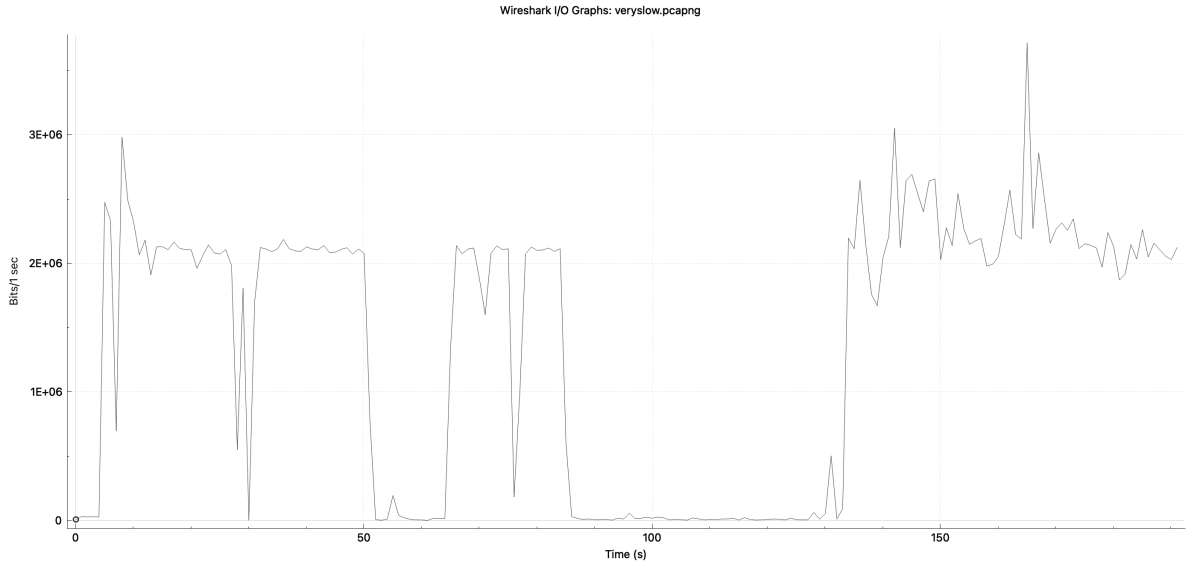
Computer Network HW1

Baby Shark

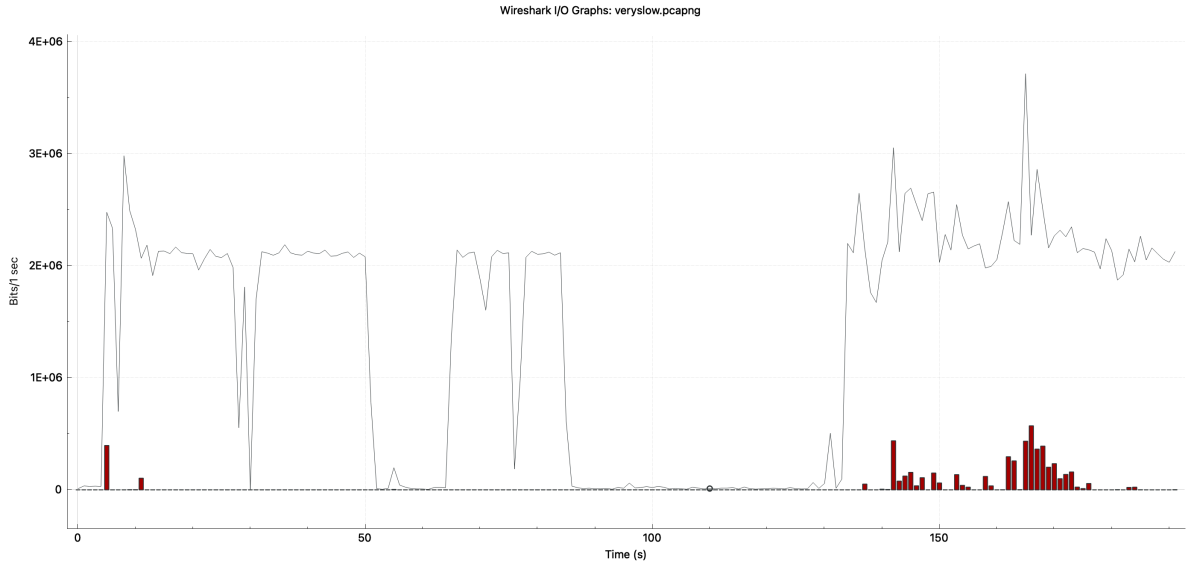
1.

