CSE351 Computer Networks

Homework #1

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[Problem 1] self-introduction

Hello, I am Hojun Lee, a junior CSE student. I take this course because I think network might be essential and fundamental for computer scientist. This course is one of optionally required class. It also shows how this course is important. But I don't have deep interest for network. That is another reason I decided to take this course. After graduation, maybe I will not study about network. I think undergraduate school might be the last chance to study what I don't want to study. So, I decided to take this course.

Figure 1 selfie

Note) you can find experiment results on my github repository :
https://github.com/foxisdog/CSE351_Network/tree/main/hw1

[Problem 2] Ping Experiment

(a) What is the average RTT for each server? Which one is larger, and why?
www.google.com : 62.828 ms
www.mit.edu : 20.393 ms
RTT for google is larger. I found mit.edu uses Akamai CDN service which might be in korea. So, If google server is in abroad then RTT for goolgle.com might be larger. Also www.google.com is more popular than www.mit.edu. Then time for queueing google.com router might be bigger than MIT's. It can be another reason.

(b) What does the TTL value in the output mean, and why might it differ between servers?
TTL stands for "time to live". If ttl=x, then after the x hops the packet will disappear. And this ttl value is set by the server when it was created. Thus, ttl can be different between the servers.

(c) Was there any packet loss? If yes, what might be the cause?
Yes, there was packet loss only for google.com. A router having too many packets will intentionally drop the remaining packets. Google.com is one of the most popular domain. So, traffic jam might cause the packet loss.

