Computer Networks (CS3205)

Assignment 1

Websites:

India : www.isro.gov.in
Asia : www.baidu.com
American continent : www.defense.gov
Pacific : www.ausopen.com
General : www.facebook.com

Screenshots and Inference :

MAC and IP address

```
Wireless LAN adapter Wi-Fi:

   Connection-specific DNS Suffix  . : domain.name
   Description . . . . . . . . . . . : Intel(R) Dual Band Wireless-AC 8265
   Physical Address. . . . . . . . . : E0-9D-31-D6-F8-85
   DHCP Enabled. . . . . . . . . . . : Yes
   Autoconfiguration Enabled . . . . : Yes
   Link-local IPv6 Address . . . . . : fe80::41fe:e011:660a:10a7%22(Preferred)
   IPv4 Address. . . . . . . . . . . : 192.168.0.10(Preferred)
   Subnet Mask . . . . . . . . . . . : 255.255.255.0
   Lease Obtained. . . . . . . . . . : Tuesday, January 28, 2020 8:04:12 PM
   Lease Expires . . . . . . . . . . : Tuesday, January 28, 2020 10:04:11 PM
   Default Gateway . . . . . . . . . : fe80::8226:89ff:fe51:b8d0%22
                                       192.168.0.1
   DHCP Server . . . . . . . . . . . : 192.168.0.1
   DHCPv6 IAID . . . . . . . . . . . : 501259569
   DHCPv6 Client DUID. . . . . . . . : 00-01-00-01-22-F4-D1-E7-E0-9D-31-D6-F8-85
   DNS Servers . . . . . . . . . . . : 192.168.0.1
   NetBIOS over Tcpip. . . . . . . . : Enabled
```

1. In this assignment I am using a wireless router as a connecting device.
2. The above screenshot is a part of the output of ipconfig which gives info about wireless configuration of my device.
3. Here MAC address is physical address (E0-9D-31-D6-F8-85) and IPv4 address is 192.168.0.10.

Ping and nslookup, tracert, inference in that order for all domains

ISRO

```
C:\Users\Akash Pramod>ping www.isro.gov.in -n 10

Pinging e26639.dscb.akamaiedge.net [180.149.52.208] with 32 bytes of data:
Reply from 180.149.52.208: bytes=32 time=52ms TTL=54
Reply from 180.149.52.208: bytes=32 time=181ms TTL=54
Reply from 180.149.52.208: bytes=32 time=109ms TTL=54
Reply from 180.149.52.208: bytes=32 time=70ms TTL=54
Reply from 180.149.52.208: bytes=32 time=44ms TTL=54
Reply from 180.149.52.208: bytes=32 time=50ms TTL=54
Reply from 180.149.52.208: bytes=32 time=50ms TTL=54
Reply from 180.149.52.208: bytes=32 time=56ms TTL=54
Reply from 180.149.52.208: bytes=32 time=44ms TTL=54
Reply from 180.149.52.208: bytes=32 time=64ms TTL=54

Ping statistics for 180.149.52.208:
    Packets: Sent = 10, Received = 10, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 44ms, Maximum = 181ms, Average = 72ms

C:\Users\Akash Pramod>nslookup www.isro.gov.in
DNS request timed out.
    timeout was 2 seconds.
Server:  UnKnown
Address:  192.168.0.1

Non-authoritative answer:
Name:    e26639.dscb.akamaiedge.net
Addresses:  2600:140f:3000:199::680f
          2600:140f:3000:1a7::680f
          180.149.52.211
          180.149.52.208
Aliases:  www.isro.gov.in
          www.isro.gov.in.edgekey.net
```

