Experiment No-2

Nikita Chitre

TE Comps

UID:- 2018130006

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Aim :- Introduction to some basic network monitoring/analysis tools.

Some basic network utilities:-

Ping :- Network latency, specifically round trip time (RTT), can be measured using ping, which sends ICMP packets.[1][2]

Question about latency:

1. Does the average RTT vary between different hosts? What aspects of latency (transmit, propagation, and queueing delay) might impact this and why?
   - Yes, the average RTT varies between different hosts.
   - Propagation delay is the time taken by the first bit of the packet to reach the destination. It depends on distance and velocity. Since the distance will change depending on where the server of the hostname is located, hence RTT for different hosts will be affected by propagation delay.
   - Queueing delay is the amount of time packet waits in queue before being processed by the destination. RTT for different hosts will be affected by queueing delay due to network congestion.

2. Does the average RTT vary with different packet sizes? What aspects of latency (transmit, propagation, and queueing delay) might impact this and why?
   - ➢ Yes, RTT varies with different packet sizes.
   - ➢ Time taken to put a packet onto link. In other words, it is simply time required to put data bits on the wire/communication medium. It depends on packet size and bandwidth. Since we are using different packet sizes , RTT for different packet sizes will be affected by transmission delay.

Exercise 1: Experiment with ping to find the round trip times to a variety of destinations. Write up any interesting observations, including in particular how the round trip time compares to the physical distance. Here are few places from who to get replies: www.uw.edu, www.cornell.edu, berkeley.edu, www.uchicago.edu, www.ox.ac.uk (England), www.u-tokyo.ac.jp (Japan).

➢ RTT for www.uw.edu:-

```
[truptis-MacBook-Air:~ trupti$ ping -c 10 uw.edu
PING uw.edu (128.95.155.135): 56 data bytes
64 bytes from 128.95.155.135: icmp_seq=0 ttl=42 time=306.543 ms
64 bytes from 128.95.155.135: icmp_seq=1 ttl=42 time=532.769 ms
64 bytes from 128.95.155.135: icmp_seq=2 ttl=42 time=449.273 ms
64 bytes from 128.95.155.135: icmp_seq=3 ttl=42 time=366.160 ms
64 bytes from 128.95.155.135: icmp_seq=4 ttl=42 time=283.137 ms
64 bytes from 128.95.155.135: icmp_seq=5 ttl=42 time=348.444 ms
64 bytes from 128.95.155.135: icmp_seq=6 ttl=42 time=323.894 ms
64 bytes from 128.95.155.135: icmp_seq=7 ttl=42 time=340.964 ms
64 bytes from 128.95.155.135: icmp_seq=8 ttl=42 time=564.546 ms
64 bytes from 128.95.155.135: icmp_seq=9 ttl=42 time=485.594 ms

--- uw.edu ping statistics ---
10 packets transmitted, 10 packets received, 0.0% packet loss
round-trip min/avg/max/stddev = 283.137/400.132/564.546/94.831 ms
```

➢ RTT for www.berkeley.edu

```
[truptis-MacBook-Air:~ trupti$ ping -c 10 berkeley.edu
PING berkeley.edu (35.163.72.93): 56 data bytes
64 bytes from 35.163.72.93: icmp_seq=0 ttl=37 time=306.678 ms
64 bytes from 35.163.72.93: icmp_seq=1 ttl=37 time=534.373 ms
64 bytes from 35.163.72.93: icmp_seq=2 ttl=37 time=450.772 ms
64 bytes from 35.163.72.93: icmp_seq=3 ttl=37 time=371.853 ms
64 bytes from 35.163.72.93: icmp_seq=4 ttl=37 time=290.204 ms
64 bytes from 35.163.72.93: icmp_seq=5 ttl=37 time=516.565 ms
64 bytes from 35.163.72.93: icmp_seq=6 ttl=37 time=433.060 ms
64 bytes from 35.163.72.93: icmp_seq=7 ttl=37 time=349.414 ms
64 bytes from 35.163.72.93: icmp_seq=8 ttl=37 time=573.050 ms
64 bytes from 35.163.72.93: icmp_seq=9 ttl=37 time=489.584 ms

--- berkeley.edu ping statistics ---
10 packets transmitted, 10 packets received, 0.0% packet loss
round-trip min/avg/max/stddev = 290.204/431.555/573.050/93.511 ms
```