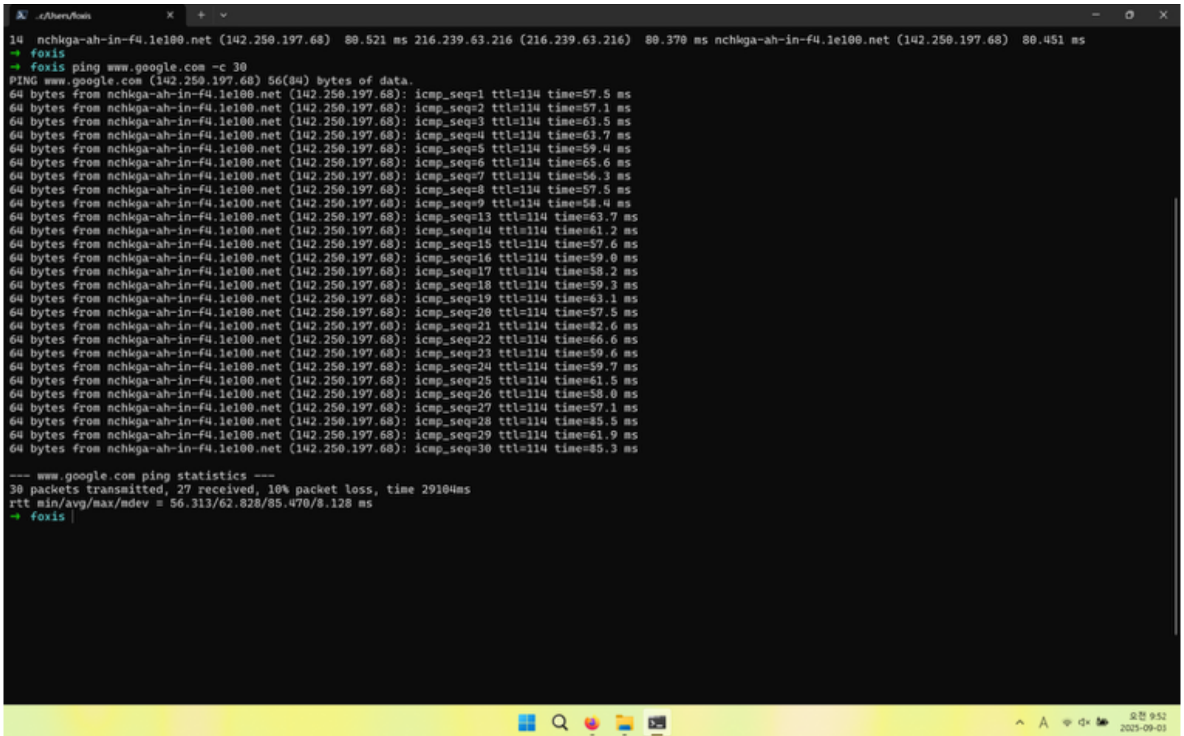

Figure 2 result of ping www.google.com. I sent 30 packets

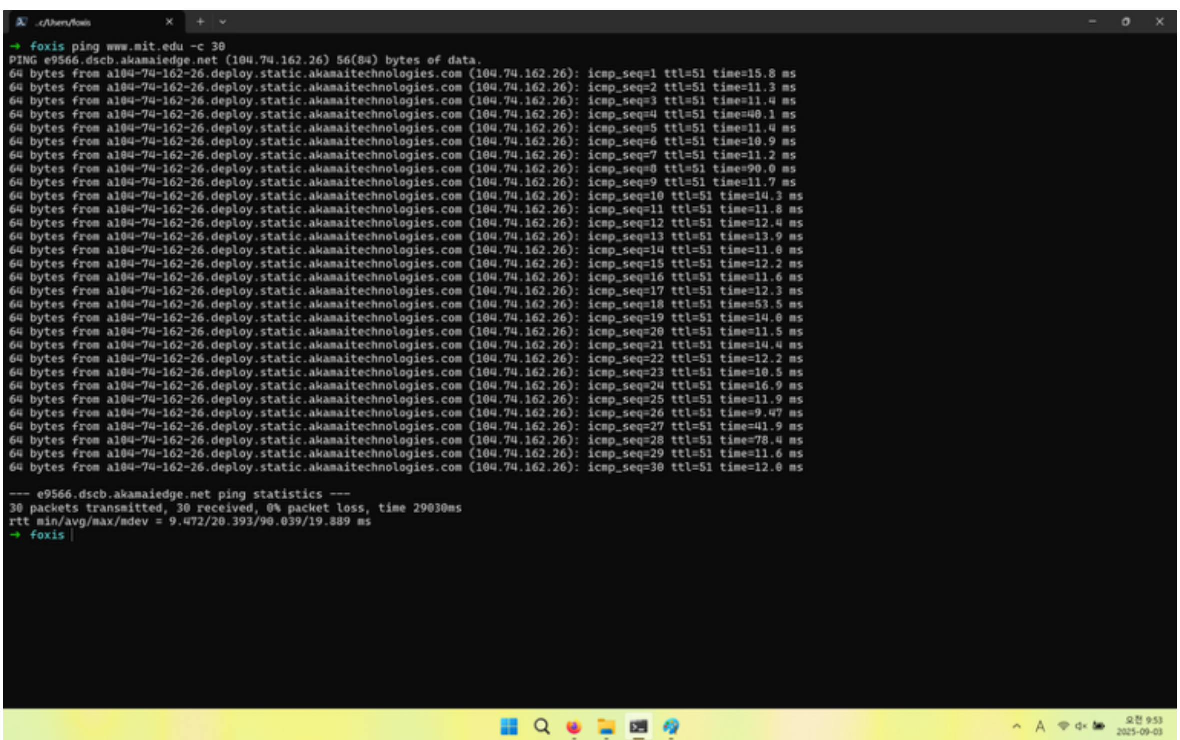

Figure 3 result of ping www.mit.edu. I sent 30 packets

Table 1 summary of ping experiment

	Min(ms)	Avg(ms)	Max(ms)	Packet loss(%)
www.google.com	56.313	62.828	85.470	10
www.mit.edu	9.472	20.393	90.039	0

[Problem 3] Traceroute Experiment

(a) For each time of day, what is the hop count from your computer to www.google.com?

Please refer to the table below.

(b) How many routers are in the path at each time of day? Did the set of routers or the number of router sever change?

Below is one of results.

2025-09-07_09-18-35.txt

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traceroute to www.google.com (142.250.197.36), 30 hops max, 60 byte packets

1 foxhouse.mshome.net (172.22.112.1) 0.211 ms 0.190 ms 0.185 ms

2 10.64.136.2 (10.64.136.2) 2.440 ms 3.741 ms 3.738 ms

3 10.0.1.2 (10.0.1.2) 3.753 ms 3.750 ms 3.747 ms

4 114.70.2.4 (114.70.2.4) 3.685 ms 4.764 ms 3.685 ms

5 114.70.0.34 (114.70.0.34) 3.675 ms 3.707 ms 3.668 ms

6 203.241.174.157 (203.241.174.157) 3.701 ms 3.709 ms 3.695 ms

7 dj-br1--us-br (134.75.8.41) 9.090 ms 10.089 ms 8.923 ms

8 * * *

9 hong-rtr--daej-rtr1kreonet2.net (134.75.101.102) 72.632 ms 72.627 ms 72.621 ms

10 134.75.108.98 (134.75.108.98) 72.575 ms 72.572 ms 72.568 ms

11 * * *

12 142.250.58.82 (142.250.58.82) 72.596 ms nchkga-ag-in-f4.1e100.net (142.250.197.36) 72.549 ms 142.251.253.106 (142.251.253.106) 72.527 ms

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***Green lines are unchanged over 6 trials. And I recorded the number of any other routers as changes in path.**

Please refer to the table below for remaining results.

The number of router server changed, but there are some common routers which are not changed.