(a)



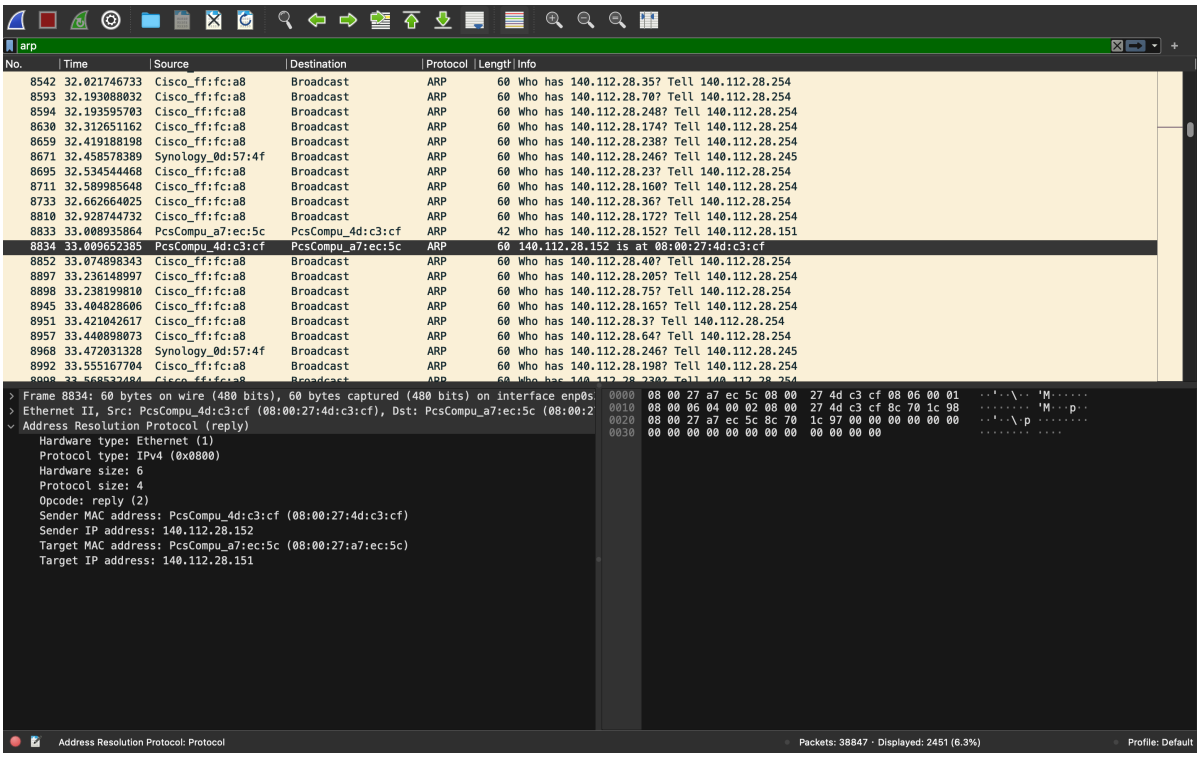
(b) about 2200 Kbps.

By observing the graph, we can know that before 100s, the transmit rate is almost restricted under 2200 Kbps, even after 100s, when it exceed 2200 Kbps, TCP error occurs.



2.

Ref: 李佩宸



Since ARP response is not Broadcast, only the target of the packet can recieve it. By observing the ARP packets, we can find out that we recieved the ARP response sending to 140.112.28.151.
So local IP address is `140.112.28.151`.

3.

