

Academic Session 2024-2025
Spring Semester

Computer Networks Lab

Assignment 1: Networking Tools and Wireshark

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Part 1: Networking Tools

1.

```
user@user-Veriton-S2690G-D22E2:~$ ifconfig
enp2s0: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 10.5.16.74 netmask 255.255.255.0 broadcast 10.5.16.255
    inet6 fe80::8aae:ddff:fe33:9f39 prefixlen 64 scopeid 0x20<link>
    ether 88:ae:dd:33:9f:39 txqueuelen 1000 (Ethernet)
    RX packets 866932 bytes 1042361297 (1.0 GB)
    RX errors 0 dropped 407 overruns 0 frame 0
    TX packets 156647 bytes 30730978 (30.7 MB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

lo: flags=73<UP,LOOPBACK,RUNNING> mtu 65536
    inet 127.0.0.1 netmask 255.0.0.0
    inet6 ::1 prefixlen 128 scopeid 0x10<host>
    loop txqueuelen 1000 (Local Loopback)
    RX packets 16241 bytes 2485085 (2.4 MB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 16241 bytes 2485085 (2.4 MB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0
```

IP address (inet in image above): 10.5.16.74

Subnet Mask (netmask in image above): 255.255.255.0

Network ID (IP address BITWISE_AND subnet mask): 10.5.16.0

2.

```
user@user-Veriton-S2690G-D22E2:~$ nslookup www.google.com
Server:      127.0.0.53
Address:     127.0.0.53#53

Non-authoritative answer:
Name:   www.google.com
Address: 142.251.42.68
Name:   www.google.com
Address: 2404:6800:4009:82f::2004

user@user-Veriton-S2690G-D22E2:~$ nslookup www.facebook.com
Server:      127.0.0.53
Address:     127.0.0.53#53

Non-authoritative answer:
www.facebook.com canonical name = star-mini.c10r.facebook.com.
Name:   star-mini.c10r.facebook.com
Address: 163.70.143.35
Name:   star-mini.c10r.facebook.com
Address: 2a03:2880:f10c:283:face:b00c:0:25de
```

```
user@user-Veriton-S2690G-D22E2:~$ nslookup
```

```
> server 172.16.1.164
```

```
Default server: 172.16.1.164
```

```
Address: 172.16.1.164#53
```

```
> www.google.com
```

```
Server:          172.16.1.164
```

```
Address:         172.16.1.164#53
```

```
Non-authoritative answer:
```

```
Name:   www.google.com
```

```
Address: 142.250.67.164
```

```
Name:   www.google.com
```

```
Address: 2404:6800:4009:82f::2004
```

```
> www.facebook.com
```

```
Server:          172.16.1.164
```

```
Address:         172.16.1.164#53
```

```
Non-authoritative answer:
```

```
www.facebook.com      canonical name = star-mini.c10r.facebook.com.
```

```
Name:   star-mini.c10r.facebook.com
```

```
Address: 57.144.160.1
```

```
Name:   star-mini.c10r.facebook.com
```

```
Address: 2a03:2880:f188:181:face:b00c:0:25de
```

```
> server 172.16.1.165
```

```
Default server: 172.16.1.165
```

```
Address: 172.16.1.165#53
```

```
> www.google.com
```

```
Server:          172.16.1.165
```

```
Address:         172.16.1.165#53
```

```
Non-authoritative answer:
```

```
Name:   www.google.com
```

```
Address: 142.250.192.100
```

```
Name:   www.google.com
```

```
Address: 2404:6800:4009:82a::2004
```

```
>
```

```
> www.facebook.com
```

```
Server:          172.16.1.165
```

```
Address:         172.16.1.165#53
```

```
Non-authoritative answer:
```

```
www.facebook.com      canonical name = star-mini.c10r.facebook.com.
```

```
Name:   star-mini.c10r.facebook.com
```

```
Address: 31.13.79.35
```

```
Name:   star-mini.c10r.facebook.com
```

```
Address: 2a03:2880:f12f:183:face:b00c:0:25de
```

```

> server 172.16.1.166
Default server: 172.16.1.166
Address: 172.16.1.166#53
>
> www.google.com
Server:      172.16.1.166
Address:     172.16.1.166#53

Non-authoritative answer:
Name:   www.google.com
Address: 142.250.77.36
Name:   www.google.com
Address: 2404:6800:4009:81c::2004
>
> www.facebook.com
Server:      172.16.1.166
Address:     172.16.1.166#53

Non-authoritative answer:
www.facebook.com canonical name = star-mini.c10r.facebook.com.
Name:   star-mini.c10r.facebook.com
Address: 31.13.79.35
Name:   star-mini.c10r.facebook.com
Address: 2a03:2880:f12f:183:face:b00c:0:25de

