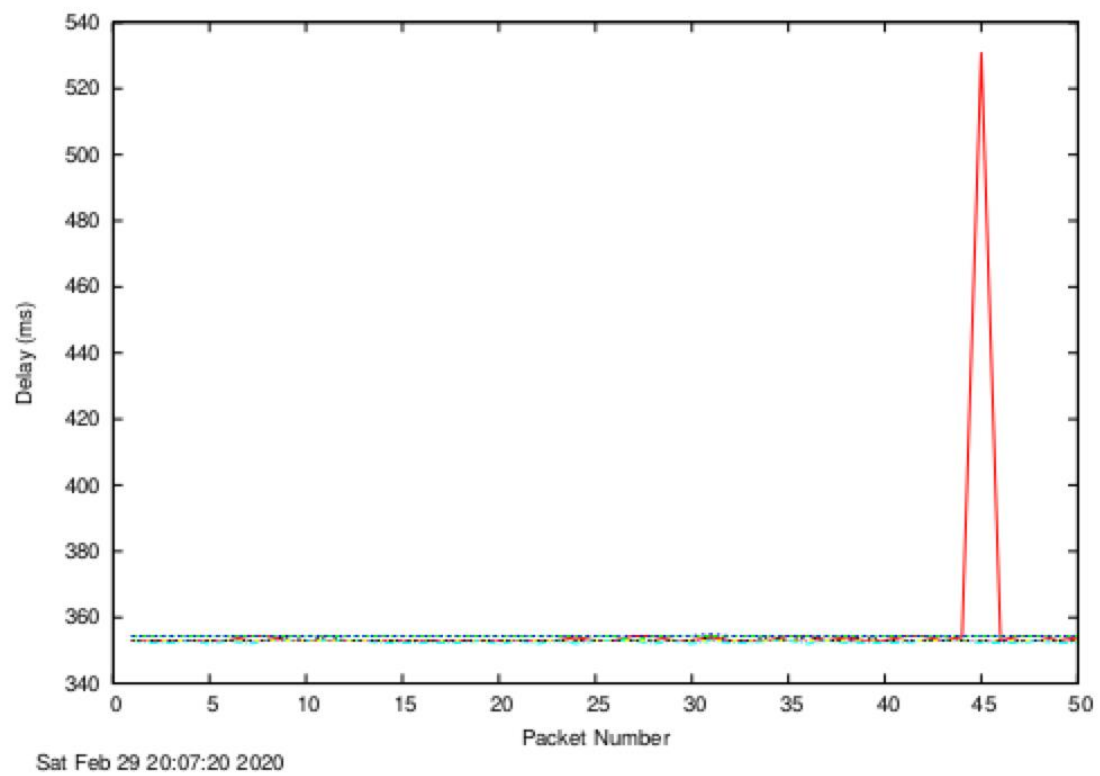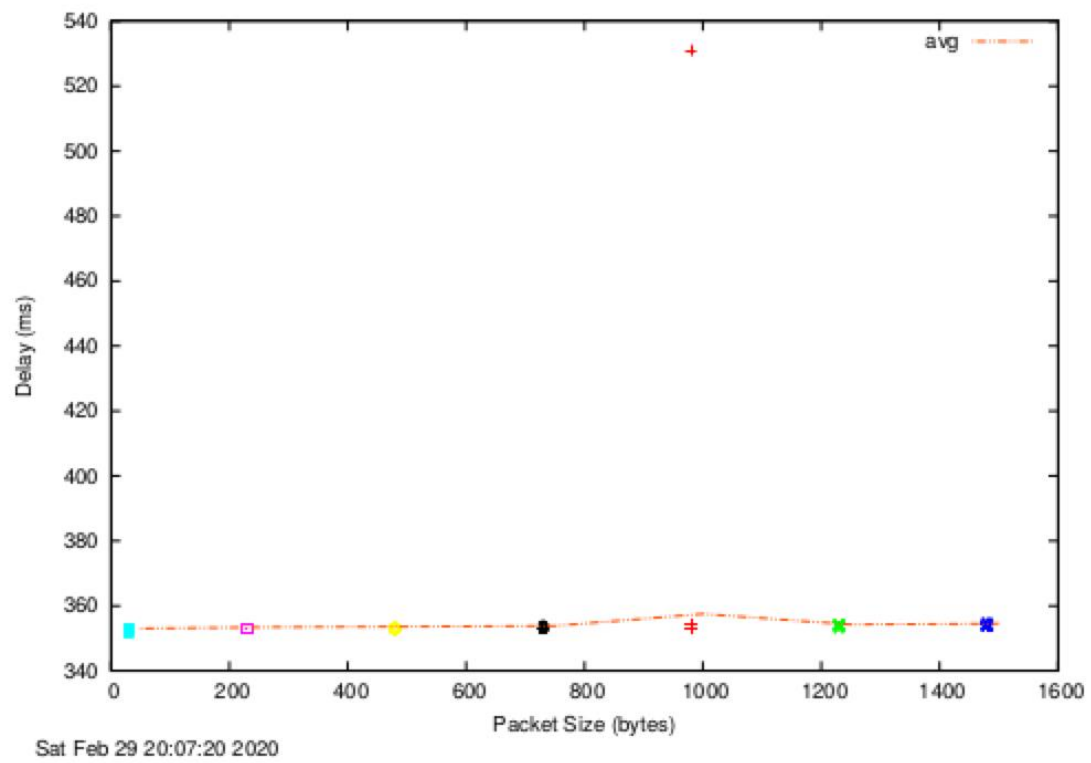University of Queensland

