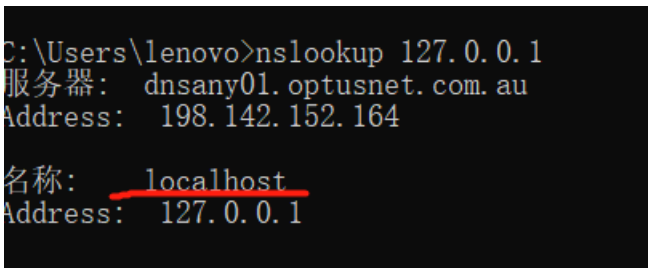
Exercise 1

www.cnn.com ip address is 151.101.29.67

My reason is to prevent hackers from attacking for security reasons. In addition, it requires multiple servers to support, different servers will have different addresses.

2, name of the IP address 127.0.0.1 is localhost



127.0.0.1 is the loopback Internet protocol (IP) address. The address is used to establish an IP connection to the same machine or computer being used by the end-user.

Exercise 2,

ping www.unsw.edu.au

It is reachable by using ping.

ping www.getfittest.com.au

Unknow host www.getfittest.com.au, it is not reachable. It may be because the host name does not even exist

ping www.mit.edu

It is reachable by using ping.

ping www.intel.com.au

It is reachable by using ping.

ping www.tgp.com.au

It is reachable by using ping.

ping www.hola.hp

It is not reachable, and it cannot be accessed by the Web browser.

ping www.amazon.com

It is reachable by using ping.

www.tsinghua.edu.au

It is reachable by using ping.

ping www.kremlin.ru

It is not reachable, but it can be accessed by the Web browser. It may be because the host refuses to respond to ping command, or this machine does not support ICMP protocol that is used by ping.

ping 8.8.8.8

It is reachable by using ping

Exercise 3,

Q1

```
No mail.
weber % 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)  0.116 ms  0.090 ms  0.11
4 ms
 2  129.94.39.17 (129.94.39.17)  0.946 ms  0.929 ms  0.874 ms
 3  ombudnex1-vl-3154.gw.unsw.edu.au (149.171.253.35)  1.689 ms  1.650 ms libudn
ex1-vl-3154.gw.unsw.edu.au (149.171.253.34)  1.402 ms
 4  ombcr1-po-6.gw.unsw.edu.au (149.171.255.169)  1.102 ms libcr1-po-5.gw.unsw.e
du.au (149.171.255.165)  1.273 ms ombcr1-po-6.gw.unsw.edu.au (149.171.255.169)
1.084 ms
 5  unswbr1-te-2-13.gw.unsw.edu.au (149.171.255.105)  1.091 ms  1.212 ms  1.103
ms
 6  138.44.5.0 (138.44.5.0)  1.274 ms  1.360 ms  1.282 ms
 7  et-1-3-0.pe1.sxt.bkvl.nsw.aarnet.net.au (113.197.15.149)  2.021 ms  1.953 ms
  1.908 ms
 8  et-0-0-0.pe1.a.hnl.aarnet.net.au (113.197.15.99)  95.093 ms  95.157 ms  95.1
65 ms
 9  et-2-1-0.bdr1.a.sea.aarnet.net.au (113.197.15.201)  146.607 ms  146.655 ms
146.638 ms
10  abilene-1-lo-jmb-706.sttlwa.pacificwave.net (207.231.240.8)  146.666 ms  146
.661 ms  146.672 ms
11  et-4-0-0.4079.rtsw.miss2.net.internet2.edu (162.252.70.0)  157.541 ms  157.5
39 ms  157.732 ms
12  et-4-0-0.4079.rtsw.minn.net.internet2.edu (162.252.70.58)  180.705 ms  180.7
04 ms  180.733 ms
13  et-1-1-5.4079.rtsw.eqch.net.internet2.edu (162.252.70.106)  188.610 ms  198.
669 ms  198.436 ms
14  ae-0.4079.rtsw3.eqch.net.internet2.edu (162.252.70.163)  188.782 ms  188.772
 ms  188.754 ms
15  ae-1.4079.rtsw.clev.net.internet2.edu (162.252.70.130)  197.142 ms  207.521
ms  197.032 ms
16  buf-9208-I2-CLEV.nysernet.net (199.109.11.33)  201.451 ms  201.340 ms  201.3
30 ms
17  syr-9208-buf-9208.nysernet.net (199.109.7.193)  204.529 ms  218.958 ms  218.
897 ms
18  nyc-9208-syr-9208.nysernet.net (199.109.7.162)  213.834 ms  213.873 ms  213.
814 ms
19  columbia.nyc-9208.nysernet.net (199.109.4.14)  213.638 ms  213.741 ms  213.7
00 ms
20  cc-core-1-x-nyser32-gw-1.net.columbia.edu (128.59.255.5)  213.923 ms  214.01
1 ms  214.096 ms
21  cc-conc-1-x-cc-core-1.net.columbia.edu (128.59.255.21)  214.009 ms  213.967
ms  214.012 ms
22  tiernobokar.columbia.edu (128.59.105.24)  213.901 ms  213.812 ms  214.002 ms
weber %
```

I did this on my own laptop using putty. the results may be slightly different

1, 22 routers between my workstation and www.columbia.edu.