(a) `This is a TCP joke. Did you get it?`

(b) `Baby shark, doo doo doo doo doo doo`

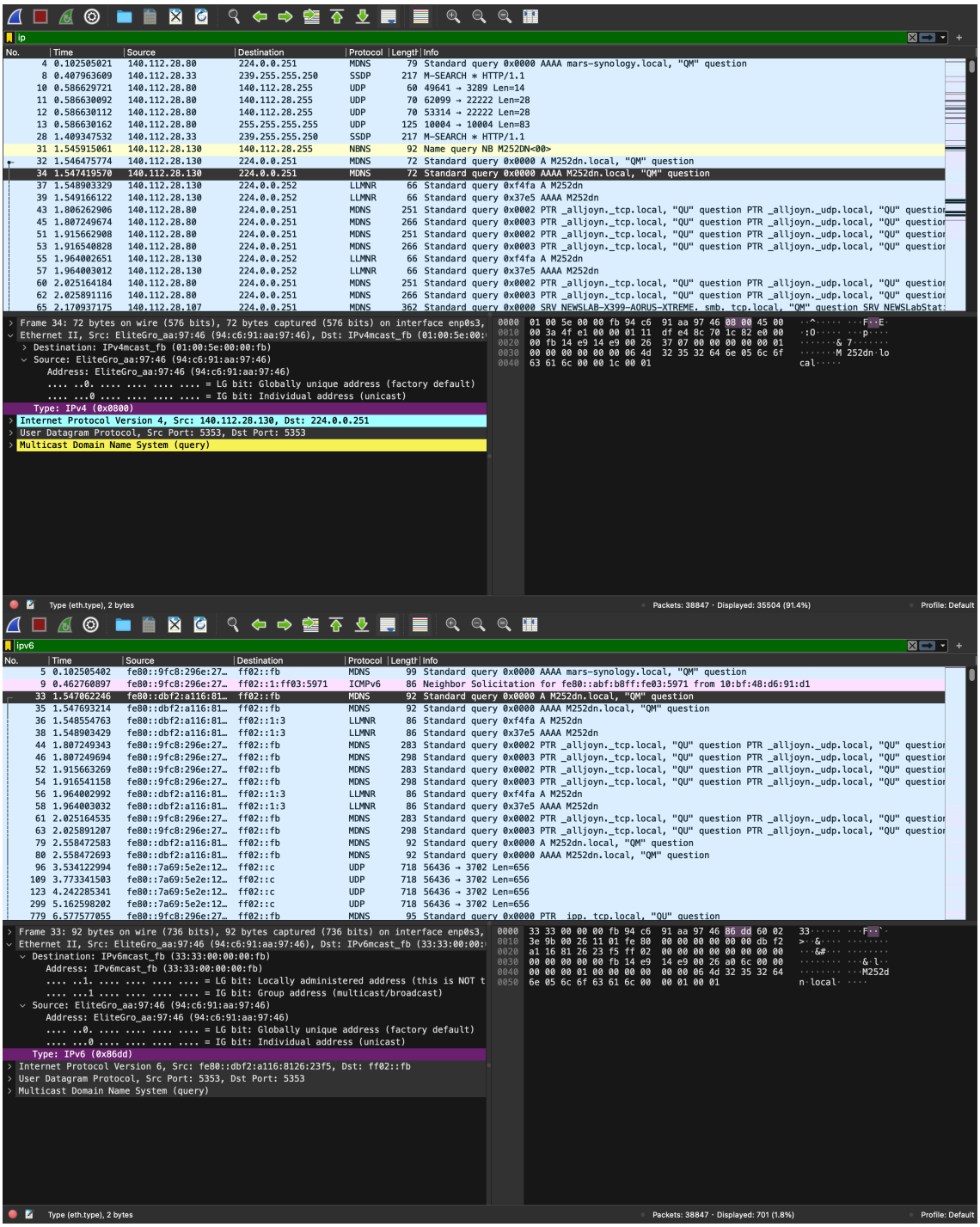
TCP needs many packets to secure the message is transmitted correctly, while UDP only needs 1 packet to send the message since it doesn't care whether the receiver is available at the moment or not.

p.s. I got bamboozled QAQ

4.

Ref: https://chat.openai.com/share/247f8265-aba9-487b-8589-3a843cddbd58

1. Look at the 13~14th bytes of the packet (last 2 bytes of the Ethernet header, you can see them in the snapshots below).
   If is IPv4, they should be `08 00`.
   If is IPv6, they should be `86 dd`.
2. Look at the first 4 bits of the 15th byte of the packet (the first 4 bits of the IP header, which follows the Ethernet header).
   If is IPv4, it should be `4`.
   If is IPv6, it should be `6`.



5.

(a)

1. zh.wikipedia.org is the CNAME for dyna.wikipedia.org
2. dyna.wikipedia.org's IP is 103.102.166.224
3. Authoritative nameserver:

- ns0.wikipedia.org, IP: 208.80.154.238
- ns1.wikipedia.org, IP: 208.80.153.231
- ns2.wikipedia.org, IP: 198.35.27.27

(b) CNAME, A, NS, OPT

(c) 103.102.166.224

The problem sheet of midterm exam

1.