1. As the server and receiver both belong to india the ttl is a bit less compared to other websites and the TTL in ping request is 54 implies there are 10 hops before reaching the site, the same is observed in tracert.
2. The similarity in the ip of intermediate connections shows that there is no change of country unlike other trace routes.
3. Ip address of destination is 180.149.52.211 which is same in both nslookup, tracert and ping.

```
 1    115 ms      6 ms      2 ms   192.168.0.1
 2      4 ms    112 ms      7 ms   10.22.43.254
 3     16 ms      4 ms      2 ms   10.25.100.1
 4     78 ms      9 ms     74 ms   10.26.0.14
 5      4 ms      4 ms      4 ms   10.119.232.138
 6      3 ms      3 ms     14 ms   10.119.232.137
 7     50 ms     72 ms     48 ms   10.163.255.201
 8     49 ms     48 ms     45 ms   10.255.238.185
 9     45 ms     44 ms     46 ms   10.1.200.138
10     70 ms     64 ms     56 ms   10.119.234.162
11     53 ms     46 ms     56 ms   180.149.52.211

Trace complete.

C:\Users\Akash Pramod>tracert www.isro.gov.in

Tracing route to e26639.dscb.akamaiedge.net [180.149.52.208]
over a maximum of 30 hops:

 1      5 ms      2 ms      2 ms   192.168.0.1
 2      4 ms      3 ms      4 ms   10.22.43.254
 3      4 ms      4 ms      3 ms   10.25.100.1
 4     29 ms      3 ms      5 ms   10.26.0.14
 5      7 ms     33 ms      4 ms   10.119.232.138
 6      4 ms      5 ms      6 ms   10.119.232.137
 7     44 ms     47 ms     44 ms   10.163.255.201
 8     51 ms     47 ms     46 ms   10.255.238.185
 9     47 ms     54 ms     44 ms   10.1.200.138
10     48 ms     47 ms     53 ms   10.119.234.162
11     44 ms     44 ms     44 ms   180.149.52.208

Trace complete.

C:\Users\Akash Pramod>tracert www.isro.gov.in

Tracing route to e26639.dscb.akamaiedge.net [180.149.52.208]
over a maximum of 30 hops:

 1      2 ms      2 ms      2 ms   192.168.0.1
 2      4 ms      5 ms     14 ms   10.22.43.254
 3      5 ms      3 ms      3 ms   10.25.100.1
 4      3 ms      3 ms      2 ms   10.26.0.14
 5      3 ms     10 ms      3 ms   10.119.232.138
 6      3 ms      2 ms      5 ms   10.119.232.137
 7     44 ms     45 ms     44 ms   10.163.255.201
 8     57 ms     44 ms     47 ms   10.255.238.185
 9     44 ms     44 ms     45 ms   10.1.200.138
10     49 ms     44 ms     44 ms   10.119.234.162
11     45 ms     44 ms     45 ms   180.149.52.208

Trace complete.
```

BAIDU

```
C:\Users\Akash Pramod>ping -n 10 www.baidu.com

Pinging www.wshifen.com [45.113.192.101] with 32 bytes of data:
Reply from 45.113.192.101: bytes=32 time=242ms TTL=47
Reply from 45.113.192.101: bytes=32 time=71ms TTL=47
Reply from 45.113.192.101: bytes=32 time=70ms TTL=47
Reply from 45.113.192.101: bytes=32 time=71ms TTL=47
Reply from 45.113.192.101: bytes=32 time=82ms TTL=47
Reply from 45.113.192.101: bytes=32 time=92ms TTL=47
Reply from 45.113.192.101: bytes=32 time=77ms TTL=47
Reply from 45.113.192.101: bytes=32 time=70ms TTL=47
Reply from 45.113.192.101: bytes=32 time=71ms TTL=47
Reply from 45.113.192.101: bytes=32 time=81ms TTL=47

Ping statistics for 45.113.192.101:
    Packets: Sent = 10, Received = 10, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 70ms, Maximum = 242ms, Average = 92ms

C:\Users\Akash Pramod>nslookup www.baidu.com
DNS request timed out.
    timeout was 2 seconds.
Server:  UnKnown
Address:  192.168.0.1

Non-authoritative answer:
Name:    www.wshifen.com
Addresses:  45.113.192.101
         45.113.192.102
Aliases:  www.baidu.com
         www.a.shifen.com
```