➤ RTT for www.ox.ac.uk

```
[truptis-MacBook-Air:~ trupti$ ping -c 10 ox.ac.uk
PING ox.ac.uk (151.101.194.133): 56 data bytes
64 bytes from 151.101.194.133: icmp_seq=0 ttl=53 time=66.735 ms
64 bytes from 151.101.194.133: icmp_seq=1 ttl=53 time=67.536 ms
64 bytes from 151.101.194.133: icmp_seq=2 ttl=53 time=66.095 ms
64 bytes from 151.101.194.133: icmp_seq=3 ttl=53 time=67.486 ms
64 bytes from 151.101.194.133: icmp_seq=4 ttl=53 time=66.385 ms
64 bytes from 151.101.194.133: icmp_seq=5 ttl=53 time=70.909 ms
64 bytes from 151.101.194.133: icmp_seq=6 ttl=53 time=67.451 ms
64 bytes from 151.101.194.133: icmp_seq=7 ttl=53 time=69.496 ms
64 bytes from 151.101.194.133: icmp_seq=8 ttl=53 time=69.108 ms
64 bytes from 151.101.194.133: icmp_seq=9 ttl=53 time=67.461 ms

--- ox.ac.uk ping statistics ---
10 packets transmitted, 10 packets received, 0.0% packet loss
round-trip min/avg/max/stddev = 66.095/67.866/70.909/1.437 ms
```

➤ RTT for www.kyoto-u.ac.jp

```
[truptis-MacBook-Air:~ trupti$ ping -c 10 kyoto-u.ac.jp
PING kyoto-u.ac.jp (133.3.250.141): 56 data bytes
64 bytes from 133.3.250.141: icmp_seq=0 ttl=43 time=466.664 ms
64 bytes from 133.3.250.141: icmp_seq=1 ttl=43 time=387.096 ms
64 bytes from 133.3.250.141: icmp_seq=2 ttl=43 time=303.526 ms
64 bytes from 133.3.250.141: icmp_seq=3 ttl=43 time=527.039 ms
64 bytes from 133.3.250.141: icmp_seq=4 ttl=43 time=443.603 ms
64 bytes from 133.3.250.141: icmp_seq=5 ttl=43 time=362.427 ms
64 bytes from 133.3.250.141: icmp_seq=6 ttl=43 time=279.968 ms
64 bytes from 133.3.250.141: icmp_seq=7 ttl=43 time=503.484 ms
64 bytes from 133.3.250.141: icmp_seq=8 ttl=43 time=420.058 ms
64 bytes from 133.3.250.141: icmp_seq=9 ttl=43 time=336.202 ms

--- kyoto-u.ac.jp ping statistics ---
10 packets transmitted, 10 packets received, 0.0% packet loss
round-trip min/avg/max/stddev = 279.968/403.007/527.039/79.290 ms
```

➤ www.uw.edu and www.berkeley.edu both have domain extension of edu which is the country code of the USA. Both of them have very similar avg RTT ie. 400 and 431 respectively since they are located in the same country. Minor difference that we can see can be because of queueing delay.

➤ www.ox.ac.uk has domain extension of uk which is the country code of United Kingdom. As compared to www.berkeley.edu , it has very small RTT i.e. 67.88. This maybe because United Kingdom is near to us as compared to USA.

➤ www.kyoto-u.ac.jp has domain extension of jp which is the country code of Japan. It has a high RTT as compared to www.ox.ac.uk since United Kingdom is near to us as compared to Japan.

