

Assignment-1 Submission

Indian Institute of Technology Delhi

COL334: Computer Networks

Name: Deepanshu Entry Number: 2019CS50427 Group: 04

1 Introduction

This assignment aims at getting familiar with basic networking tools.

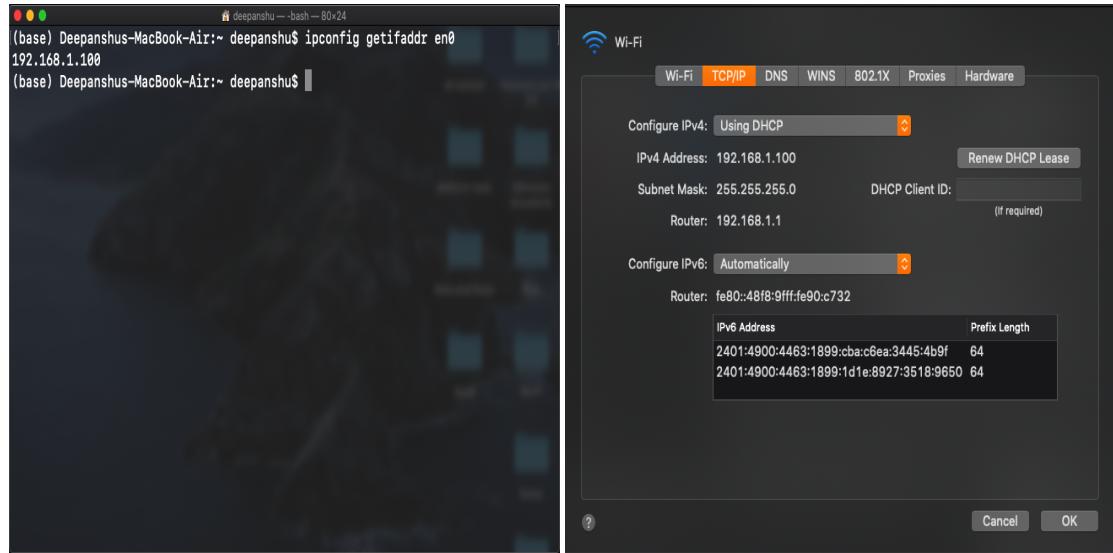
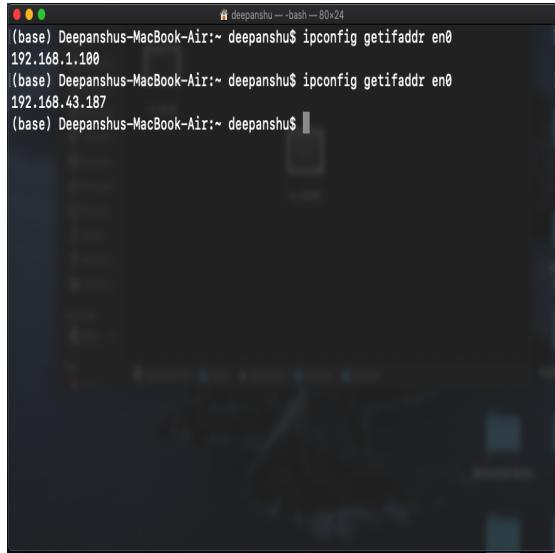


Figure 1: Ans 1(a): IP address when connected to home wifi (Airtel dongle)



```
(base) Deepanshus-MacBook-Air:~ deepanshu$ ipconfig getifaddr en0
192.168.1.100
(base) Deepanshus-MacBook-Air:~ deepanshu$ ipconfig getifaddr en0
192.168.43.187
(base) Deepanshus-MacBook-Air:~ deepanshu$
```