USER `cnta`
PASS `ji32k7au4a83`

2.

21
30010/30012/30013/30016

3.

(a) midterm.txt
(b) 10

```
C0MPU73r Ne7w0Rk$
M!d73rM Ex@M
2023/10/25
14:20~17:20

1. (10%)
Consider sending a large file of F bits from Host A to Host B. There are three
links (and two switches) between A and B, and the links are uncongested (that is,
no queuing delays). Host A segments the file into segments of S bits each and
adds 80 bits of header to each segment, forming packets of L = 80 + S bits. Each
link has a transmission rate of R bps. Find the value of S that minimizes the
delay of moving the file from Host A to Host B. Disregard propagation delay.

2. (10%)
Describe the different wireless technologies you use during the day and their
characteristics. If you have a choice between multiple technologies, why do you
prefer one over another?

3. (10%)
What advantage does a circuit-switched network have over a packet-switched
network? What advantages does TDM have over FDM in a circuit-switched network?

4. (10%)
Consider sending a packet from a source host to a destination host over a fixed
route. List the delay components in the end-to-end delay. Which of these delays
are constant and which are variable?

5. (10%)
What are the five layers in the Internet protocol stack? What are the principal
responsibilities of each of these layers?

6. (10%)
```

```
Consider a short, 30-meter link, over which a sender can transmit at a rate of
300 bits/sec in both directions. Suppose that packets containing data are 100,
000 bits long, and packets containing only control (e.g., ACK or handshaking) are
200 bits long. Assume that N parallel connections each get 1/N of the link
bandwidth. Now consider the HTTP protocol, and suppose that each downloaded
object is 100 Kbits long, and that the initial downloaded object contains 10
referenced objects from the same sender. Would parallel downloads via parallel
instances of non-persistent HTTP make sense in this case? Now consider persistent
HTTP. Do you expect significant gains over the non-persistent case? Justify and
explain your answer.

7. (10%)
Consider distributing a file of F = 10 Gbits to N peers. The server has an upload
rate of us = 1 Gbps, and each peer has a download rate of di = 200 Mbps and an
upload rate of u. For N = 10, 100, and 1, 000 and u = 2 Mbps, 10 Mbps, and 100
Mbps, prepare a chart giving the minimum distribution time for each of the
combinations of N and u for both client-server distribution and P2P distribution.

8. (10%)
Consider a new peer Alice that joins BitTorrent without possessing any chunks.
Without any chunks, she cannot become a top-four uploader for any of the other
peers, since she has nothing to upload. How then will Alice get her first chunk?

9. (10%)
Describe how Web caching can reduce the delay in receiving a requested object.
Will Web caching reduce the delay for all objects requested by a user or for only
some of the objects? Why?

10. (10%)
Can you configure your browser to open multiple simultaneous connections to a Web
site? What are the advantages and disadvantages of having a large number of
simultaneous TCP connections?
```

The course permission code

1.

Ref: https://serversmtp.com/port-for-smtp/?doing_wp_cron=1696340925.7948288917541503906250

Port 4000
ESMTP, port 25

2.

Sender: prof.devil@notearuniv.edu
Receiver: wanna.cry@notearuniv.edu
Subject: Signing up for the course

3.

Yes
Course: Assembly Languages from Beginner to Quitter
Permission Code: toRt0R-53d-@CcuM54n-bibenduM