```

```

> server 172.16.1.180
Default server: 172.16.1.180
Address: 172.16.1.180#53
>
> www.google.com
Server:      172.16.1.180
Address:     172.16.1.180#53

Non-authoritative answer:
Name:   www.google.com
Address: 142.250.207.228
Name:   www.google.com
Address: 2404:6800:4002:81f::2004
>
> www.facebook.com
Server:      172.16.1.180
Address:     172.16.1.180#53

Non-authoritative answer:
www.facebook.com canonical name = star-mini.c10r.facebook.com.
Name:   star-mini.c10r.facebook.com
Address: 157.240.16.35
Name:   star-mini.c10r.facebook.com
Address: 2a03:2880:f12f:83:face:b00c:0:25de

```

DNS server address	www.google.com	www.facebook.com
127.0.0.53	142.251.42.68	163.70.143.35

172.16.1.164	142.250.67.164	57.144.160.1
172.16.1.165	142.250.192.100	31.13.79.35
172.16.1.166	142.250.77.36	31.13.79.35
172.16.1.180	142.250.207.228	157.240.16.35

Different DNS servers resolve domain names to different IPs based on factors such as geographic location, load balancing and caches. It helps to distribute traffic and optimize performance.

3.

a) 64 bytes packet

```
user@user-Veriton-S2690G-D22E2:~$ ping -c 10 -s 64 -W 100 10.5.16.73
PING 10.5.16.73 (10.5.16.73) 64(92) bytes of data.
72 bytes from 10.5.16.73: icmp_seq=1 ttl=64 time=0.238 ms
72 bytes from 10.5.16.73: icmp_seq=2 ttl=64 time=0.505 ms
72 bytes from 10.5.16.73: icmp_seq=3 ttl=64 time=0.310 ms
72 bytes from 10.5.16.73: icmp_seq=4 ttl=64 time=0.508 ms
72 bytes from 10.5.16.73: icmp_seq=5 ttl=64 time=0.400 ms
72 bytes from 10.5.16.73: icmp_seq=6 ttl=64 time=0.494 ms
72 bytes from 10.5.16.73: icmp_seq=7 ttl=64 time=0.491 ms
72 bytes from 10.5.16.73: icmp_seq=8 ttl=64 time=0.481 ms
72 bytes from 10.5.16.73: icmp_seq=9 ttl=64 time=0.505 ms
72 bytes from 10.5.16.73: icmp_seq=10 ttl=64 time=0.240 ms

--- 10.5.16.73 ping statistics ---
10 packets transmitted, 10 received, 0% packet loss, time 9208ms
rtt min/avg/max/mdev = 0.238/0.417/0.508/0.106 ms
```

MIN: 0.238 ms

AVG: 0.417 ms

MAX: 0.508 ms

MDEV: 0.106 ms

b) 128 bytes packet

```
user@user-Veriton-S2690G-D22E2:~$ ping -c 10 -s 128 -W 100 10.5.16.73
PING 10.5.16.73 (10.5.16.73) 128(156) bytes of data.
136 bytes from 10.5.16.73: icmp_seq=1 ttl=64 time=0.218 ms
136 bytes from 10.5.16.73: icmp_seq=2 ttl=64 time=0.490 ms
136 bytes from 10.5.16.73: icmp_seq=3 ttl=64 time=0.506 ms
136 bytes from 10.5.16.73: icmp_seq=4 ttl=64 time=0.257 ms
136 bytes from 10.5.16.73: icmp_seq=5 ttl=64 time=0.440 ms
136 bytes from 10.5.16.73: icmp_seq=6 ttl=64 time=0.490 ms
136 bytes from 10.5.16.73: icmp_seq=7 ttl=64 time=0.318 ms
136 bytes from 10.5.16.73: icmp_seq=8 ttl=64 time=0.512 ms
136 bytes from 10.5.16.73: icmp_seq=9 ttl=64 time=0.511 ms
136 bytes from 10.5.16.73: icmp_seq=10 ttl=64 time=0.263 ms

--- 10.5.16.73 ping statistics ---
10 packets transmitted, 10 received, 0% packet loss, time 9204ms
rtt min/avg/max/mdev = 0.218/0.400/0.512/0.115 ms
```