Traceroute :-

The traceroute command, as the name implies, traces the route that packets takes to reach the host. It will show you how many hops it takes to reach the host and how long it took between each hop. This allows you to diagnose potential networking bottlenecks. [3]

Exercise 2: (Very short.) Use traceroute to trace the route from your computer to math.hws.edu and to www.hws.edu. Explain the difference in the results.

```
C:\Users\Nikita>tracert math.hws.edu

Tracing route to math.hws.edu [64.89.144.237]
over a maximum of 30 hops:

  1      8 ms     3 ms     3 ms  AIRPORT [10.0.1.1]
  2     24 ms    80 ms    64 ms  10.80.0.1
  3     22 ms    20 ms    21 ms  125.99.127.237
  4     20 ms    18 ms    95 ms  203.212.193.30
  5     11 ms    23 ms    17 ms  125.99.55.254
  6     20 ms    23 ms    26 ms  125.99.55.253
  7     35 ms    18 ms    13 ms  136.232.27.245.static.jio.com [136.232.27.245]
  8     23 ms    18 ms    16 ms  49.45.4.253
  9    178 ms   137 ms   130 ms  103.198.140.45
 10    180 ms   156 ms   140 ms  103.198.140.29
 11    195 ms   134 ms   154 ms  103.198.140.45
 12    205 ms   305 ms   162 ms  hu0-4-0-1.agr21.lhr01.atlas.cogentco.com [149.14.196.81]
 13    158 ms   235 ms   167 ms  be3672.ccr52.lhr01.atlas.cogentco.com [130.117.48.145]
 14    148 ms   136 ms   170 ms  be3488.ccr42.lon13.atlas.cogentco.com [154.54.60.13]
 15    183 ms   159 ms      *    be2869.ccr22.lon01.atlas.cogentco.com [154.54.57.162]
 16    136 ms   146 ms   141 ms  ae-7.edge7.London1.Level3.net [4.68.62.41]
 17    223 ms   268 ms   202 ms  ae-228-3604.edge3.London15.Level3.net [4.69.167.102]
 18    138 ms   160 ms   133 ms  ae-228-3604.edge3.London15.Level3.net [4.69.167.102]
 19    151 ms   154 ms   166 ms  ae4.ar8.lon15.Level3.net [4.68.111.254]
 20   2088 ms   291 ms   281 ms  roc1-ar5-xe-11-0-0-0.us.twtelecom.net [35.248.1.162]
 21    283 ms   299 ms   293 ms  66-195-65-170.static.ctl.one [66.195.65.170]
 22    314 ms   308 ms   278 ms  nat.hws.edu [64.89.144.100]
 23      *        *        *     Request timed out.
 24      *        *        *     Request timed out.
 25      *        *        *     Request timed out.
 26      *        *        *     Request timed out.
 27      *        *        *     Request timed out.
 28      *        *        *     Request timed out.
 29      *        *        *     Request timed out.
 30      *        *        *     Request timed out.

Trace complete.
```

```
C:\Users\Nikita>tracert www.hws.edu

Tracing route to www.hws.edu [64.89.145.159]
over a maximum of 30 hops:

  1    47 ms     6 ms     *       AIRPORT [10.0.1.1]
  2    16 ms    70 ms    11 ms    10.80.0.1
  3    27 ms    16 ms    12 ms    125.99.88.1
  4   145 ms    75 ms    11 ms    203.212.193.30
  5    29 ms    13 ms    25 ms    125.99.55.254
  6    22 ms    15 ms    25 ms    125.99.55.253
  7    22 ms    67 ms    15 ms    136.232.27.245.static.jio.com [136.232.27.245]
  8    18 ms    15 ms    18 ms    49.45.4.253
  9   136 ms   132 ms   146 ms    103.198.140.45
 10   153 ms   138 ms   140 ms    103.198.140.54
 11   184 ms   145 ms   133 ms    103.198.140.45
 12   207 ms   140 ms   140 ms    hu0-4-0-1.agr21.lhr01.atlas.cogentco.com [149.14.196.81]
 13   180 ms   156 ms   150 ms    be3672.ccr52.lhr01.atlas.cogentco.com [130.117.48.145]
 14   146 ms   163 ms   206 ms    be3488.ccr42.lon13.atlas.cogentco.com [154.54.60.13]
 15   155 ms   142 ms   152 ms    be2869.ccr22.lon01.atlas.cogentco.com [154.54.57.162]
 16     *      140 ms   173 ms    lag-3.ear2.London2.Level3.net [4.68.72.185]
 17   145 ms   167 ms   146 ms    ae-115-3501.edge3.London15.Level3.net [4.69.167.74]
 18   172 ms   158 ms   145 ms    ae-115-3501.edge3.London15.Level3.net [4.69.167.74]
 19   148 ms   186 ms   178 ms    ae4.ar8.lon15.Level3.net [4.68.111.254]
 20   677 ms   299 ms   369 ms    roc1-ar5-xe-11-0-0-0.us.twtelecom.net [35.248.1.162]
 21   354 ms   294 ms   292 ms    66-195-65-170.static.ctl.one [66.195.65.170]
 22   281 ms   274 ms   287 ms    nat.hws.edu [64.89.144.100]
 23     *        *        *       Request timed out.
 24     *        *        *       Request timed out.
 25     *        *        *       Request timed out.
 26     *        *        *       Request timed out.
 27     *        *        *       Request timed out.
 28     *        *        *       Request timed out.
 29     *        *        *       Request timed out.
 30     *        *        *       Request timed out.

Trace complete.
```