2, 5 routers are part of UNSW network

3, The big difference in the RTTs from the router 7 to 8 and 8 to 9

Q2

1, (i) www.ucla.edu

```
No mail.
weber % 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)  0.130 ms  0.109 ms  0.11
0 ms
 2  129.94.39.17 (129.94.39.17)  0.888 ms  0.874 ms  0.829 ms
 3  ombudnex1-vl-3154.gw.unsw.edu.au (149.171.253.35)  7.166 ms libudnex1-vl-315
4.gw.unsw.edu.au (149.171.253.34)  1.448 ms ombudnex1-vl-3154.gw.unsw.edu.au (14
9.171.253.35)  7.131 ms
 4  libcr1-po-6.gw.unsw.edu.au (149.171.255.201)  1.107 ms ombcr1-po-6.gw.unsw.e
du.au (149.171.255.169)  1.142 ms ombcr1-po-5.gw.unsw.edu.au (149.171.255.197)
1.144 ms
 5  unswbr1-te-1-9.gw.unsw.edu.au (149.171.255.101)  12.137 ms unswbr1-te-2-13.g
w.unsw.edu.au (149.171.255.105)  12.160 ms unswbr1-te-1-9.gw.unsw.edu.au (149.17
1.255.101)  12.180 ms
 6  138.44.5.0 (138.44.5.0)  1.361 ms  1.272 ms  1.250 ms
 7  et-1-3-0.pe1.sxt.bkvl.nsw.aarnet.net.au (113.197.15.149)  2.200 ms  2.171 ms
  1.914 ms
 8  et-0-0-0.pe1.a.hnl.aarnet.net.au (113.197.15.99)  95.217 ms  95.088 ms  95.2
50 ms
 9  et-2-1-0.bdr1.a.sea.aarnet.net.au (113.197.15.201)  146.533 ms  146.513 ms
146.512 ms
10  cenichpr-1-is-jmb-778.snvaca.pacificwave.net (207.231.245.129)  163.096 ms
163.124 ms  163.038 ms
11  hpr-lax-hpr3--svl-hpr3-100ge.cenic.net (137.164.25.73)  170.956 ms  170.886
ms  170.992 ms
12  * * *
13  bd11f1.anderson--cr00f2.csb1.ucla.net (169.232.4.4)  171.775 ms  172.318 ms
bd11f1.anderson--cr001.anderson.ucla.net (169.232.4.6)  171.320 ms
14  cr00f1.anderson--dr00f2.csb1.ucla.net (169.232.4.55)  171.422 ms cr00f2.csb1
--dr00f2.csb1.ucla.net (169.232.4.53)  171.411 ms cr00f1.anderson--dr00f2.csb1.u
cla.net (169.232.4.55)  171.348 ms
15  * * *
16  * * *
17  * * *
18  * * *
19  * * *
20  * * *
21  * * *
22  * * *
23  * * *
24  * * *
25  * * *
26  * * *
27  * * *
28  * * *
29  * * *
30  * * *
```

(ii) www.u-tokyo.ac.jp

```
weber % 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)  0.133 ms  0.149 ms  0.13
6 ms
 2  129.94.39.17 (129.94.39.17)  0.852 ms  0.884 ms  0.826 ms
 3  ombudnex1-vl-3154.gw.unsw.edu.au (149.171.253.35)  1.387 ms  1.637 ms  1.600
 ms
 4  libcr1-po-5.gw.unsw.edu.au (149.171.255.165)  1.104 ms ombcr1-po-6.gw.unsw.e
du.au (149.171.255.169)  1.112 ms libcr1-po-5.gw.unsw.edu.au (149.171.255.165)
1.157 ms
 5  unswbr1-te-1-9.gw.unsw.edu.au (149.171.255.101)  1.283 ms unswbr1-te-2-13.gw
.unsw.edu.au (149.171.255.105)  1.303 ms  1.187 ms
 6  138.44.5.0 (138.44.5.0)  1.477 ms  1.304 ms  1.287 ms
 7  et-0-3-0.pe1.bkvl.nsw.aarnet.net.au (113.197.15.147)  1.841 ms  1.782 ms  1.
785 ms
 8  ge-4_0_0.bb1.a.pao.aarnet.net.au (202.158.194.177)  156.479 ms  156.486 ms
156.456 ms
 9  paloalto0.iij.net (198.32.176.24)  157.511 ms  157.545 ms  157.526 ms
10  osk004bb01.IIJ.Net (58.138.88.189)  270.872 ms  270.916 ms  270.812 ms
11  osk004ix51.IIJ.Net (58.138.106.126)  268.813 ms  268.833 ms  268.800 ms
12  210.130.135.130 (210.130.135.130)  267.292 ms  268.859 ms  268.794 ms
13  124.83.228.58 (124.83.228.58)  268.913 ms  267.559 ms  267.554 ms
14  124.83.252.178 (124.83.252.178)  274.804 ms  274.909 ms  274.873 ms
15  158.205.134.26 (158.205.134.26)  276.376 ms  274.775 ms  276.314 ms
16  * * *
17  * * *
18  * * *
19  * * *
20  * * *
21  * * *
22  * * *
23  * * *
24  * * *
25  * * *
26  * * *
27  * * *
28  * * *
29  * * *
30  * * *
```