MIN: 0.218 ms
AVG: 0.400 ms
MAX: 0.512 ms
MDEV: 0.115 ms

c) 256 bytes packet

```
user@user-Veriton-S2690G-D22E2:~$ ping -c 10 -s 256 -W 100 10.5.16.73
PING 10.5.16.73 (10.5.16.73) 256(284) bytes of data.
264 bytes from 10.5.16.73: icmp_seq=1 ttl=64 time=0.509 ms
264 bytes from 10.5.16.73: icmp_seq=2 ttl=64 time=0.510 ms
264 bytes from 10.5.16.73: icmp_seq=3 ttl=64 time=0.303 ms
264 bytes from 10.5.16.73: icmp_seq=4 ttl=64 time=0.276 ms
264 bytes from 10.5.16.73: icmp_seq=5 ttl=64 time=0.256 ms
264 bytes from 10.5.16.73: icmp_seq=6 ttl=64 time=0.254 ms
264 bytes from 10.5.16.73: icmp_seq=7 ttl=64 time=0.313 ms
264 bytes from 10.5.16.73: icmp_seq=8 ttl=64 time=0.248 ms
264 bytes from 10.5.16.73: icmp_seq=9 ttl=64 time=0.297 ms
264 bytes from 10.5.16.73: icmp_seq=10 ttl=64 time=0.388 ms

--- 10.5.16.73 ping statistics ---
10 packets transmitted, 10 received, 0% packet loss, time 9219ms
rtt min/avg/max/mdev = 0.248/0.335/0.510/0.095 ms
```

MIN: 0.248 ms
AVG: 0.335 ms
MAX: 0.510 ms
MDEV: 0.095 ms

d) 512 bytes packet

```

user@user-Veriton-S2690G-D22E2:~$ ping -c 10 -s 512 -W 100 10.5.16.73
PING 10.5.16.73 (10.5.16.73) 512(540) bytes of data.
520 bytes from 10.5.16.73: icmp_seq=1 ttl=64 time=0.319 ms
520 bytes from 10.5.16.73: icmp_seq=2 ttl=64 time=0.503 ms
520 bytes from 10.5.16.73: icmp_seq=3 ttl=64 time=0.524 ms
520 bytes from 10.5.16.73: icmp_seq=4 ttl=64 time=0.473 ms
520 bytes from 10.5.16.73: icmp_seq=5 ttl=64 time=0.454 ms
520 bytes from 10.5.16.73: icmp_seq=6 ttl=64 time=0.451 ms
520 bytes from 10.5.16.73: icmp_seq=7 ttl=64 time=0.446 ms
520 bytes from 10.5.16.73: icmp_seq=8 ttl=64 time=0.459 ms
520 bytes from 10.5.16.73: icmp_seq=9 ttl=64 time=0.427 ms
520 bytes from 10.5.16.73: icmp_seq=10 ttl=64 time=0.456 ms

--- 10.5.16.73 ping statistics ---
10 packets transmitted, 10 received, 0% packet loss, time 9222ms
rtt min/avg/max/mdev = 0.319/0.451/0.524/0.051 ms

```

MIN: 0.319 ms
 AVG: 0.451 ms
 MAX: 0.524 ms
 MDEV: 0.051 ms

4.

```

user@user-Veriton-S2690G-D22E2:~$ traceroute www.google.com
traceroute to www.google.com (142.250.183.4), 30 hops max, 60 byte packets
 1  gateway (10.5.16.2)  0.454 ms  0.441 ms  0.434 ms
 2  10.120.2.33 (10.120.2.33)  0.398 ms  0.392 ms  0.384 ms
 3  10.255.1.3 (10.255.1.3)  2.952 ms  5.832 ms  3.665 ms
 4  * * *
 5  * * *
 6  * * *
 7  * * *
 8  142.250.172.80 (142.250.172.80)  55.475 ms  72.14.204.62 (72.14.204.62)  39.716 ms  142.250.172.80 (142.250.172.80)  56.428 ms
 9  * * *
10  209.85.142.84 (209.85.142.84)  48.622 ms  216.239.46.136 (216.239.46.136)  45.334 ms  142.250.227.72 (142.250.227.72)  53.620 ms
11  142.250.214.109 (142.250.214.109)  36.997 ms  142.250.214.107 (142.250.214.107)  38.231 ms  142.250.214.109 (142.250.214.109)  40.594 ms
12  192.178.111.61 (192.178.111.61)  46.652 ms  142.250.226.67 (142.250.226.67)  48.209 ms  bom07s30-in-f4.1e100.net (142.250.183.4)  40.456 ms