➢ The ip address at hop 16 is different for both the websites.
math.hws.edu goes at ae-7.edge7.London1.Level3.net [4.68.62.41]
whereas hws.edu goes at lag-3.ear2.London2.Level3.net [4.68.72.185]

Exercise 3: Two packets sent from the same source to the same destination do not necessarily follow the same path through the net. Experiment with some sources that are fairly far away. Can you find cases where packets sent to the same destination follow different paths? How likely does it seem to be? What about when the packets are sent at very different times? Save some of the outputs from traceroute. (You can copy them from the Terminal window by highlighting and right-, then paste into a text editor.) Come back sometime next week, try the same destinations again, and compare the results with the results from today. Report your observations.

```
C:\Users\Nikita>tracert cs.manchester.ac.uk

Tracing route to cs.manchester.ac.uk [130.88.101.49]
over a maximum of 30 hops:

  1      7 ms     33 ms      8 ms  AIRPORT [10.0.1.1]
  2     27 ms     30 ms     25 ms  10.80.0.1
  3     16 ms     12 ms     13 ms  125.99.127.237
  4     35 ms     14 ms     13 ms  203.212.193.30
  5     25 ms     18 ms     13 ms  125.99.55.254
  6     14 ms     15 ms     14 ms  125.99.55.253
  7     22 ms     14 ms     15 ms  136.232.27.245.static.jio.com [136.232.27.245]
  8     41 ms     22 ms     22 ms  103.198.140.58
  9    140 ms    139 ms    135 ms  103.198.140.45
 10    136 ms    137 ms    135 ms  103.198.140.56
 11    169 ms    147 ms    156 ms  103.198.140.107
 12    134 ms    131 ms    136 ms  103.198.140.45
 13    160 ms    139 ms    154 ms  hu0-4-0-1.agr21.lhr01.atlas.cogentco.com [149.14.196.81]
 14    146 ms    135 ms    138 ms  be3672.ccr52.lhr01.atlas.cogentco.com [130.117.48.145]
 15    179 ms    162 ms    162 ms  be3488.ccr42.lon13.atlas.cogentco.com [154.54.60.13]
 16    199 ms    147 ms    132 ms  be2869.ccr22.lon01.atlas.cogentco.com [154.54.57.162]
 17    145 ms    140 ms       *    ldn-b1-link.telia.net [62.115.185.38]
 18    136 ms    139 ms    143 ms  ldn-bb3-link.telia.net [62.115.120.74]
 19      *         *         *     Request timed out.
 20    151 ms    149 ms    136 ms  jisc-ic-345131-ldn-b4.c.telia.net [62.115.175.131]
 21    365 ms   3034 ms    199 ms  ae24.londhx-sbr1.ja.net [146.97.35.197]
 22    917 ms    165 ms    133 ms  ae29.londpg-sbr2.ja.net [146.97.33.2]
 23    168 ms    151 ms    155 ms  ae31.erdiss-sbr2.ja.net [146.97.33.22]
 24    151 ms    135 ms    137 ms  ae29.manckh-sbr2.ja.net [146.97.33.42]
 25    145 ms    153 ms    157 ms  ae23.mancrh-rbr1.ja.net [146.97.38.42]