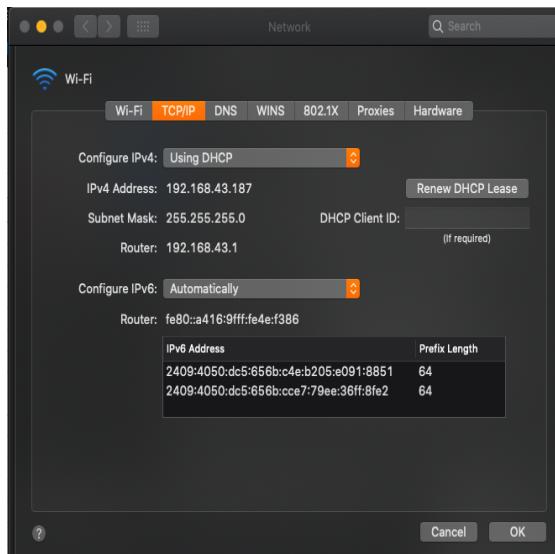


Figure 2: Ans 1(a):The output changed on switching to Jio network using mobile hotspot.

```

(base) Deepanshus-MacBook-Air:~ deepanshu$ nslookup www.google.com
Server: 2401:4900:47f3:2648:9481:4cff:fe11:4849
Address: 2401:4900:47f3:2648:9481:4cff:fe11:4849#53

Non-authoritative answer:
Name: www.google.com
Address: 142.250.194.100

(base) Deepanshus-MacBook-Air:~ deepanshu$ nslookup www.facebook.com
Server: 2401:4900:47f3:2648:9481:4cff:fe11:4849
Address: 2401:4900:47f3:2648:9481:4cff:fe11:4849#53

Non-authoritative answer:
www.facebook.com canonical name = star-mini.c10r.facebook.com.
Name: star-mini.c10r.facebook.com
Address: 157.240.198.35

(base) Deepanshus-MacBook-Air:~ deepanshu$ nslookup www.fb.com
Server: 2401:4900:47f3:2648:9481:4cff:fe11:4849
Address: 2401:4900:47f3:2648:9481:4cff:fe11:4849#53

Non-authoritative answer:
www.fb.com canonical name = www.facebook.com.
www.facebook.com canonical name = star-mini.c10r.facebook.com.
Name: star-mini.c10r.facebook.com
Address: 157.240.239.35

(base) Deepanshus-MacBook-Air:~ deepanshu$ nslookup www.iitd.ac.in
Server: 2401:4900:47f3:2648:9481:4cff:fe11:4849
Address: 2401:4900:47f3:2648:9481:4cff:fe11:4849#53

Non-authoritative answer:
Name: www.iitd.ac.in
Address: 103.27.9.24

(base) Deepanshus-MacBook-Air:~ deepanshu$ nslookup www.google.com
Server: 208.67.222.222
Address: 208.67.222.222#53

Non-authoritative answer:
Name: www.google.com
Address: 142.250.194.68

(base) Deepanshus-MacBook-Air:~ deepanshu$ nslookup www.facebook.com
Server: 208.67.222.222
Address: 208.67.222.222#53

Non-authoritative answer:
www.facebook.com canonical name = star-mini.c10r.facebook.com.
Name: star-mini.c10r.facebook.com
Address: 157.240.198.35

(base) Deepanshus-MacBook-Air:~ deepanshu$ nslookup www.fb.com
Server: 208.67.222.222
Address: 208.67.222.222#53

Non-authoritative answer:
www.fb.com canonical name = www.facebook.com.
www.facebook.com canonical name = star-mini.c10r.facebook.com.
Name: star-mini.c10r.facebook.com
Address: 157.240.198.35

(base) Deepanshus-MacBook-Air:~ deepanshu$ nslookup www.iitd.ac.in
Server: 208.67.222.222
Address: 208.67.222.222#53

Non-authoritative answer:
Name: www.iitd.ac.in
Address: 103.27.9.24