(iii)www.lancaster.ac.uk

```
weber % 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)  0.141 ms  0.136 ms  0.12
1 ms
 2  129.94.39.17 (129.94.39.17)  0.838 ms  0.857 ms  0.844 ms
 3  ombudnex1-vl-3154.gw.unsw.edu.au (149.171.253.35)  1.513 ms libudnex1-vl-315
4.gw.unsw.edu.au (149.171.253.34)  1.535 ms  1.497 ms
 4  libcr1-po-6.gw.unsw.edu.au (149.171.255.201)  18.408 ms ombcr1-po-6.gw.unsw.
edu.au (149.171.255.169)  1.115 ms libcr1-po-5.gw.unsw.edu.au (149.171.255.165)
 18.335 ms
 5  unswbr1-te-1-9.gw.unsw.edu.au (149.171.255.101)  1.192 ms unswbr1-te-2-13.gw
.unsw.edu.au (149.171.255.105)  1.267 ms  1.274 ms
 6  138.44.5.0 (138.44.5.0)  1.326 ms  1.284 ms  1.264 ms
 7  et-1-3-0.pe1.sxt.bkvl.nsw.aarnet.net.au (113.197.15.149)  2.009 ms  1.897 ms
  1.876 ms
 8  et-0-0-0.pe1.a.hnl.aarnet.net.au (113.197.15.99)  95.244 ms  95.232 ms  95.1
82 ms
 9  et-2-1-0.bdr1.a.sea.aarnet.net.au (113.197.15.201)  146.578 ms  146.585 ms
146.499 ms
10  abilene-1-lo-jmb-706.sttlwa.pacificwave.net (207.231.240.8)  146.611 ms  146
.632 ms  146.610 ms
11  et-4-0-0.4079.rtsw.miss2.net.internet2.edu (162.252.70.0)  157.498 ms  157.5
14 ms  157.364 ms
12  et-4-0-0.4079.rtsw.minn.net.internet2.edu (162.252.70.58)  180.548 ms  180.5
51 ms  182.120 ms
13  et-1-1-5.4079.rtsw.eqch.net.internet2.edu (162.252.70.106)  188.710 ms  188.
401 ms  188.573 ms
14  ae-0.4079.rtsw3.eqch.net.internet2.edu (162.252.70.163)  188.619 ms  188.575
 ms  188.652 ms
15  ae-1.4079.rtsw.clev.net.internet2.edu (162.252.70.130)  198.102 ms  199.504
ms  199.527 ms
16  ae-0.4079.rtsw.ashb.net.internet2.edu (162.252.70.128)  205.198 ms  205.353
ms  205.331 ms
17  ae-2.4079.rtsw2.ashb.net.internet2.edu (162.252.70.75)  204.987 ms  205.180
ms  205.241 ms
18  ae-2.4079.rtsw.wash.net.internet2.edu (162.252.70.136)  205.498 ms  205.399
ms  205.264 ms
19  internet2-gw.mx1.lon.uk.geant.net (62.40.124.44)  280.243 ms  280.145 ms  28
0.084 ms
20  janet-gw.mx1.lon.uk.geant.net (62.40.124.198)  280.160 ms  280.251 ms  280.0
50 ms
21  ae29.londpg-sbr2.ja.net (146.97.33.2)  280.695 ms  280.683 ms  288.418 ms
22  ae31.erdiss-sbr2.ja.net (146.97.33.22)  284.419 ms  284.430 ms  284.401 ms
23  ae29.manckh-sbr2.ja.net (146.97.33.42)  286.259 ms  286.232 ms  286.195 ms
24  ae24.lanclu-rbr1.ja.net (146.97.38.58)  288.416 ms  288.453 ms  288.421 ms
25  lancaster-university.ja.net (194.81.46.2)  304.988 ms  305.006 ms  304.973 m
s
26  * * *
27  ismx-issrx.rtr.lancs.ac.uk (148.88.255.17)  290.256 ms  290.193 ms  290.184
```

```
27  ismx-issrx.rtr.lancs.ac.uk (148.88.255.17)  290.256 ms  290.193 ms  290.184
ms
28  iss-servers.iscore01-ismx01.rtr.lancs.ac.uk (148.88.7.137)  295.597 ms  296.
251 ms  295.798 ms
29  * * *
30  www.lancs.ac.uk (148.88.65.80)  290.142 ms !X  290.463 ms !X  290.493 ms !X
```

2, From 1 to 7, routers are same for three destinations

The eighth router:

www.ucla.edu: 113.197.15.99

www.lancaster.ac.uk: 113.197.15.99

www.u-tokyo.ac.jp : 202.158.194.177

Therefore, www.ucla.edu and www.lancaster.ac.uk are the same. www.u-tokyo.ac.jp is different. At eighth router the paths diverge.