 26      *         *         *     Request timed out.
 27    325 ms    310 ms    250 ms  130.88.249.194
 28      *         *         *     Request timed out.
 29    155 ms    144 ms    174 ms  gw-jh.its.manchester.ac.uk [130.88.250.32]
 30    156 ms    167 ms    147 ms  eps.its.man.ac.uk [130.88.101.49]
```

```
C:\Users\Nikita>tracert cs.manchester.ac.uk

Tracing route to cs.manchester.ac.uk [130.88.101.49]
over a maximum of 30 hops:

  1     25 ms      2 ms      8 ms  AIRPORT [10.0.1.1]
  2     28 ms     19 ms     19 ms  10.80.0.1
  3    105 ms     32 ms     12 ms  125.99.127.237
  4     28 ms     17 ms     12 ms  203.212.193.30
  5    288 ms     63 ms     30 ms  202.88.130.245
  6     79 ms     36 ms     31 ms  mail.megtec.in [125.99.119.2]
  7     27 ms     58 ms     17 ms  136.232.27.245.static.jio.com [136.232.27.245]
  8     65 ms     21 ms     18 ms  103.198.140.58
  9    143 ms    143 ms    169 ms  103.198.140.45
 10    185 ms    146 ms    171 ms  103.198.140.56
 11    329 ms    238 ms    186 ms  103.198.140.107
 12    296 ms    146 ms    162 ms  103.198.140.45
 13    220 ms    308 ms    266 ms  hu0-4-0-1.agr21.lhr01.atlas.cogentco.com [149.14.196.81]
 14    152 ms    174 ms    308 ms  be3672.ccr52.lhr01.atlas.cogentco.com [130.117.48.145]
 15    160 ms    141 ms    141 ms  be3488.ccr42.lon13.atlas.cogentco.com [154.54.60.13]
 16    164 ms    184 ms    327 ms  be2871.ccr21.lon01.atlas.cogentco.com [154.54.58.186]
 17    278 ms    172 ms    153 ms  ldn-b1-link.telia.net [62.115.9.28]
 18    278 ms    184 ms    178 ms  ldn-bb3-link.telia.net [62.115.120.74]
 19    223 ms      *         *     ldn-b2-link.telia.net [62.115.122.189]
 20    159 ms    169 ms    150 ms  jisc-ic-345131-ldn-b4.c.telia.net [62.115.175.131]
 21    264 ms    206 ms    138 ms  ae24.londhx-sbr1.ja.net [146.97.35.197]
 22    290 ms    223 ms    172 ms  ae29.londpg-sbr2.ja.net [146.97.33.2]
 23    240 ms    337 ms    180 ms  ae31.erdiss-sbr2.ja.net [146.97.33.22]
 24    149 ms    168 ms    163 ms  ae29.manckh-sbr2.ja.net [146.97.33.42]
 25    410 ms    223 ms    184 ms  ae23.mancrh-rbr1.ja.net [146.97.38.42]
 26    162 ms      *         *     universityofmanchester.ja.net [146.97.169.2]
 27    151 ms    155 ms    150 ms  130.88.249.194
 28      *         *         *     Request timed out.
 29    169 ms    439 ms       *    gw-jh.its.manchester.ac.uk [130.88.250.32]
 30    168 ms    200 ms    245 ms  eps.its.man.ac.uk [130.88.101.49]
```

At 6th hop the second case takes mail.megtec.in path whereas the first case takes 125.99.55.253 path.