```

```

(base) Deepanshus-MacBook-Air:~ deepanshu$ nslookup www.google.com
Server: 8.8.8.8
Address: 8.8.8.8#53

Non-authoritative answer:
Name: www.google.com
Address: 172.217.27.164

(base) Deepanshus-MacBook-Air:~ deepanshu$ nslookup www.facebook.com
Server: 8.8.8.8
Address: 8.8.8.8#53

Non-authoritative answer:
www.facebook.com canonical name = star-mini.c10r.facebook.com.
Name: star-mini.c10r.facebook.com
Address: 157.240.198.35

(base) Deepanshus-MacBook-Air:~ deepanshu$ nslookup www.fb.com
Server: 8.8.8.8
Address: 8.8.8.8#53

Non-authoritative answer:
www.fb.com canonical name = www.facebook.com.
www.facebook.com canonical name = star-mini.c10r.facebook.com.
Name: star-mini.c10r.facebook.com
Address: 157.240.198.35

(base) Deepanshus-MacBook-Air:~ deepanshu$ nslookup www.iitd.ac.in
Server: 8.8.8.8
Address: 8.8.8.8#53

Non-authoritative answer:
Name: www.iitd.ac.in
Address: 103.27.9.24

```

Figure 3: Ans 1(b):Output of nslookup on various websites and using different DNS servers

```

● ● ● deepanshu — bash — 80x33
(base) Deepanshus-MacBook-Air:~ deepanshu$ ping -c 2 www.iitd.ac.in
PING www.iitd.ac.in (103.27.9.24): 56 data bytes
64 bytes from 103.27.9.24: icmp_seq=0 ttl=51 time=25.835 ms
64 bytes from 103.27.9.24: icmp_seq=1 ttl=51 time=45.841 ms

--- www.iitd.ac.in ping statistics ---
2 packets transmitted, 2 packets received, 0.0% packet loss
round-trip min/avg/max/stddev = 25.835/35.838/45.841/10.003 ms
(base) Deepanshus-MacBook-Air:~ deepanshu$ ping -c 2 -s 8184 www.iitd.ac.in
PING www.iitd.ac.in (103.27.9.24): 8184 data bytes
8192 bytes from 103.27.9.24: icmp_seq=0 ttl=51 time=141.305 ms
8192 bytes from 103.27.9.24: icmp_seq=1 ttl=51 time=95.548 ms

--- www.iitd.ac.in ping statistics ---
2 packets transmitted, 2 packets received, 0.0% packet loss
round-trip min/avg/max/stddev = 95.548/118.427/141.305/22.879 ms
(base) Deepanshus-MacBook-Air:~ deepanshu$ ping -c 2 -s 8185 www.iitd.ac.in
PING www.iitd.ac.in (103.27.9.24): 8185 data bytes
ping: sendto: Message too long
ping: sendto: Message too long
Request timeout for icmp_seq 0

--- www.iitd.ac.in ping statistics ---
2 packets transmitted, 0 packets received, 100.0% packet loss
(base) Deepanshus-MacBook-Air:~ deepanshu$ |
```



```

● ● ● deepanshu — bash — 80x34
(base) Deepanshus-MacBook-Air:~ deepanshu$ ping -c 2 -s 818 -m 40 www.fb.com
PING star-mini.c10r.facebook.com (157.240.16.35): 818 data bytes
826 bytes from 157.240.16.35: icmp_seq=0 ttl=54 time=78.933 ms
826 bytes from 157.240.16.35: icmp_seq=1 ttl=54 time=68.106 ms

--- star-mini.c10r.facebook.com ping statistics ---
2 packets transmitted, 2 packets received, 0.0% packet loss
round-trip min/avg/max/stddev = 68.106/73.519/78.933/5.414 ms
(base) Deepanshus-MacBook-Air:~ deepanshu$ ping -c 2 -s 818 -m 15 www.fb.com
PING star-mini.c10r.facebook.com (157.240.16.35): 818 data bytes
826 bytes from 157.240.16.35: icmp_seq=0 ttl=54 time=105.919 ms
826 bytes from 157.240.16.35: icmp_seq=1 ttl=54 time=81.880 ms

--- star-mini.c10r.facebook.com ping statistics ---
2 packets transmitted, 2 packets received, 0.0% packet loss
round-trip min/avg/max/stddev = 81.880/93.899/195.919/12.828 ms
(base) Deepanshus-MacBook-Air:~ deepanshu$ ping -c 2 -s 818 -m 5 www.fb.com
PING star-mini.c10r.facebook.com (157.240.16.35): 818 data bytes
36 bytes from nsg-corporate-1.39.185.122.airtel.in (122.185.39.1): Time to live exceeded
Vr Hl TOS Len ID Flg off TTL Pro cks Src Dst
4 5 68 4e03 ab4d 0 0000 01 01 9ada 192.168.1.100 157.240.16.35

Request timeout for icmp_seq 0
36 bytes from nsg-corporate-1.39.185.122.airtel.in (122.185.39.1): Time to live exceeded
Vr Hl TOS Len ID Flg off TTL Pro cks Src Dst
4 5 68 4e03 82ad 0 0000 01 01 e37a 192.168.1.100 157.240.16.35

--- star-mini.c10r.facebook.com ping statistics ---
2 packets transmitted, 0 packets received, 100.0% packet loss
(base) Deepanshus-MacBook-Air:~ deepanshu$ ping -c 2 -s 818 -m 400 www.fb.com
ping: invalid TTL: `400'
```