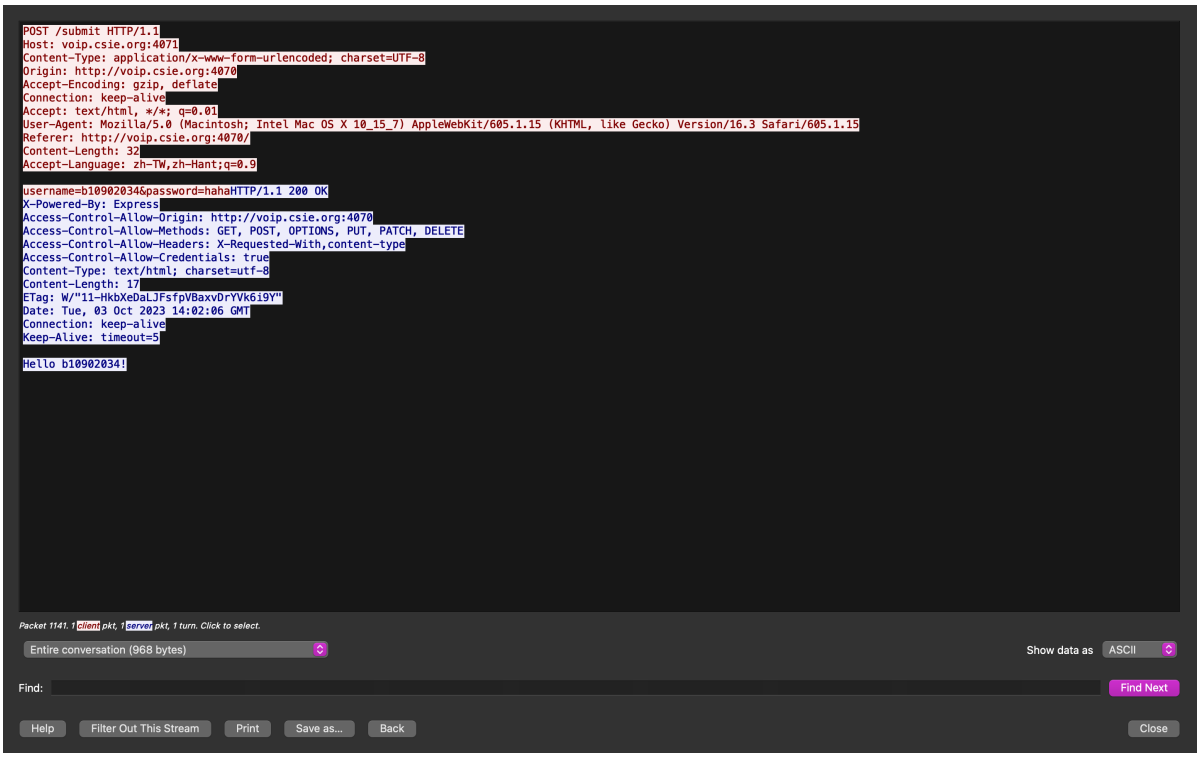
4.

Ref: https://www.cloudflare.com/zh-tw/learning/ssl/transport-layer-security-tls/

Yes
Without using TLS, it may leads to lack of data privacy, authentication, and data vulnerability problems.

Back to elementary school

1.



2.

No, since HTTPS will encrypt packets before sending them, people can't figure out my account by sniffing HTTPS packets.

Yet another curl?

1.

Ref: https://chat.openai.com/share/64a18326-62a5-45e2-bf8f-43d21d77c0e7

```
curl -X POST "http://voip.csie.org:4071/submit" \
-H "Content-Type: application/x-www-form-urlencoded; charset=UTF-8" \
-H "Origin: http://voip.csie.org:4070" \
-H "Accept-Encoding: gzip, deflate" \
-H "Accept: text/html, */*; q=0.01" \
-H "User-Agent: Mozilla/5.0 (Macintosh; Intel Mac OS X 10_15_7)
AppleWebKit/605.1.15 (KHTML, like Gecko) Version/16.3 Safari/605.1.15" \
-H "Referer: http://voip.csie.org:4070/" \
-H "Accept-Language: zh-TW,zh-Hant;q=0.9" \
-d "username=b10902034&password=haha"
```

```
❯ curl -X POST "http://voip.csie.org:4071/submit" \
-H "Content-Type: application/x-www-form-urlencoded; charset=UTF-8" \
-H "Origin: http://voip.csie.org:4070" \
-H "Accept-Encoding: gzip, deflate" \
-H "Accept: text/html, */*; q=0.01" \
-H "User-Agent: Mozilla/5.0 (Macintosh; Intel Mac OS X 10_15_7) AppleWebKit/605.
1.15 (KHTML, like Gecko) Version/16.3 Safari/605.1.15" \
-H "Referer: http://voip.csie.org:4070/" \
-H "Accept-Language: zh-TW,zh-Hant;q=0.9" \
-d "username=b10902034&password=haha"

Hello b10902034!
```

2.