1. This website baidu is chinese search engine.
2. The increase in roundtrip time and less TTL indicates change of country.
3. The connection between the 2 countries is handled by airtel as we can see in traceroute.
4. Destination ip : 45.113.192.101
5. This has lowest TTL of the websites considered.

```
C:\Users\Akash Pramod>tracert www.baidu.com

Tracing route to www.wshifen.com [45.113.192.101]
over a maximum of 30 hops:

  1      2 ms     48 ms      2 ms  192.168.0.1
  2     66 ms    174 ms      *     10.22.43.254
  3      *         3 ms      4 ms  10.25.100.1
  4      *         *        63 ms  10.26.0.14
  5     99 ms      3 ms      3 ms  10.119.232.138
  6     15 ms     16 ms     13 ms  10.119.232.137
  7     34 ms      6 ms      6 ms  10.163.255.201
  8    424 ms     41 ms     44 ms  10.119.73.122
  9     49 ms     56 ms     49 ms  aes-static-029.85.22.125.airtel.in [125.22.85.29]
 10     71 ms     68 ms     68 ms  182.79.134.149
 11     90 ms     94 ms     78 ms  55967.sgw.equinix.com [27.111.228.237]
 12     69 ms     86 ms    105 ms  45.113.192.3
 13    218 ms    100 ms    124 ms  45.113.192.101

Trace complete.

C:\Users\Akash Pramod>tracert www.baidu.com

Tracing route to www.wshifen.com [45.113.192.101]
over a maximum of 30 hops:

  1      3 ms      3 ms     49 ms  192.168.0.1
  2    229 ms    153 ms     15 ms  10.22.43.254
  3     20 ms      4 ms      3 ms  10.25.100.1
  4      3 ms     18 ms      3 ms  10.26.0.14
  5     18 ms     57 ms      9 ms  10.119.232.138
  6      6 ms      3 ms     32 ms  10.119.232.137
  7     12 ms      4 ms      5 ms  10.163.255.201
  8     13 ms      7 ms      5 ms  10.119.73.122
  9    103 ms     66 ms     43 ms  aes-static-029.85.22.125.airtel.in [125.22.85.29]
 10    178 ms     89 ms     75 ms  182.79.134.149
 11     83 ms     90 ms     71 ms  55967.sgw.equinix.com [27.111.228.237]
 12    108 ms    105 ms     93 ms  45.113.192.3
 13     91 ms     70 ms     86 ms  45.113.192.101

Trace complete.
```

USA DEFENSE

```
C:\Users\Akash Pramod>ping -n 10 www.defense.gov

Pinging e8732.dscb.akamaiedge.net [96.6.38.191] with 32 bytes of data:
Reply from 96.6.38.191: bytes=32 time=3ms TTL=54
Reply from 96.6.38.191: bytes=32 time=4ms TTL=54
Reply from 96.6.38.191: bytes=32 time=5ms TTL=54
Reply from 96.6.38.191: bytes=32 time=6ms TTL=54
Reply from 96.6.38.191: bytes=32 time=4ms TTL=54
Reply from 96.6.38.191: bytes=32 time=27ms TTL=54
Reply from 96.6.38.191: bytes=32 time=4ms TTL=54
Reply from 96.6.38.191: bytes=32 time=50ms TTL=54
Reply from 96.6.38.191: bytes=32 time=4ms TTL=54
Reply from 96.6.38.191: bytes=32 time=54ms TTL=54

Ping statistics for 96.6.38.191:
    Packets: Sent = 10, Received = 10, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 3ms, Maximum = 54ms, Average = 16ms

C:\Users\Akash Pramod>nslookup www.defense.gov
DNS request timed out.
    timeout was 2 seconds.
Server:  UnKnown
Address:  192.168.0.1

Non-authoritative answer:
Name:    e8732.dscb.akamaiedge.net
Addresses:  2600:140f:3000:19f::221c
          2600:140f:3000:195::221c
          96.6.38.191
Aliases:  www.defense.gov
          www.defense.gov.edgekey.net
```

```
Tracing route to e8732.dscb.akamaiedge.net [96.6.38.191]
over a maximum of 30 hops:

  1    32 ms     2 ms     6 ms  192.168.0.1
  2    12 ms     8 ms    10 ms  10.22.43.254
  3    24 ms    21 ms    97 ms  10.25.100.1
  4    18 ms     8 ms    16 ms  10.26.0.14
  5     3 ms     2 ms    18 ms  10.119.232.138
  6    24 ms     3 ms     4 ms  10.119.232.137
  7     5 ms    17 ms     4 ms  10.163.255.201
  8    16 ms   102 ms     5 ms  10.119.73.122
  9    14 ms     9 ms     8 ms  115.248.104.230
 10    10 ms     5 ms     7 ms  115.255.252.226
 11    12 ms    26 ms    11 ms  a96-6-38-191.deploy.static.akamaitechnologies.com [96.6.38.191]

Trace complete.

C:\Users\Akash Pramod>tracert www.defense.gov

Tracing route to e8732.dscb.akamaiedge.net [96.6.38.191]
over a maximum of 30 hops:

  1   146 ms    87 ms    88 ms  192.168.0.1
  2    35 ms     4 ms     4 ms  10.22.43.254
  3     6 ms     6 ms    11 ms  10.25.100.1
  4     2 ms     6 ms    31 ms  10.26.0.14
  5     5 ms    35 ms     6 ms  10.119.232.138
  6     4 ms     3 ms     6 ms  10.119.232.137
  7    14 ms     4 ms     5 ms  10.163.255.201
  8    59 ms     4 ms     5 ms  10.119.73.122
  9   104 ms    84 ms   104 ms  115.248.104.230
 10    33 ms    67 ms     6 ms  115.255.252.226
 11    18 ms    12 ms    36 ms  a96-6-38-191.deploy.static.akamaitechnologies.com [96.6.38.191]

Trace complete.
```