```

A total of 12 hops are required.

At some hops, * * * is observed as the tool doesn't receive a reply at that hop from the device in the timeout period. This happens because certain devices are configured to ignore such traceroute requests due to security reasons or due to congestion or because of firewall restrictions.

Part 2: Packet Analysis

1. Analysis of DNS Packets: Structure and its Traffic

The image shows a Wireshark packet capture analysis. The top pane displays a list of packets filtered by 'dns.qry.name=="www.iitkgp.ac.in"'. Packet 11 is selected, showing it is a DNS response from 172.16.1.165 to 10.145.22.240. The bottom pane shows the detailed structure of packet 11, including Ethernet II, Internet Protocol Version 4, User Datagram Protocol, and Domain Name System (response). The DNS response contains two records: an A record for 'www.iitkgp.ac.in' with IP address 172.16.3.10 and an AAAA record for 'www.iitkgp.ac.in' with IP address 2001:0000:0000:0000:0000:0000:0000:0000.

No.	Time	Source	Destination	Protocol	Length	Info
7	1.766519669	10.145.22.240	172.16.1.165	DNS	87	Standard query 0xd0ac HTTPS www.iitkgp.ac.in OPT
8	1.769359747	172.16.1.165	10.145.22.240	DNS	143	Standard query response 0xd0ac HTTPS www.iitkgp.ac.in SOA localdns.iitkgp.ac.in OPT
9	1.769419649	10.145.22.240	172.16.1.165	DNS	87	Standard query 0xd0fa A www.iitkgp.ac.in OPT
10	1.769568632	10.145.22.240	172.16.1.165	DNS	87	Standard query 0x8224 AAAA www.iitkgp.ac.in OPT
11	1.775267968	172.16.1.165	10.145.22.240	DNS	103	Standard query response 0x8d0a A www.iitkgp.ac.in A 172.16.3.10 OPT
12	1.780808634	172.16.1.165	10.145.22.240	DNS	143	Standard query response 0x8224 AAAA www.iitkgp.ac.in SOA localdns.iitkgp.ac.in OPT

Wireshark · Packet 11 · part 2 q1.pcapng

Frame 11: 103 bytes on wire (824 bits), 103 bytes captured (824 bits) on interface wlo1, id 0

Ethernet II, Src: Cisco_4c:7a:9f (70:61:7b:4c:7a:9f), Dst: IntelCor_e8:65:8e (dc:21:5c:e8:65:8e)

Internet Protocol Version 4, Src: 172.16.1.165, Dst: 10.145.22.240

User Datagram Protocol, Src Port: 53, Dst Port: 35699

Source Port: 53

Destination Port: 35699

Length: 69

Checksum: 0xb4f4 [unverified]

[Checksum Status: Unverified]

[Stream index: 3]

[Timestamps]

UDP payload (61 bytes)

Domain Name System (response)

0000 dc 21 5c e8 65 8e 70 61 7b 4c 7a 9f 08 00 45 00 !\·e·pa {Lz···E·

0010 00 59 57 24 00 00 3d 11 57 3a ac 10 01 a5 0a 91 ·YWS·=-·W:·.....

0020 16 f0 00 35 8b 73 00 45 bf 4f 0d fa 85 80 00 01 ...5·s·E ·0·.....

0030 00 01 00 00 00 01 03 77 77 77 06 69 69 74 6b 67w ww·iitkg

0040 70 02 61 63 02 69 6e 00 00 01 00 01 c0 0c 00 01 p·ac·in·

a) From information about packet 11 by which DNS query response was returned, we can see that DNS uses UDP (User Datagram Protocol) protocol. Hence, DNS uses UDP protocol.

b) DNS query:

1. Source: 10.145.22.240
2. Destination: 172.16.1.165

DNS query response:

1. Source 172.16.1.165
2. Destination: 10.145.22.240

c) 2 DNS queries were sent from my machine to DNS server during name-to-IP resolution step.