Figure 4: Ans 1(c): Output with different package size and TTL values

```

(base) Deepanshus-MacBook-Air:COL334 deepanshu$ traceroute www.iitd.ac.in
traceroute to www.iitd.ac.in (103.27.9.24), 64 hops max, 52 byte packets
1 192.168.43.1 (192.168.43.1) 2.572 ms 1.488 ms 1.519 ms
2 192.168.31.16 (192.168.31.16) 50.053 ms 37.810 ms 53.274 ms
3 192.168.12.121 (192.168.12.121) 38.536 ms
192.168.12.109 (192.168.12.109) 38.946 ms 39.141 ms
4 192.168.13.58 (192.168.13.58) 34.925 ms
192.168.13.68 (192.168.13.68) 40.735 ms
192.168.13.58 (192.168.13.58) 29.278 ms
5 dsl-tn-dynamic-125.222.22.125.airtelbroadband.in (125.22.222.125) 66.797 ms
dsl-tn-dynamic-121.222.22.125.airtelbroadband.in (125.22.222.121) 21.144 ms 24.481 ms
6 182.79.135.70 (182.79.135.70) 26.093 ms
182.79.181.83 (182.79.181.83) 25.318 ms
182.79.176.142 (182.79.176.142) 24.867 ms
7 115.110.232.173.static.delhi.vsnl.net.in (115.110.232.173) 23.522 ms 40.213 ms 24.699 ms
8 * *
9 * *
10 * *
11 18.119.233.65 (18.119.233.65) 40.238 ms 26.462 ms 24.854 ms
12 18.119.233.66 (18.119.233.66) 59.752 ms 28.991 ms 75.382 ms
13 * *
14 * *
```



```

(base) Deepanshus-MacBook-Air:COL334 deepanshu$ traceroute6 www.google.com
traceroute6 to www.google.com (2404:6800:4000:800:810::2004) from 2401:4900:4157:7d83:60b4:f52f:7a71:b0
3, 64 hops max, 12 byte packets
1 2401:4900:0:4157:7d83::a8 2.698 ms 2.910 ms 2.161 ms
2 2401:4900:0:4157:7d83::0:22:4b10:1e40 28.420 ms 25.240 ms 23.358 ms
3 * *
4 2401:4900:0:c003::1c80 52.575 ms
2401:4900:0:c003::1c78 114.499 ms 37.253 ms
5 2401:4900:0:c003::1c06 50.961 ms 22.576 ms 25.908 ms
6 2404:a800:1a00:806::1d 27.011 ms
2404:a800:1a00:806::21 83.338 ms 61.943 ms
7 *
2001:4860:1:1:d4e 55.968 ms 26.149 ms
8 2404:6800:8095::1 32.934 ms
2001:4860:0:9e::1 30.530 ms
2001:4860:0:1a::1 35.415 ms
9 *
2001:4860:0:1:386b 83.768 ms
2001:4860:0:1:5e46 30.899 ms
```

Figure 5: Ans 1(d): Traceroute and traceroute6

2 Observations and response to Ans-1

1. 1c: Ping packet size is different for different addresses (see figure 4 and 5). It packet size varies from 8000 to nearly 1400 depending on the website.
2. 1d: In macos, default traceroute command uses IPv4. To use IPv6, use traceroute6 as the command instead of traceroute. To force traceroute to use IPv4, use -4 as a flag. Use the flag -I to get the private addresses.