1. US Defence website, ip : 96.6.38.191

AUSTRALIAN OPEN

```
C:\Users\Akash Pramod>ping -n 10 ausopen.com

Pinging ausopen.com [104.17.178.107] with 32 bytes of data:
Reply from 104.17.178.107: bytes=32 time=5ms TTL=54
Reply from 104.17.178.107: bytes=32 time=13ms TTL=54
Reply from 104.17.178.107: bytes=32 time=4ms TTL=54
Reply from 104.17.178.107: bytes=32 time=6ms TTL=54
Reply from 104.17.178.107: bytes=32 time=4ms TTL=54
Reply from 104.17.178.107: bytes=32 time=4ms TTL=54
Reply from 104.17.178.107: bytes=32 time=4ms TTL=54
Reply from 104.17.178.107: bytes=32 time=4ms TTL=54
Reply from 104.17.178.107: bytes=32 time=4ms TTL=54
Reply from 104.17.178.107: bytes=32 time=6ms TTL=54

Ping statistics for 104.17.178.107:
    Packets: Sent = 10, Received = 10, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 4ms, Maximum = 13ms, Average = 5ms

C:\Users\Akash Pramod>nslookup ausopen.com
DNS request timed out.
    timeout was 2 seconds.
Server:  UnKnown
Address:  192.168.0.1

Non-authoritative answer:
Name:    ausopen.com
Addresses:  2606:4700::6811:b26b
          2606:4700::6811:b16b
          104.17.177.107
          104.17.178.107
```

```
C:\Users\Akash Pramod>tracert ausopen.com

Tracing route to ausopen.com [104.17.178.107]
over a maximum of 30 hops:

  1    20 ms    28 ms    57 ms  192.168.0.1
  2    33 ms     6 ms    34 ms  10.22.43.254
  3    12 ms    12 ms    27 ms  10.25.100.1
  4     8 ms     3 ms     4 ms  10.26.0.14
  5   191 ms    48 ms   172 ms  10.119.232.138
  6     5 ms     3 ms     3 ms  10.119.232.137
  7     7 ms     9 ms    10 ms  10.163.255.201
  8     8 ms     7 ms     6 ms  10.119.73.122
  9    11 ms     5 ms     5 ms  115.248.104.230
 10    18 ms     9 ms     7 ms  115.249.1.241
 11     7 ms     5 ms     6 ms  104.17.178.107

Trace complete.

C:\Users\Akash Pramod>tracert ausopen.com

Tracing route to ausopen.com [104.17.177.107]
over a maximum of 30 hops:

  1     2 ms     3 ms     2 ms  192.168.0.1
  2     5 ms     6 ms     3 ms  10.22.43.254
  3     5 ms     3 ms     3 ms  10.25.100.1
  4     3 ms     3 ms     3 ms  10.26.0.14
  5     9 ms    10 ms     8 ms  10.119.232.138
  6     8 ms     5 ms     4 ms  10.119.232.137
  7     7 ms    15 ms    26 ms  10.163.255.201
  8     9 ms    15 ms     4 ms  10.119.73.122
  9    27 ms     7 ms    14 ms  115.248.104.230
 10    10 ms     7 ms     5 ms  115.249.1.241
 11     5 ms     4 ms     4 ms  104.17.177.107

Trace complete.
```