Ref: https://chat.openai.com/share/64a18326-62a5-45e2-bf8f-43d21d77c0e7

```
curl -X POST "http://voip.csie.org:4071/submit" \
-H "Content-Type: application/x-www-form-urlencoded; charset=UTF-8" \
-H "Origin: http://voip.csie.org:4070" \
-H "Accept-Encoding: gzip, deflate" \
-H "Accept: text/html, */*; q=0.01" \
-H "User-Agent: Mozilla/5.0 (Macintosh; Intel Mac OS X 10_15_7)
AppleWebKit/605.1.15 (KHTML, like Gecko) Version/16.3 Safari/605.1.15" \
-H "Referer: http://voip.csie.org:4070/" \
-H "Accept-Language: zh-TW,zh-Hant;q=0.9" \
-d "username=b10902034&password=haha&secret=CN"
```

```
Hello b10902034!
❯ curl -X POST "http://voip.csie.org:4071/submit" \
-H "Content-Type: application/x-www-form-urlencoded; charset=UTF-8" \
-H "Origin: http://voip.csie.org:4070" \
-H "Accept-Encoding: gzip, deflate" \
-H "Accept: text/html, */*; q=0.01" \
-H "User-Agent: Mozilla/5.0 (Macintosh; Intel Mac OS X 10_15_7) AppleWebKit/605.
1.15 (KHTML, like Gecko) Version/16.3 Safari/605.1.15" \
-H "Referer: http://voip.csie.org:4070/" \
-H "Accept-Language: zh-TW,zh-Hant;q=0.9" \
-d "username=b10902034&password=haha&secret=CN"

Hello b10902034. Your secret is "THE_dUe_Da7e_0F_@Ss19NmeNT_1_Is_Oct_4Th"
```

The path to the destination

1.

Ref: https://chat.openai.com/share/bae9eca4-77d4-428d-875c-9ba2366a805d

1. Traceroute sends packets from a source to a destination with increasing "Time-to-Live" (TTL) values.
2. Each router or device along the way decrements the TTL. When TTL reaches zero, it sends back a message.
3. Traceroute records the IP addresses of these routers and the time it takes for messages to come back.
4. This process continues until the destination is reached, and Traceroute shows you the path.

```
b10902034@ws1 [~] traceroute 8.8.8.8
traceroute to 8.8.8.8 (8.8.8.8), 30 hops max, 60 byte packets
 1  140.112.30.254 (140.112.30.254)  11.459 ms  11.688 ms  11.812 ms
 2  140.112.149.121 (140.112.149.121)  0.355 ms  0.336 ms  0.314 ms
 3  140.112.0.218 (140.112.0.218)  0.252 ms  0.257 ms 140.112.0.238 (140.112.0.2
38)  0.264 ms
 4  140.112.0.206 (140.112.0.206)  1.322 ms  1.306 ms  1.208 ms
 5  140.112.0.34 (140.112.0.34)  1.832 ms  1.811 ms  1.794 ms
 6  72.14.196.229 (72.14.196.229)  1.475 ms  1.325 ms  1.226 ms
 7  108.170.244.97 (108.170.244.97)  2.378 ms  1.543 ms 108.170.244.129 (108.170
.244.129)  2.430 ms
 8  209.85.242.125 (209.85.242.125)  1.425 ms 108.170.225.177 (108.170.225.177)
 1.981 ms 142.251.77.87 (142.251.77.87)  1.762 ms
 9  dns.google (8.8.8.8)  1.358 ms  1.465 ms  1.397 ms
```

2.

Ref: https://chat.openai.com/share/bae9eca4-77d4-428d-875c-9ba2366a805d

`* * *` means that Traceroute couldn't get a response from a particular router or device in the network path. This can happen due to various reasons, like security settings or network congestion. It's like encountering a "silent" point in the network where you don't know what's happening. The rest of the Traceroute may still provide useful information, but those `* * *` indicate a lack of response from that specific point.

```
b10902034@ws1 [~] traceroute 198.51.100.23
traceroute to 198.51.100.23 (198.51.100.23), 30 hops max, 60 byte packets
 1  * * *
 2  140.112.149.121 (140.112.149.121)  0.449 ms  0.431 ms  0.412 ms
 3  140.112.0.238 (140.112.0.238)  0.266 ms 140.112.0.218 (140.112.0.218)  0.322 ms 140.112.0.238 (140.112.0.238)  0.271 ms
 4  140.112.0.206 (140.112.0.206)  1.170 ms  1.151 ms  1.131 ms
 5  * * *
 6  * * *
 7  * * *
 8  * * *
 9  * * *
10  * * *
11  * * *
12  * * *
13  * * *
14  * * *
15  * * *
16  * * *
17  * * *
18  * * *
19  * * *
20  * * *
21  * * *
22  * * *
23  * * *
24  * * *
25  * * *
26  * * *
27  * * *
28  * * *
29  * * *
30  * * *
b10902034@ws1 [~]
```

