Introduction to Web Science

Assignment 1

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1. Ethernet Frame (5 Points)

1.1.Source MAC Address

00 13 10 e8 dd 52

1.2. Destination MAC Address

00 27 10 21 fa 48

1.3. What protocol is inside the data payload?

Ethernet Type contains : 08 06 which is bigger than *06 00* and it means that you do IP over the Ethernet.

1.4. Please mention what the last 2 fields hold in the above frame.

The last 2 fields are data and checksum field. Data contains all the data and playload at least 46 bytes plus the additional Ethernet header. Checksum is a sum calculated from all the data in the data field. It is used to detect and correct errors. The sum should be 1 otherwise the frame will be dropped.

2. Cable Issue! (5 Points)

Let us consider we have two cables of 20 meters each. One of them is in a 100MBps network while the other is in a 10MBps network. If you had to transfer data through each of them, how much time it would take for the first bit to arrive in each setting? (For your calculation you can assume that the speed of light takes the same value as in the videos.) Please provide formulas and calculations along with your results.

Propagation delay is the time it takes for the first bit to travel from the sender to the receiver and is equal to Distance/ propagation speed

Distance = 20 meters

Propagation speed = 300 million m/s (speed of light)

Propagation Delay = 20 m/300 million m/s = $6.67*10^{8}$ sec

3. Basic Network Tools (10 points)

3.1. The % packet loss if at all it happened after sending 100 packets.

Answer: % packet loss = 0%

3.2. Size of the packet sent to Wikipedia server

Answer : Size of packet = 32 byte of data

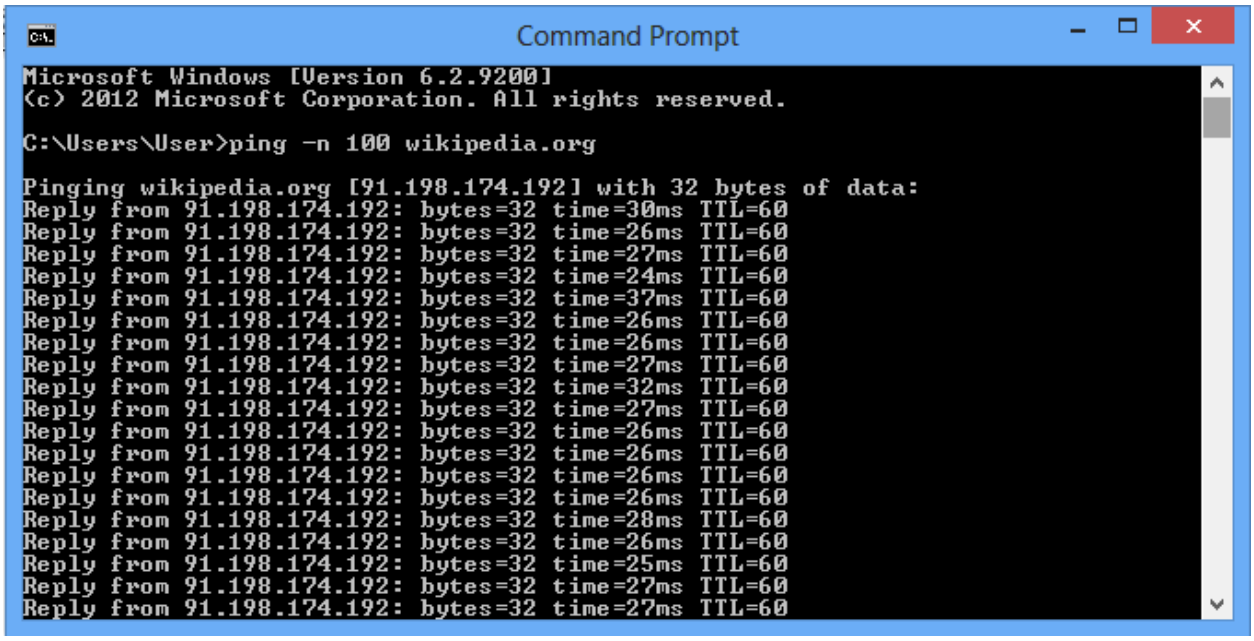

Figure 1

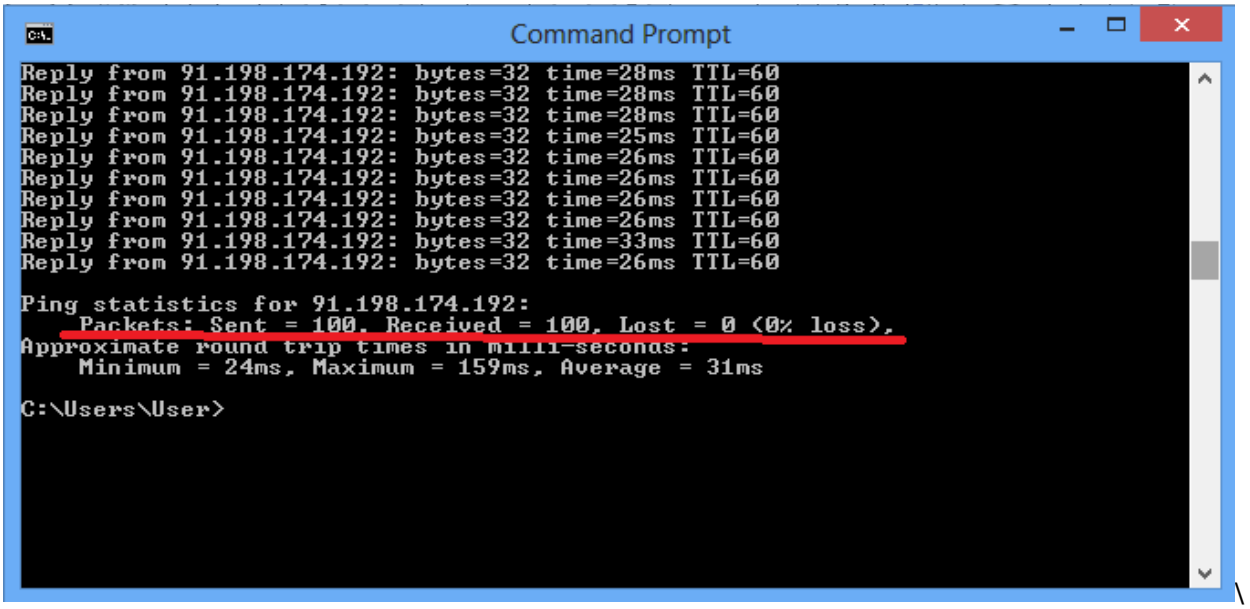

Figure 2

3.3. IP address of your machine and the Wikipedia server

My laptop IP address : 192.168.178.93 (Figure 5)

Wikipedia server IP address : 91.198.174.192 (Figure 3)