Whois:-The whois command can give detailed information about domain names and IP addresses.[5]

Exercise 4: (Short.) Use whois to investigate a well-known web site such as google.com or amazon.com, and write a couple of sentences about what you find out.

```
Domain Name: google.com
Registry Domain ID: 2138514_DOMAIN_COM-VRSN
Registrar WHOIS Server: whois.markmonitor.com
Registrar URL: http://www.markmonitor.com
Updated Date: 2019-09-09T08:39:04-0700
Creation Date: 1997-09-15T00:00:00-0700
Registrar Registration Expiration Date: 2028-09-13T00:00:00-0700
Registrar: MarkMonitor, Inc.
Registrar IANA ID: 292
Registrar Abuse Contact Email: abusecomplaints@markmonitor.com
Registrar Abuse Contact Phone: +1.2083895770
Domain Status: clientUpdateProhibited (https://www.icann.org/epp#clientUpdateProhibited)
Domain Status: clientTransferProhibited (https://www.icann.org/epp#clientTransferProhibited)
Domain Status: clientDeleteProhibited (https://www.icann.org/epp#clientDeleteProhibited)
Domain Status: serverUpdateProhibited (https://www.icann.org/epp#serverUpdateProhibited)
Domain Status: serverTransferProhibited (https://www.icann.org/epp#serverTransferProhibited)
Domain Status: serverDeleteProhibited (https://www.icann.org/epp#serverDeleteProhibited)
Registrant Organization: Google LLC
Registrant State/Province: CA
Registrant Country: US
Registrant Email: Select Request Email Form at https://domains.markmonitor.com/whois/google.com
Admin Organization: Google LLC
Admin State/Province: CA
Admin Country: US
Admin Email: Select Request Email Form at https://domains.markmonitor.com/whois/google.com
Tech Organization: Google LLC
Tech State/Province: CA
Tech Country: US
Tech Email: Select Request Email Form at https://domains.markmonitor.com/whois/google.com
Name Server: ns4.google.com
Name Server: ns3.google.com
Name Server: ns1.google.com
Name Server: ns2.google.com
```

➢ **Domain:** This field will give you the domain name which we are querying the WHOIS details. Here domain name is google.com
➢ **Registrar Name** : The registrar is an (ICANN)accredited organization, that sells domain names to the public. Here is MarkMonitor, Inc.
➢ **Creation Date:** This is the date when the domain name was first registered. Here it is 1997-09-15
➢ **Expiration Date:** This is the date when the domain will expire.
Here it is 2028 – 09-13.
➢ **Updated Date:** This is the date when the WHOIS details last updated. Here it is 2019-09-09
➢ **Status:** This is the registrar status of the domain.
  o clientDeleteProhibited: Tells domain's registry to reject requests to delete the domain.
  o clientUpdateProhibited:- Tells domain's registry to reject requests to update the domain.

- o clientTransferProhibited:- tells domain's registry to reject requests to transfer the domain from your current registrar to another.
- o serverDeleteProhibited:- Prevents domain from being deleted.
- o serverUpdateProhibited:- locks domain preventing it from being updated.
- o serverTransferProhibited:- Prevents domain from being transferred from your current registrar to another.
- ➢ **Nameservers:** Nameservers essentially tell you where a domain's DNS records are stored. Here it is ns4.google.com, ns3.google.com, ns2.google.com, ns1.google.com
- ➢ **Registrant Contact Details:** A registrant is the person or organization or company who registers a domain name. This area provides you with details of the registrant of a domain. Here organization is Google LLC

nslookup :-

NsLookup queries the specified DNS server and retrieves the requested records that are associated with the domain name you provided. These records contain information like the domain name's IP addresses.[4]

Exercise 5: (Should be short.) : Because of NAT, the domain name spit.ac.in has a different IP address outside of SPIT than it does on campus. Using information in this lab and working on a home computer, find the outside IP address for spit.ac.in. Explain how you did it.