(c) What is the name and IP address of the gateway of UNIST to the external world? Who provides the regional network that connects UNIST to the rest of the Internet?

The IP address of the gateway of UNIST is 10.0.1.2. It does not have name for itself. And the ip address of right after router of UNIST gate way is 114.70.2.4. using whois command, I found it is managed by KREN. And also, I found hong-rtr--daej-rtr1kreonet2.net appears over all cases. And that router is owned by KISTI.

(d) Compare the RTTs across the hops in your traceroute results. At which hop(s) do you observe a sudden increase in delay, and what might be the possible reasons (e.g., transcontinental link, congestion, routing policy)

After the 9 hop, the latencies are increased. The nineth router is hong-rtr--daej-rtr1kreonet2.net owned by KISTI. Even if that router must be in korea, the latency is suddenly increased. Most suspected reason is congestion. If many institutions in korea government uses that router then, there must be a traffic jam. And for some reasons (mainly about security), KISTI could decide to use inefficient policy.

Table 2 summary of tracerout experiment. Green lines above are unchanged over 6 trials. And I recorded the number of any other routers as changes in path.

	Hop count	Total number of routers	*Changes in path
1st morning	12	14	4
1st afternoon	12	14	4
1st evening	12	14	4
2nd morning	14	19	9
2nd afternoon	14	20	10
2nd evening	14	18	9