The detail information as below:

```
No mail.
weber % whois 113.197.15.99
% [whois.apnic.net]
% Whois data copyright terms    http://www.apnic.net/db/dbcopyright.html

% Information related to '113.197.15.0 - 113.197.15.255'

% Abuse contact for '113.197.15.0 - 113.197.15.255' is 'abuse@aarnet.edu.au'

inetnum:        113.197.15.0 - 113.197.15.255
netname:        IIPC
descr:          Customer Connection Network
country:        AU
admin-c:        ANOC-AP
tech-c:         ANOC-AP
status:         ASSIGNED NON-PORTABLE
remarks:        AARNet customer network
mnt-by:         MAINT-AARNET-AP
mnt-lower:      MAINT-AARNET-AP
mnt-routes:     MAINT-AARNET-AP
mnt-irt:        IRT-AARNET-AU
last-modified:  2011-10-20T08:36:39Z
source:         APNIC

irt:            IRT-AARNET-AU
address:        AARNet Pty Ltd
address:        26 Dick Perry Avenue
address:        Kensington, Western Australia
address:        Australia
e-mail:         abuse@aarnet.edu.au
abuse-mailbox:  abuse@aarnet.edu.au
admin-c:        SM6-AP
tech-c:         ANOC-AP
auth:           # Filtered
mnt-by:         MAINT-AARNET-AP
last-modified:  2010-11-08T08:02:43Z
source:         APNIC

role:           AARNet Network Operations Centre
remarks:
address:        AARNet Pty Ltd
address:        GPO Box 1559
address:        Canberra
address:        ACT  2601
country:        AU
phone:          +61 1300 275 662
phone:          +61 2 6222 3555
remarks:
e-mail:         noc@aarnet.edu.au
```

```
e-mail:         noc@aarnet.edu.au
remarks:
remarks:        Send abuse reports to abuse@aarnet.edu.au
remarks:        Please include timestamps and offset to UTC in logs
remarks:        Peering requests to peering@aarnet.edu.au
remarks:
admin-c:        SM6-AP
tech-c:         BM-AP
nic-hdl:        ANOC-AP
mnt-by:         MAINT-AARNET-AP
last-modified:  2010-06-30T13:16:48Z
source:         APNIC
```

```
weber % whois 202.158.194.177
% [whois.apnic.net]
% Whois data copyright terms    http://www.apnic.net/db/dbcopyright.html

% Information related to '202.158.192.0 - 202.158.223.255'

% Abuse contact for '202.158.192.0 - 202.158.223.255' is 'abuse@aarnet.edu.au'

inetnum:        202.158.192.0 - 202.158.223.255
netname:        AARNET
descr:          Australian Academic and Research Network
descr:          Canberra
country:        AU
org:            ORG-AAAR1-AP
admin-c:        SM6-AP
tech-c:         ANOC-AP
status:         ALLOCATED PORTABLE
mnt-by:         APNIC-HM
mnt-lower:      MAINT-AARNET-AP
mnt-irt:        IRT-AARNET-AU
remarks:        ------------------------------------------------------
remarks:        To report network abuse, please contact mnt-irt
remarks:        For troubleshooting, please contact tech-c and admin-c
remarks:        Report invalid contact via www.apnic.net/invalidcontact
remarks:        ------------------------------------------------------
last-modified:  2017-10-09T13:02:45Z
source:         APNIC

irt:            IRT-AARNET-AU
address:        AARNet Pty Ltd
address:        26 Dick Perry Avenue
address:        Kensington, Western Australia
address:        Australia
e-mail:         abuse@aarnet.edu.au
abuse-mailbox:  abuse@aarnet.edu.au
admin-c:        SM6-AP
tech-c:         ANOC-AP
auth:           # Filtered
mnt-by:         MAINT-AARNET-AP
last-modified:  2010-11-08T08:02:43Z
source:         APNIC

organisation:   ORG-AAAR1-AP
org-name:       Australian Academic and Research Network
country:        AU
address:        Building 9
address:        Banks Street
phone:          +61-2-6222-3530
fax-no:         +61-2-6222-3535
e-mail:         irrcontact@aarnet.edu.au
```

```
fax-no:         +61-2-6222-3535
e-mail:         irrcontact@aarnet.edu.au
mnt-ref:        APNIC-HM
mnt-by:         APNIC-HM
last-modified:  2017-10-09T12:56:36Z
source:         APNIC

role:           AARNet Network Operations Centre
remarks:
address:        AARNet Pty Ltd
address:        GPO Box 1559
address:        Canberra
address:        ACT  2601
country:        AU
phone:          +61 1300 275 662
phone:          +61 2 6222 3555
remarks:
e-mail:         noc@aarnet.edu.au
remarks:
remarks:        Send abuse reports to abuse@aarnet.edu.au
remarks:        Please include timestamps and offset to UTC in logs
remarks:        Peering requests to peering@aarnet.edu.au
remarks:
admin-c:        SM6-AP
tech-c:         BM-AP
nic-hdl:        ANOC-AP
mnt-by:         MAINT-AARNET-AP
last-modified:  2010-06-30T13:16:48Z
source:         APNIC

person:         Steve Maddocks
remarks:        Director Operations
address:        AARNet Pty Ltd
address:        26 Dick Perry Avenue
address:        Kensington
address:        Perth
address:        WA  6151
country:        AU
phone:          +61-8-9289-2210
fax-no:         +61-2-6222-7509
e-mail:         steve.maddocks@aarnet.edu.au
nic-hdl:        SM6-AP
mnt-by:         MAINT-AARNET-AP
last-modified:  2011-02-01T08:37:06Z
source:         APNIC

% This query was served by the APNIC Whois Service version 1.88.15-46 (WHOIS-NODE3)
```