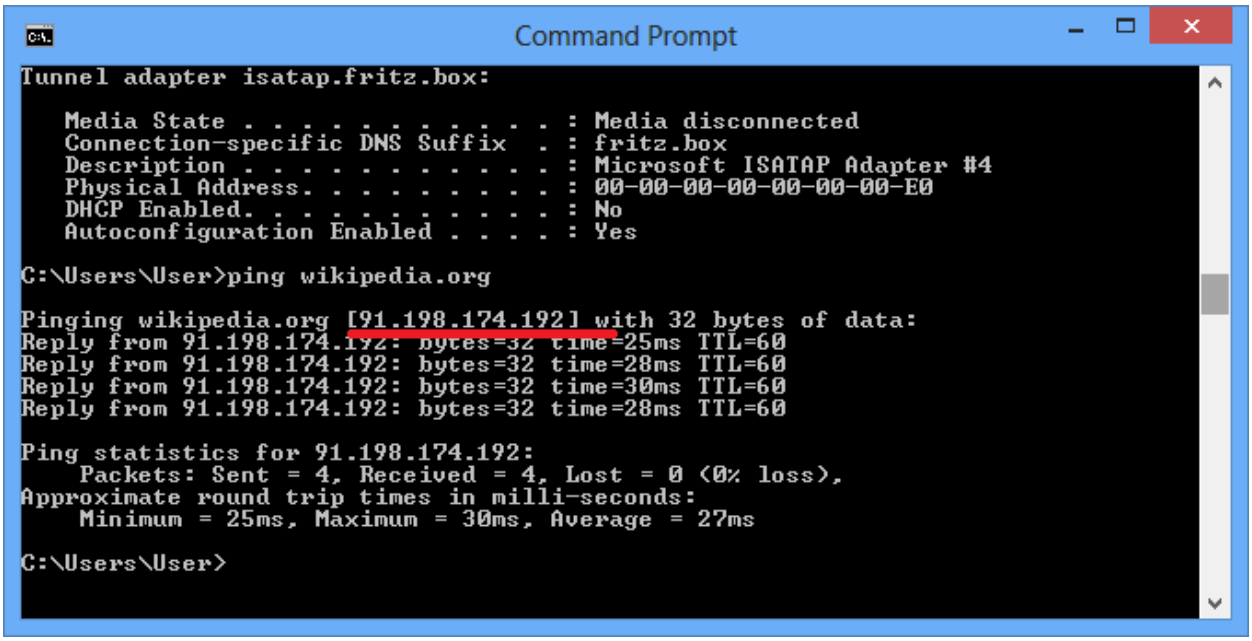

Figure 3

3.4. Query Time for DNS query of the above url.

(executed in mac OS laptop)

Query time : 123 msec

```
Owners-MacBook-Pro:~ owner$ dig www.wikipedia.org

; <<>> DiG 9.8.3-P1 <<>> www.wikipedia.org
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 47654
;; flags: qr rd ra; QUERY: 1, ANSWER: 1, AUTHORITY: 0, ADDITIONAL: 0

;; QUESTION SECTION:
;www.wikipedia.org.             IN      A

;; ANSWER SECTION:
www.wikipedia.org.      186     IN      A       91.198.174.192

;; Query time: 123 msec
;; SERVER: 192.168.1.1#53(192.168.1.1)
;; WHEN: Wed Nov  2 00:17:59 2016
;; MSG SIZE  rcvd: 51

Owners-MacBook-Pro:~ owner$
```