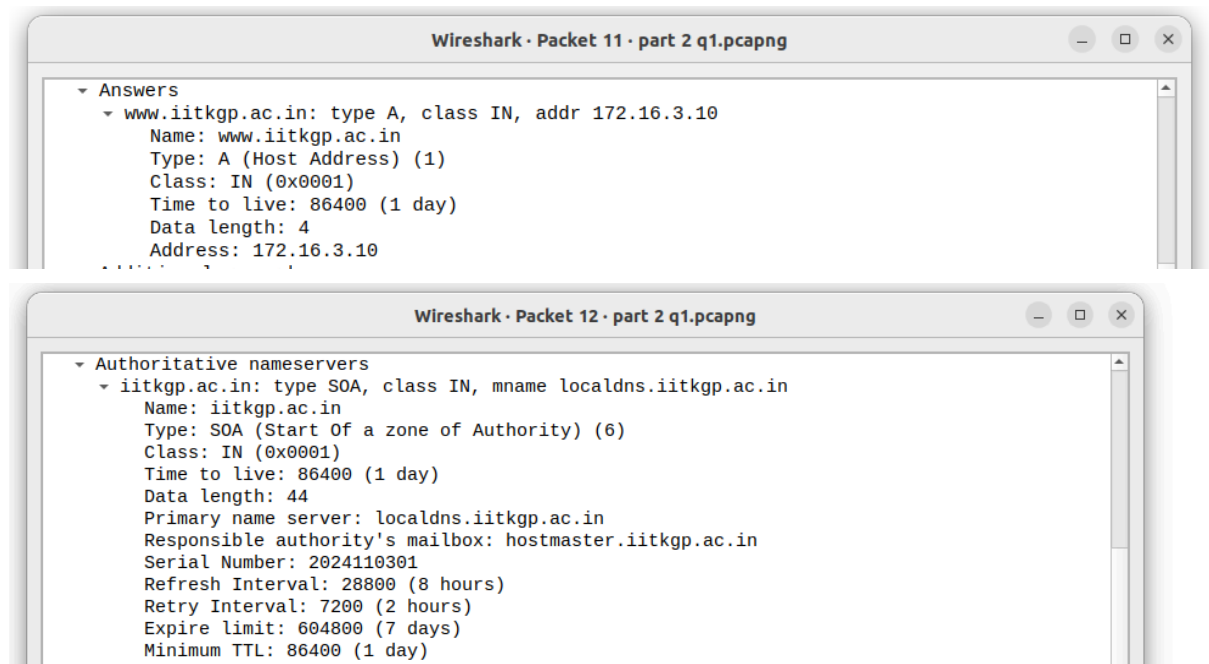
The first query is a A query to get the IPv4 address of the website.

The second query is a AAAA query to get the IPv6 address of the website.

d) The DNS server 172.16.1.165 replied with the actual IP address.

e) My machine communicates with 1 DNS server and it responds correctly.