3，No, The number of hops on each path is not proportional the physical distance. The distance of www.ucla.edu is longer than www.u-tokyo.ac.jp But the number of routers of www.u-tokyo.ac.jp more than www.ucla.edu.

Q3

http://www.speedtest.com.sg/tr.php

```
wagner % traceroute www.speedtest.com.sg/tr.php
www.speedtest.com.sg/tr.php: Name or service not known
Cannot handle "host" cmdline arg `www.speedtest.com.sg/tr.php' on position 1 (ar
gc 1)
wagner % traceroute www.speedtest.com
traceroute to www.speedtest.com (209.15.13.134), 30 hops max, 60 byte packets
 1  cserouter1-server.cse.unsw.EDU.AU (129.94.242.251)  0.285 ms  0.232 ms  0.19
0 ms
 2  129.94.39.17 (129.94.39.17)  0.883 ms  0.914 ms  0.858 ms
 3  libudnex1-vl-3154.gw.unsw.edu.au (149.171.253.34)  1.836 ms  1.793 ms  1.748
 ms
 4  ombcr1-po-6.gw.unsw.edu.au (149.171.255.169)  1.071 ms libcr1-po-6.gw.unsw.e
du.au (149.171.255.201)  1.095 ms  1.080 ms
 5  unswbr1-te-2-13.gw.unsw.edu.au (149.171.255.105)  1.124 ms  1.152 ms  1.033
ms
 6  138.44.5.0 (138.44.5.0)  1.311 ms  1.317 ms  1.270 ms
 7  xe-1-2-0.bdr1.a.sin.aarnet.net.au (113.197.15.207)  141.054 ms  140.835 ms
140.791 ms
 8  xe-0-0-6-2.a01.sngpsi03.sg.bb.gin.ntt.net (116.51.27.145)  146.661 ms  146.6
41 ms  146.589 ms
 9  ae-13.r00.sngpsi07.sg.bb.gin.ntt.net (129.250.7.82)  141.378 ms  141.361 ms
ae-8.r01.sngpsi07.sg.bb.gin.ntt.net (129.250.7.84)  141.092 ms
10  ae-0.a01.sngpsi07.sg.bb.gin.ntt.net (129.250.2.122)  140.880 ms ae-1.a01.sng
psi07.sg.bb.gin.ntt.net (129.250.2.240)  141.012 ms  140.968 ms
11  * * *
12  ae-0-11.bar2.Toronto1.Level3.net (4.69.151.242)  287.225 ms  287.326 ms  287
.200 ms
13  4.28.138.82 (4.28.138.82)  286.511 ms  286.302 ms  286.402 ms
14  * * *
15  * * *
16  * * *
17  * * *
18  * * *
19  * * *
20  * * *
21  * * *
22  * * *
23  * * *
24  * * *
25  * * *
26  * * *
27  * * *
28  * * *
29  * * *
30  * * *
```