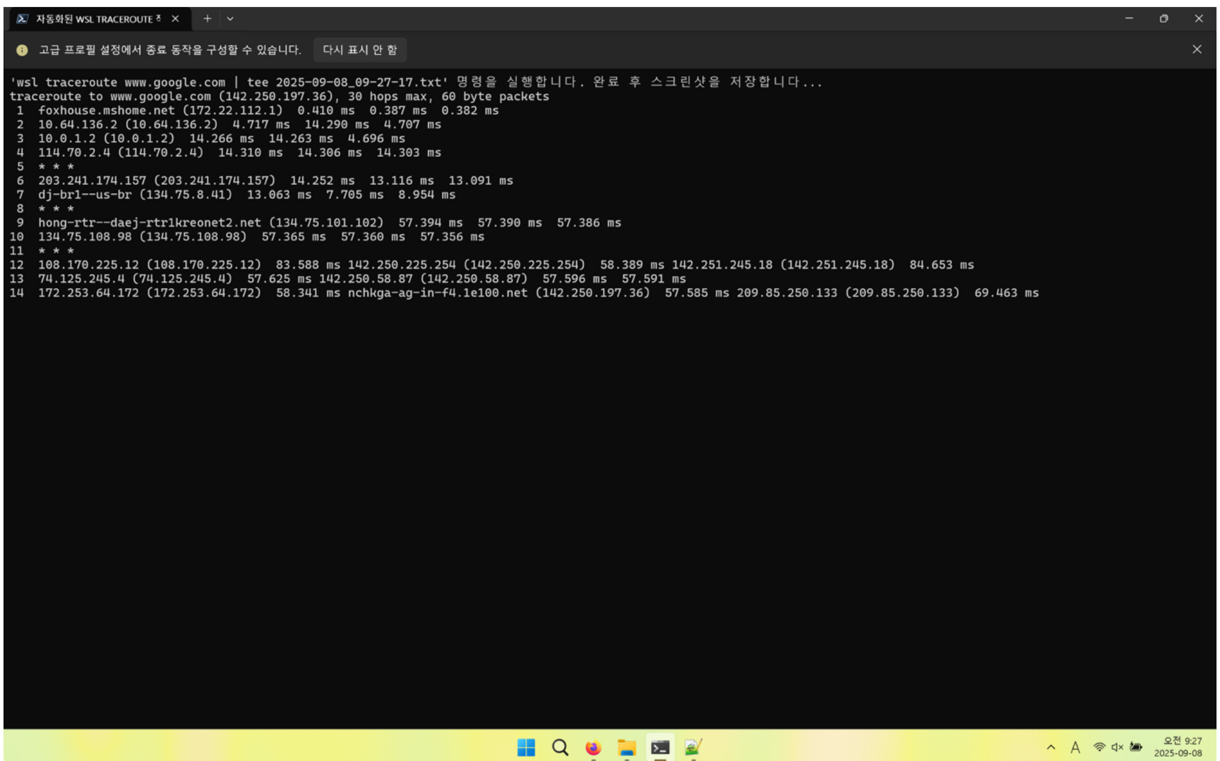

Figure 4 result of traceroute experiment on 09.08 morning

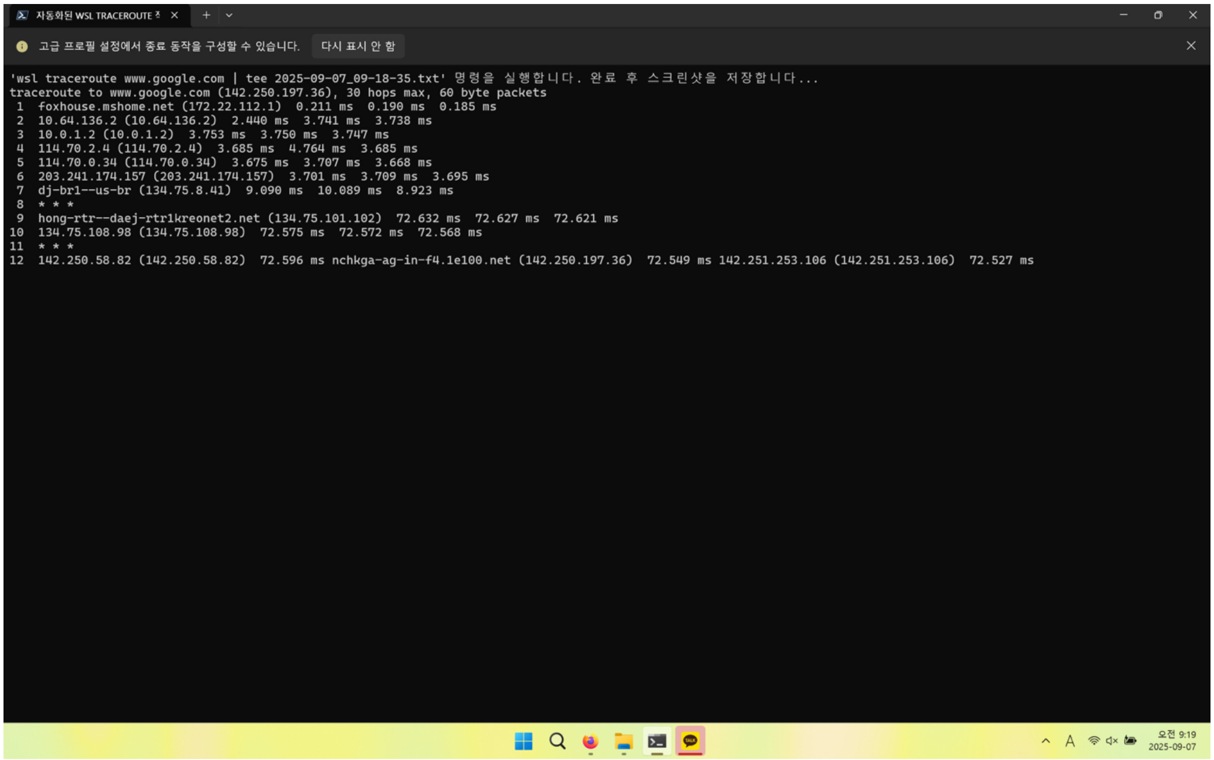

Figure 5 result of traceroute experiment on 09.07 evening

[Problem 4] Short Essays

Let us imagine a future. Our wearable devices operate not only for its original purpose but also corporate with any other wearable devices. The intuitive way is putting an central hub managing all wearable devices. But in the wonderful future, there was not. This essay is about my imagination of the answer on “what conditions does the wearable system meet?”. I consider privacy, different importance of information, and efficiency.

As I said, I want to assume that there is no central device managing wearable devices. I think the existence of central device is not ideal. For realistic reasons, I can be. But if there is a central device to manage wearable devices. I need to carry it. I don’t think this is ideal. Thus, let me assume there is no central device. Then, each device must send signals for connecting to other devices. Also, each device does not know how many devices need to be connected to itself. It means each device must send signals periodically to find other devices. Additionally, to recognize whether a device sending signals is mine or not, there must be a protocol to check the ownership of the device. It is good for you to imagine how iPod connect to your iPhone. And this must be encrypted for the security.

Now, we have the devices connecting to each other. What we need to consider is about how we should manage enormous data. Each wearable devices produces data about me frequently and much. And sending raw data produced to another wearable device might not be good. While sending raw data, our data is exposed to other, reaching privacy issue. And it would be also inefficient. Each device has computation ability, and it means it has ability to check that signal is to be sent or not. This is kind of edge computing. And it makes our system efficient and private. Using this idea, we can send less signals.

Finally, all information produced by wearable devices are not equally important. That means we can consider QoS protocol. For example, information about heart warning from smart watch are more important than information about how many you walk.

In conclusion, I suggest how and why wearable devices connect to each other periodically. And for the security and efficiency, the system needs to use edge computing. And since every data is not important evenly. Considering the importance, the system guarantee important information must be transferred fast. This system will lead us to live better lives ensuring privacy.