Delay:

Scatter:

Sat Feb 29 20:06:37 2020

University of Philippines

Delay:

Sat Feb 29 20:07:20 2020

Scatter:

Sat Feb 29 20:07:20 2020

University of Oslo
Delay:

Sat Feb 29 20:06:58 2020

Scatter:

Sat Feb 29 20:06:59 2020
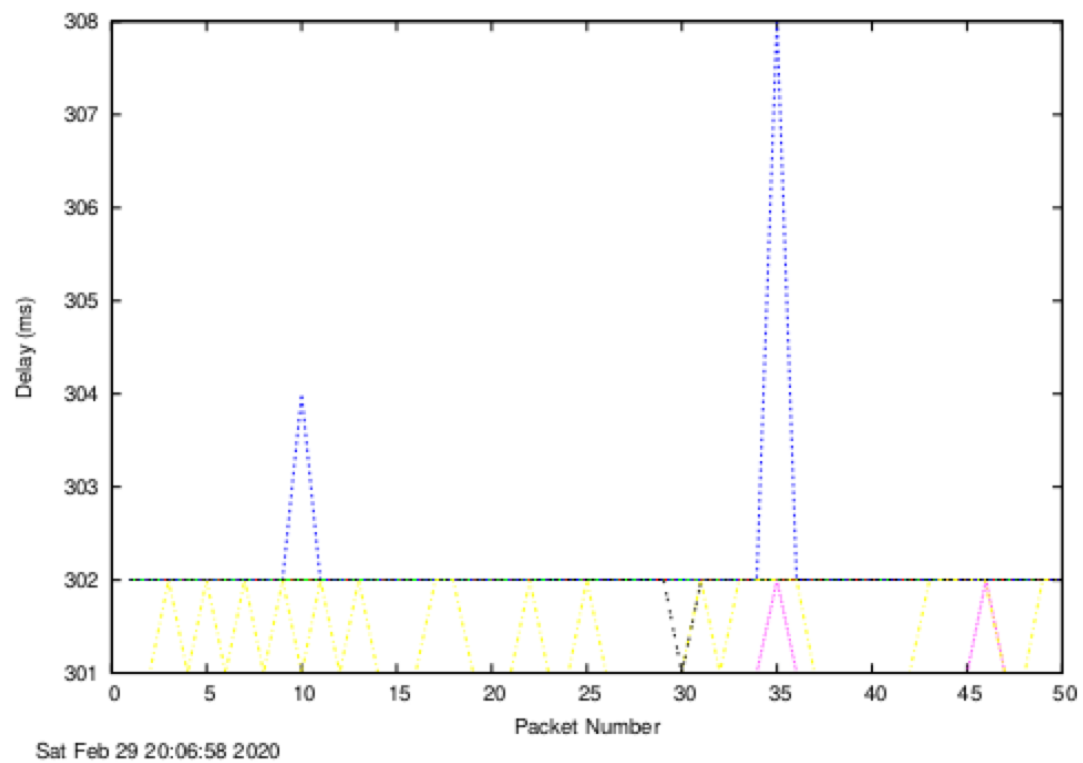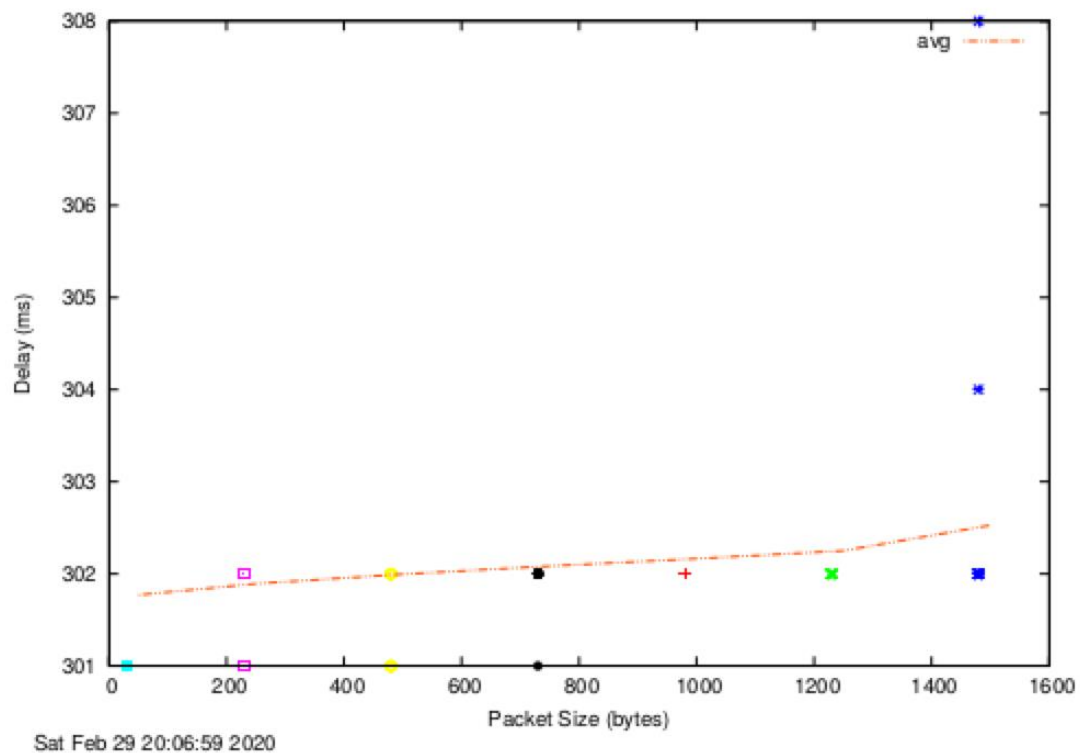
Part 1

Speed of light $= 3.8 \times 10^8 m/s$

Place	Physical distance from UNSW (km)	Shortest time for T to reach location
University of Queensland	733.55	T = ~0.0019 s, 1.9ms
University of Philippines	6209.95	T = ~0.0163 s, 16.3ms
University of Oslo	15,000	T = ~0.0395 s, 39.5ms