https://www.telstra.net/cgibin/trace .,

```
weill % traceroute telstra.net
telstra.net: Name or service not known
Cannot handle "host" cmdline arg `telstra.net' on position 1 (argc 1)
weill % 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)  0.163 ms  0.134 ms  0.11
0 ms
 2  129.94.39.17 (129.94.39.17)  0.893 ms  0.904 ms  0.861 ms
 3  libudnex1-vl-3154.gw.unsw.edu.au (149.171.253.34)  1.299 ms  1.351 ms  1.468
 ms
 4  ombcr1-po-5.gw.unsw.edu.au (149.171.255.197)  1.188 ms libcr1-po-6.gw.unsw.e
du.au (149.171.255.201)  1.133 ms libcr1-po-5.gw.unsw.edu.au (149.171.255.165)
1.268 ms
 5  unswbr1-te-2-13.gw.unsw.edu.au (149.171.255.105)  236.027 ms  236.045 ms  23
6.059 ms
 6  138.44.5.0 (138.44.5.0)  1.279 ms  1.509 ms  1.495 ms
 7  et-0-3-0.pe1.alxd.nsw.aarnet.net.au (113.197.15.153)  1.529 ms  1.488 ms  1.
512 ms
 8  ae9.bb1.b.syd.aarnet.net.au (113.197.15.65)  1.776 ms  1.827 ms  1.859 ms
 9  gigabitethernet1-1.pe1.b.syd.aarnet.net.au (202.158.202.18)  1.880 ms  1.920
 ms  1.953 ms
10  gigabitethernet3-11.ken37.sydney.telstra.net (139.130.0.77)  2.285 ms  2.375
 ms  2.318 ms
11  bundle-ether13.ken-core10.sydney.telstra.net (203.50.11.94)  4.410 ms  2.498
 ms bundle-ether2.chw-edge901.sydney.telstra.net (203.50.11.103)  2.589 ms
12  bundle-ether10.win-core10.melbourne.telstra.net (203.50.11.123)  14.592 ms
14.328 ms  14.174 ms
13  bundle-ether8.exi-core10.melbourne.telstra.net (203.50.11.125)  16.487 ms 20
3.50.6.40 (203.50.6.40)  16.430 ms bundle-ether8.exi-core10.melbourne.telstra.ne
t (203.50.11.125)  16.396 ms
14  bundle-ether2.exi-ncprouter101.melbourne.telstra.net (203.50.11.209)  15.169
 ms  17.311 ms  17.274 ms
15  www.telstra.net (203.50.5.178)  14.256 ms  14.864 ms  14.926 ms
```

Does the reverse path go through the same routers as the forward path?

No

If you observe common routers between the forward and the reverse path, do you also observe the same IP addresses? Why or why not?

Yes, I observe some same IP addresses. It is because the website tries to give a best and shortest path every time, which makes the paths dynamic.

Exercise 4:

Q1.1, Compute the shortest possible time T using speed of light as propagation speed:

Approximate physical distance from UNSW to Brisbane: 735km

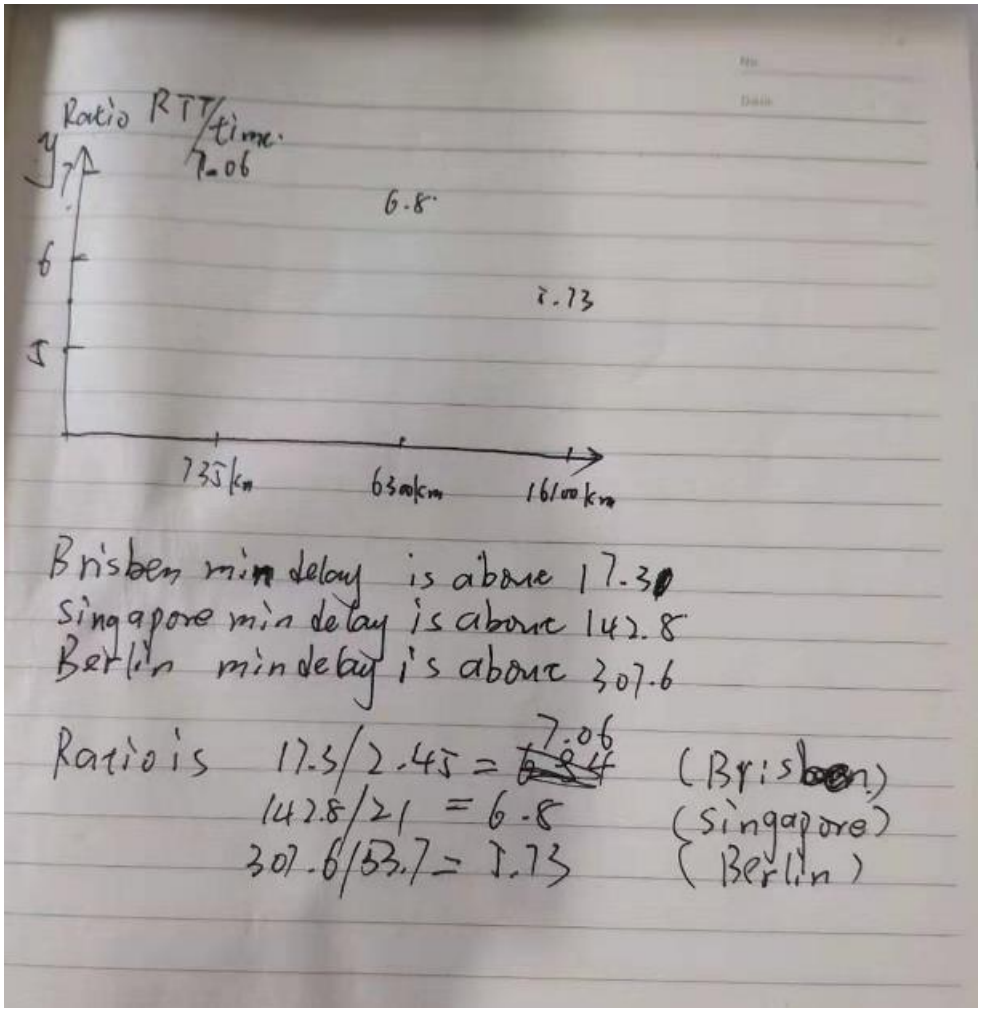
T = 735km/(3*108 m/s) = 2.45 ms

Approximate physical distance from UNSW to Singapore: 6300km

T = 6300km/(3*108 m/s)= 21 ms

Approximate physical distance from UNSW to Berlin: 16100km

T = 16100km/(3*108 m/s) = 53.7 ms



Q1.2

Reason1, Packets travel along cables and across multiple hops, rather than as the crow files

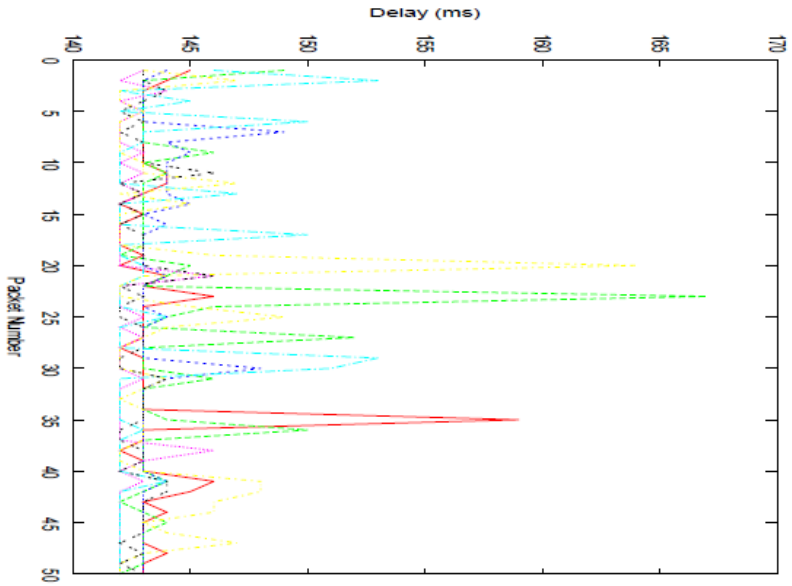
Reason2, packets do not travel at the full speed of light through any real medium.

Q2, For the Singapore destination and the Berlin destination, the delay depends on the size of the packets. For larger packets the transmission delay is greater which is manifested in the increased overall delay.

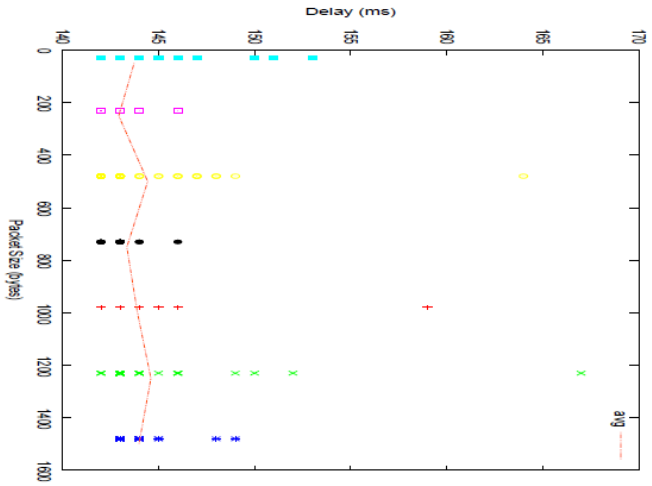
However, this trend is not so obvious for Brisbane destination.