Dig out the domain information

(1)

IP: 140.112.30.26

```
❯ dig csie.ntu.edu.tw

; <<>> DiG 9.10.6 <<>> csie.ntu.edu.tw
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 13966
;; flags: qr rd ra; QUERY: 1, ANSWER: 1, AUTHORITY: 3, ADDITIONAL: 5

;; OPT PSEUDOSECTION:
; EDNS: version: 0, flags:; udp: 4096
;; QUESTION SECTION:
;csie.ntu.edu.tw.               IN      A

;; ANSWER SECTION:
csie.ntu.edu.tw.        308     IN      A       140.112.30.26

;; AUTHORITY SECTION:
csie.ntu.edu.tw.        146     IN      NS      csman2.csie.ntu.edu.tw.
csie.ntu.edu.tw.        146     IN      NS      csman.csie.ntu.edu.tw.
csie.ntu.edu.tw.        146     IN      NS      ntuns.ntu.edu.tw.

;; ADDITIONAL SECTION:
csman.csie.ntu.edu.tw.  195     IN      A       140.112.30.13
ntuns.ntu.edu.tw.       7614    IN      A       140.112.254.67
ntuns.ntu.edu.tw.       7614    IN      A       140.112.254.68
csman2.csie.ntu.edu.tw. 195     IN      A       140.112.30.14

;; Query time: 38 msec
;; SERVER: 140.112.30.21#53(140.112.30.21)
;; WHEN: Wed Sep 27 14:23:37 CST 2023
;; MSG SIZE  rcvd: 185
```

(2)

Ref: https://chat.openai.com/share/47a77399-c894-4642-9b37-9e8dea301f49

IP: 125.251.242.103, 52.94.236.248, 54.239.28.85

Why bind multiple address under a single domain?
Binding multiple addresses under a single domain simplifies management, reduces costs, , balances loading, and maintains brand consistency.

```
❯ dig amazon.com

; <<>> DiG 9.10.6 <<>> amazon.com
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 60499
;; flags: qr rd ra; QUERY: 1, ANSWER: 3, AUTHORITY: 8, ADDITIONAL: 9

;; OPT PSEUDOSECTION:
; EDNS: version: 0, flags:; udp: 4096
;; QUESTION SECTION:
;amazon.com.                    IN      A

;; ANSWER SECTION:
amazon.com.             509     IN      A       205.251.242.103
amazon.com.             509     IN      A       52.94.236.248
amazon.com.             509     IN      A       54.239.28.85

;; AUTHORITY SECTION:
amazon.com.             766     IN      NS      ns1.amzndns.net.
amazon.com.             766     IN      NS      ns1.amzndns.co.uk.
amazon.com.             766     IN      NS      ns2.amzndns.net.
amazon.com.             766     IN      NS      ns1.amzndns.com.
amazon.com.             766     IN      NS      ns2.amzndns.co.uk.
amazon.com.             766     IN      NS      ns2.amzndns.com.
amazon.com.             766     IN      NS      ns2.amzndns.org.
amazon.com.             766     IN      NS      ns1.amzndns.org.

;; ADDITIONAL SECTION:
ns1.amzndns.co.uk.      2422    IN      A       156.154.67.10
ns1.amzndns.com.        47447   IN      A       156.154.64.10
ns1.amzndns.net.        210     IN      AAAA    2610:a1:1014::10
ns1.amzndns.org.        162     IN      AAAA    2610:a1:1015::10
ns2.amzndns.co.uk.      1569    IN      AAAA    2610:a1:32d1::53
ns2.amzndns.com.        2423    IN      A       156.154.68.10
ns2.amzndns.net.        210     IN      AAAA    2610:a1:1017::10
ns2.amzndns.org.        1183    IN      AAAA    2610:a1:31d1::53

;; Query time: 880 msec
;; SERVER: 140.112.30.21#53(140.112.30.21)
;; WHEN: Wed Sep 27 14:25:39 CST 2023
;; MSG SIZE  rcvd: 462
```