- ➢ I used the command nslookup spit.ac.in. This gave me the outside IP address on my home computer.


```
nslookup spit.ac.in
Non-authoritative answer:
Name:    spit.ac.in
Address: 43.252.193.19
```

Ifconfig :-

ifconfig stands for "interface configuration." It is used to view and change the configuration of the network interfaces on your system.[6]

```
[truptis-MacBook-Air:~ trupti$ ifconfig
lo0: flags=8049<UP,LOOPBACK,RUNNING,MULTICAST> mtu 16384
        options=1203<RXCSUM,TXCSUM,TXSTATUS,SW_TIMESTAMP>
        inet 127.0.0.1 netmask 0xff000000
        inet6 ::1 prefixlen 128
        inet6 fe80::1%lo0 prefixlen 64 scopeid 0x1
        nd6 options=201<PERFORMNUD,DAD>
gif0: flags=8010<POINTOPOINT,MULTICAST> mtu 1280
stf0: flags=0<> mtu 1280
en0: flags=8863<UP,BROADCAST,SMART,RUNNING,SIMPLEX,MULTICAST> mtu 1500
        options=400<CHANNEL_IO>
        ether 64:76:ba:b0:a3:fc
        inet6 fe80::146e:4828:a687:c22f%en0 prefixlen 64 secured scopeid 0x4
        inet 10.0.1.14 netmask 0xffffff00 broadcast 10.0.1.255
        nd6 options=201<PERFORMNUD,DAD>
        media: autoselect
        status: active
en1: flags=8963<UP,BROADCAST,SMART,RUNNING,PROMISC,SIMPLEX,MULTICAST> mtu 1500
        options=460<TSO4,TSO6,CHANNEL_IO>
        ether 82:0d:53:4b:80:00
        media: autoselect <full-duplex>
        status: inactive
bridge0: flags=8863<UP,BROADCAST,SMART,RUNNING,SIMPLEX,MULTICAST> mtu 1500
        options=63<RXCSUM,TXCSUM,TSO4,TSO6>
        ether 82:0d:53:4b:80:00
        Configuration:
                id 0:0:0:0:0:0 priority 0 hellotime 0 fwddelay 0
                maxage 0 holdcnt 0 proto stp maxaddr 100 timeout 1200
                root id 0:0:0:0:0:0 priority 0 ifcost 0 port 0
                ipfilter disabled flags 0x0
        member: en1 flags=3<LEARNING,DISCOVER>
                ifmaxaddr 0 port 5 priority 0 path cost 0
        nd6 options=201<PERFORMNUD,DAD>
        media: <unknown type>
        status: inactive
p2p0: flags=8843<UP,BROADCAST,RUNNING,SIMPLEX,MULTICAST> mtu 2304
        options=400<CHANNEL_IO>
        ether 06:76:ba:b0:a3:fc
        media: autoselect
        status: inactive
awdl0: flags=8943<UP,BROADCAST,RUNNING,PROMISC,SIMPLEX,MULTICAST> mtu 1484
        options=400<CHANNEL_IO>
        ether 46:2e:d2:38:af:2c
        inet6 fe80::442e:d2ff:fe38:af2c%awdl0 prefixlen 64 scopeid 0x8
        nd6 options=201<PERFORMNUD,DAD>
        media: autoselect
        status: active
llw0: flags=8863<UP,BROADCAST,SMART,RUNNING,SIMPLEX,MULTICAST> mtu 1500
        options=400<CHANNEL_IO>
        ether 46:2e:d2:38:af:2c
        inet6 fe80::442e:d2ff:fe38:af2c%llw0 prefixlen 64 scopeid 0x9
        nd6 options=201<PERFORMNUD,DAD>
        media: autoselect
        status: active
utun0: flags=8051<UP,POINTOPOINT,RUNNING,MULTICAST> mtu 1380
        inet6 fe80::3ea4:ec6e:d3b4:b10e%utun0 prefixlen 64 scopeid 0xa
        nd6 options=201<PERFORMNUD,DAD>
utun1: flags=8051<UP,POINTOPOINT,RUNNING,MULTICAST> mtu 2000
        inet6 fe80::8dc9:d93f:8e07:3647%utun1 prefixlen 64 scopeid 0xb
        nd6 options=201<PERFORMNUD,DAD>
```

netstat :-

Netstat command displays various network related information such as network connections, routing tables, interface statistics, masquerade connections, multicast memberships etc.,[7]

References :-

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4. https://network-tools.com/nslookup/

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