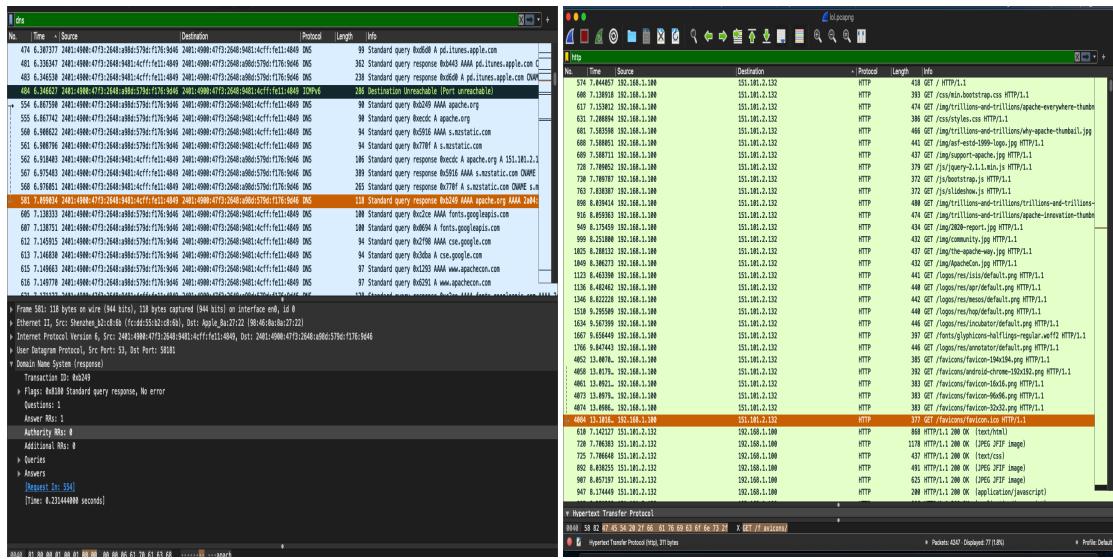


Figure 6: Packet trace with DNS and HTTP filter



Figure 7: First DNS request and last content object

3 Calculations and response to Ans-2

1. 2a: Time taken for DNS request-response to complete: 0.31 seconds. (See Figure 6(a))
2. 2b: Total HTTP requests: 29. (See figure 6(b)). Regarding rendering of complex pages with multiple images and files. As discussed in the live lecture, the browser loads "lighter" packets so that the user can start interacting with that part of webpage while other part is rendered in the background.
3. 2c: Total time taken to download the entire page: $13.184 - 6.867 = 6.317$ seconds. (See figure 7)
4. 2d: www.iitd.ac.in sends encrypted packages which wireshark cannot decrypt. This results in no HTTP package detection. Only 2 HTTP packages are received. One is the HTTP GET request and other is the redirecting response request that redirects us to HTTPS.

4 Part-3

Code is given in zip folder. Following are the libraries required before running the python file.

- subprocesses

- matplotlib

Apart from this, the machine should support python3. You should have a

5 Conclusion

Following are the major learning points and conclusion of the assignment:

1. We learned about various networking tools including some from terminal directly while other applications like wireshark.
2. Looked at the actual working of hops in action (in part-3).
3. From the time taken by various packets, we can analyse the time taken by various types of data. For example, text takes lesser time than images which in turn takes lesser time to render than videos.
4. We also learned how browser might load various parts of the page.