Round trip time calculation:
University of Queensland: 16.543/1.9 = 8.570
University of Philippines: 352.758/16.342 = 21.586
University of Oslo: 301.665/39.474 = 7.642

Distance and RTT
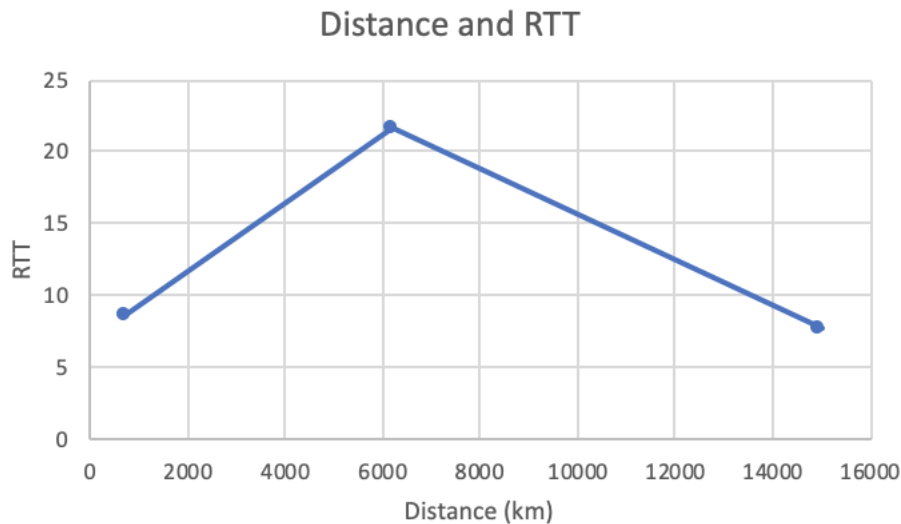
Why is the y-axis value greater than 2?

- The T is the shortest time it takes to reach the destination whereas the RTT counts the time for the packet to travel to the destination and back again to the source. Therefore, the RTT must be two times bigger than T. Therefore, the y-axis value is greater than 2 ms

Is the delay to destinations constant or does it vary? Why?

- There seems to be burst of delay during visit to the university of Philippines site and then it decreases in delay at the university of Oslo site
- Reasons for increase delay at university of Philippines:
  - Either Queuing delay, nodal processing or propagation delay
- Reasons for decrease in delay at Oslo:
  - The use of packet switching which optimises resource flow. It is dynamically allocated and shared and ensures load balancing so minimal overloading occurs

Explore where the website for www.epfl.ch (http://www.epfl.ch/) is hosted. Is it in Switzerland?


```
Non-authoritative answer:
www.epfl.ch       canonical name = www.epfl.ch.cdn.cloudflare.net.
Name:   www.epfl.ch.cdn.cloudflare.net
Address: 104.20.229.42
Name:   www.epfl.ch.cdn.cloudflare.net
Address: 104.20.228.42
```

Nope. It is hosted in the US (san Francisco).

104.20.228.42		FIND
IP address	104.20.228.42 CHANGE	
Latitude	37.751	
Longitude	-97.822	
Country	United States	
Region		
City		
Organization	Cloudflare	

104.20.229.42		FIND
IP address	104.20.229.42 CHANGE	
Latitude	37.751	
Longitude	-97.822	
Country	United States	
Region		
City		
Organization	Cloudflare	

The measured delay (i.e., the delay you can see in the graphs) is composed of propagation delay, transmission delay, processing delay and queuing delay. Which of these delays depend on the packet size and which do not?

- Transmission delay: Depends on packet size
  - It is the amount of time taken to transmit whole package of a size. It calculated by L/R, where L = size of the whole packet and R = link of bandwidth
- Propagation, Processing and Queueing: Doesn't depend on packet size
  - Propagation: relies on length of physical length over the propagation speed
  - Processing: checks for bit errors
  - Queueing: time waiting for output link for transmission