3.5. Number of Hops in between your machine and the server

Answer: Number of Hops = 8

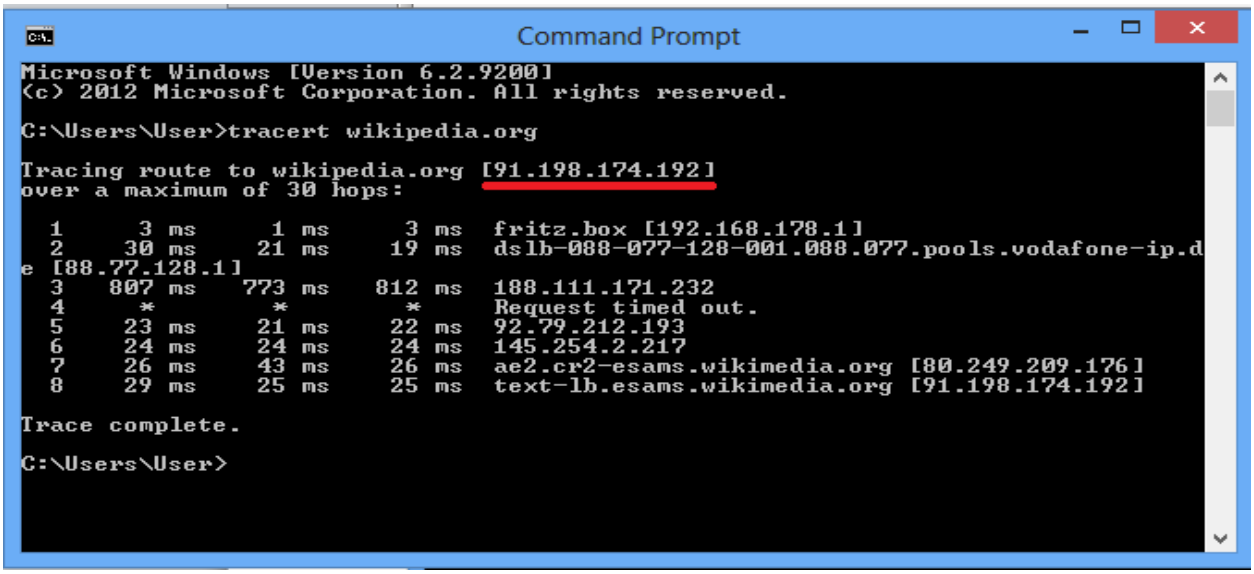

Figure 4

3.6. MAC address of the device that is acting as your network gateway.

MAC address : 60-6C-66-60-66-9D

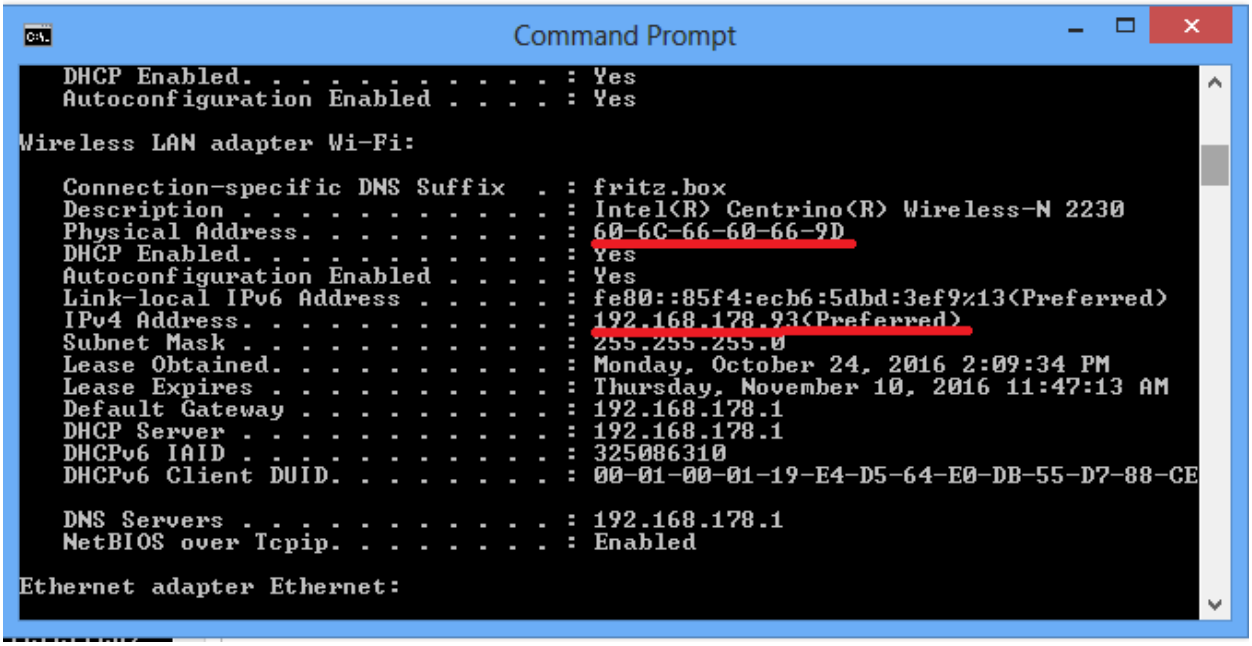

Figure 5: (also related to question 3.3)

4. Simple Python Programming (10 Points)

```
import random
import matplotlib.pyplot as pl
import numpy as np
```

```
#Create an array X to store generated numbers
X=[]
#COSIN is an array in where we will store cosine values
COSIN=[]
#SIN is an array in where we will store sine values
SIN=[]
#Generate 10 random numbers between 0 and 90
for x in range(0,10):
    X.append(random.randrange(0,90))

X=np.sort(X)
for x in range(len(X)):
    COSIN.append(np.cos(X[x]))
for x in range(len(X)):
    SIN.append(np.sin(X[x]))
#Create a new subplot from a grid
fig, aX = pl.subplots(1)
#Plot sine using red color with a continuous line of width 1 (pixels)
aX.plot(X, SIN,'-r',label='sin')
# Plot cosine using blue color with a continuous line of width 1 (pixels)
aX.plot(X, COSIN,'-b',label='cos')
#Customize plot
pl.ylim(-1.5,1.5)
pl.xticks([0,10,20,30,40,50,60,70,80,90],[0,10,20,30,40,50,60,70,80,90])
pl.title('Plots of the sine and cosine function for 10 random numbers!')
pl.xlabel('x-axis')
pl.ylabel('y-axis')
#Add a legend
pl.legend(loc='best')
#Print random numbers
```

```
print(X)
#Show the plot
pl.show()
```