The impossible reason is the destination is far away, and therefore the

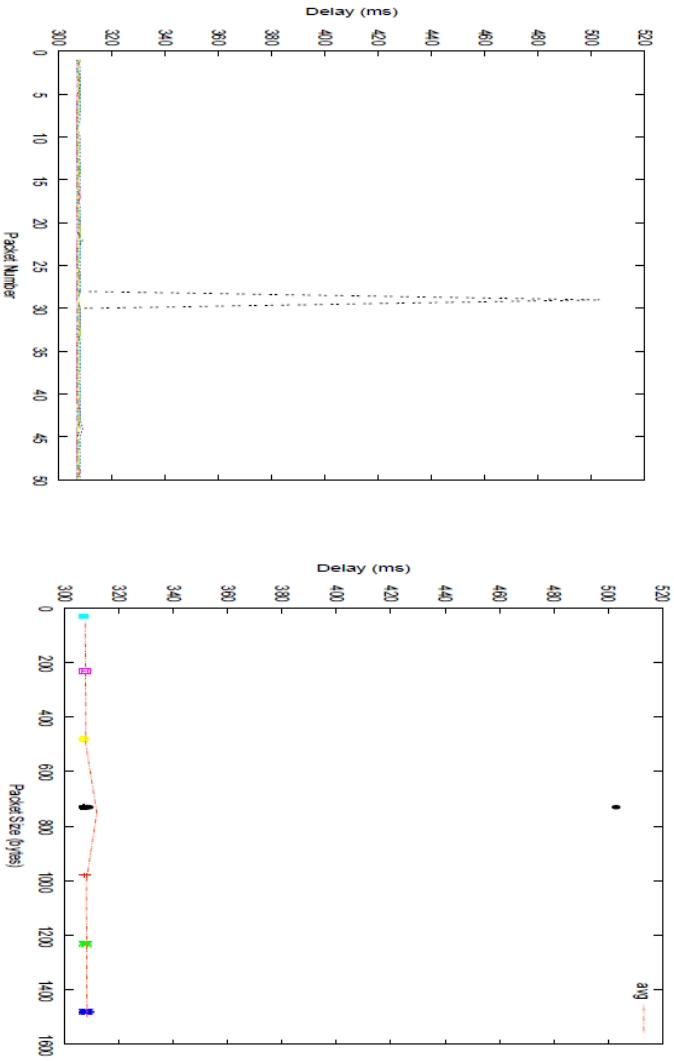
propagation delay is significantly higher than the transmission delay.



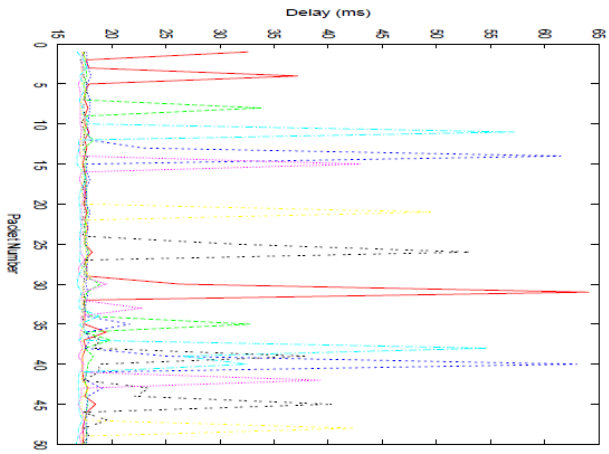
www.nus.edu.sg_delay.pdf



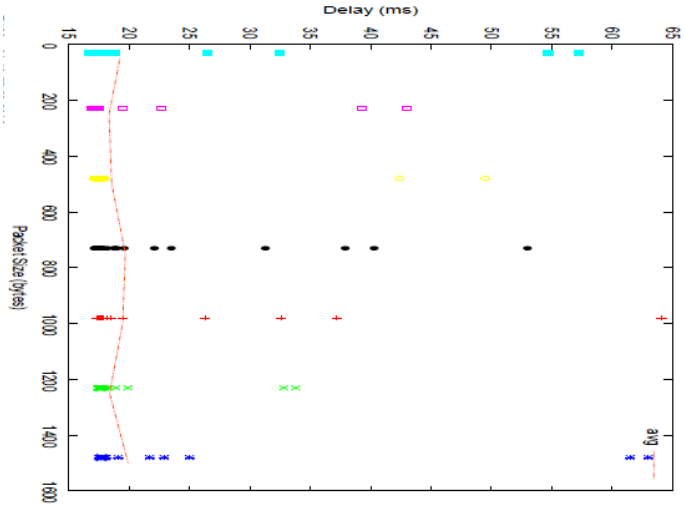
www.nus.edu.sg_scatter.pdf



www.tu-berlin.de_scatter.pdf



www.uq.edu.au_delay.pdf



www.uq.edu.au_scatter.pdf

Q3,

```
C:\Users\lenovo>ping www.epfl.ch

正在 Ping www.epfl.ch.cdn.cloudflare.net [104.20.228.42] 具有 32 字节的数据:
来自 104.20.228.42 的回复: 字节=32 时间=13ms TTL=55
来自 104.20.228.42 的回复: 字节=32 时间=12ms TTL=55
来自 104.20.228.42 的回复: 字节=32 时间=15ms TTL=55
来自 104.20.228.42 的回复: 字节=32 时间=19ms TTL=55

104.20.228.42 的 Ping 统计信息:
    数据包: 已发送 = 4，已接收 = 4，丢失 = 0 (0% 丢失)，
往返行程的估计时间(以毫秒为单位):
    最短 = 12ms，最长 = 19ms，平均 = 14ms
```

www.epfl.ch ip address is 104.20.228.42. It is in America.

104.20.228.42

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

Q4,

The propagation delay does not depend on the packet size. It is affected by the link and it generally remains unchanged if the material of the link

stays unchanged.

The queuing delay only depends on the congestion in the network. If the amount of the traffic is huge, then packets have to wait until all the packets in the queue have been processed

The transmission delay is almost proportional to the packet size.

The processing delay can depends on the packet size but to a much smaller than transmission delay.