1. Australian open sports website, IP : 104.17.178.107

FACEBOOK

```
C:\Users\Akash Pramod>ping -n 10 www.facebook.com

Pinging star-mini.c10r.facebook.com [157.240.16.35] with 32 bytes of data:
Reply from 157.240.16.35: bytes=32 time=30ms TTL=52
Reply from 157.240.16.35: bytes=32 time=36ms TTL=52
Reply from 157.240.16.35: bytes=32 time=34ms TTL=52
Reply from 157.240.16.35: bytes=32 time=30ms TTL=52
Reply from 157.240.16.35: bytes=32 time=49ms TTL=52
Reply from 157.240.16.35: bytes=32 time=28ms TTL=52
Reply from 157.240.16.35: bytes=32 time=28ms TTL=52
Reply from 157.240.16.35: bytes=32 time=28ms TTL=52
Reply from 157.240.16.35: bytes=32 time=28ms TTL=52
Reply from 157.240.16.35: bytes=32 time=50ms TTL=52

Ping statistics for 157.240.16.35:
    Packets: Sent = 10, Received = 10, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 28ms, Maximum = 50ms, Average = 34ms

C:\Users\Akash Pramod>nslookup www.facebook.com
DNS request timed out.
    timeout was 2 seconds.
Server:  UnKnown
Address:  192.168.0.1

DNS request timed out.
    timeout was 2 seconds.
DNS request timed out.
    timeout was 2 seconds.
Non-authoritative answer:
Name:    star-mini.c10r.facebook.com
Addresses:  2a03:2880:f12f:83:face:b00c:0:25de
          157.240.16.35
Aliases:  www.facebook.com
```

1. This is another american website, IP : 157.240.16.35

```
C:\Users\Akash Pramod>tracert www.facebook.com

Tracing route to star-mini.c10r.facebook.com [157.240.16.35]
over a maximum of 30 hops:

  1    17 ms     3 ms     8 ms  192.168.0.1
  2    22 ms    12 ms    12 ms  10.22.43.254
  3     4 ms     9 ms    10 ms  10.25.100.1
  4    19 ms     5 ms     7 ms  10.26.0.14
  5     3 ms     3 ms    37 ms  10.119.232.138
  6    44 ms     8 ms     3 ms  10.119.232.137
  7    32 ms    37 ms    32 ms  10.163.255.201
  8    29 ms    29 ms    32 ms  10.255.232.217
  9    97 ms    32 ms    29 ms  10.152.7.38
 10    34 ms    33 ms    32 ms  ae1.pr01.bom1.tfbnw.net [157.240.68.238]
 11    31 ms    36 ms   137 ms  po101.psw03.bom1.tfbnw.net [157.240.40.229]
 12    34 ms    33 ms    35 ms  173.252.67.115
 13    31 ms    32 ms    32 ms  edge-star-mini-shv-01-bom1.facebook.com [157.240.16.35]

Trace complete.

C:\Users\Akash Pramod>tracert www.facebook.com

Tracing route to star-mini.c10r.facebook.com [157.240.16.35]
over a maximum of 30 hops:

  1     4 ms     2 ms     2 ms  192.168.0.1
  2    10 ms     8 ms     4 ms  10.22.43.254
  3    25 ms    11 ms     8 ms  10.25.100.1
  4    14 ms    19 ms    10 ms  10.26.0.14
  5    11 ms    12 ms     9 ms  10.119.232.138
  6    11 ms    14 ms    13 ms  10.119.232.137
  7    42 ms    39 ms    39 ms  10.163.255.201
  8    33 ms    31 ms    30 ms  10.255.232.217
  9    35 ms    43 ms    28 ms  10.152.7.38
 10    50 ms    37 ms    44 ms  ae1.pr01.bom1.tfbnw.net [157.240.68.238]
 11    39 ms    35 ms    32 ms  po101.psw03.bom1.tfbnw.net [157.240.40.229]
 12    31 ms    37 ms    37 ms  173.252.67.115
 13    38 ms    34 ms    35 ms  edge-star-mini-shv-01-bom1.facebook.com [157.240.16.35]

Trace complete.
```

General Inference (Overall) :

1. Traceroute sends packets to the destination with the field TTL equal to the number of hops. If router does not respond within a timeout then traceroute prints an asterisk.
2. The sum of rows (minus one) in tracert and received TTL from ping will be equal to 64 - indicating the number of total time to live of request packets. We are subtracting one because tracert counts both your router and a successful ping request.
3. The variations in consecutive tracert corresponds to different paths to reach the same ip address.
4. Two IP addresses in nslookup correspond to IP4 and IP6 or old and new address of the website.
5. Wireshark captures for the same is available with short names in the directory.