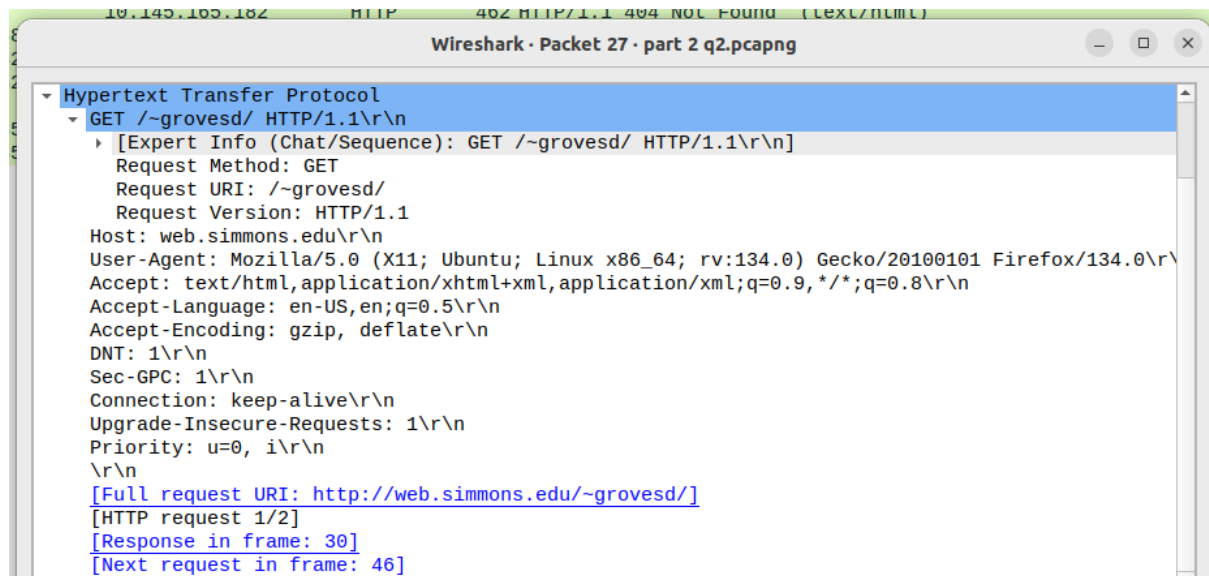
f)



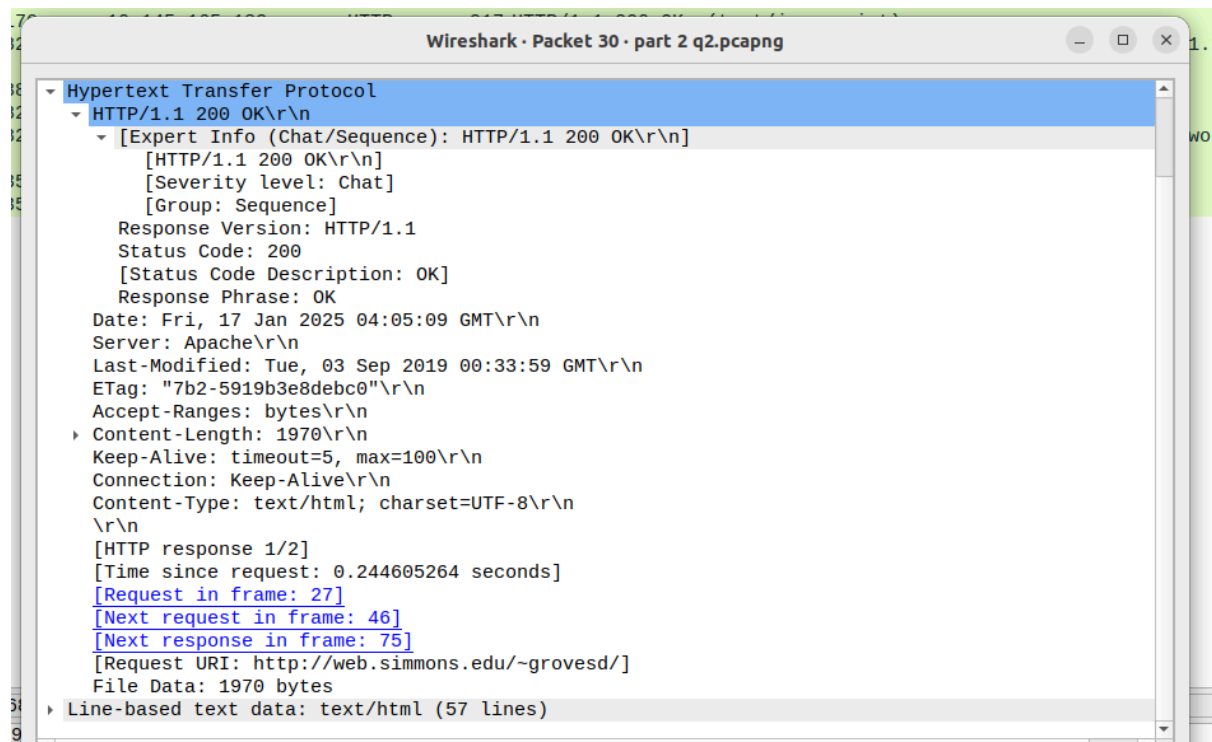
2.
a)

No.	Time	Source	Destination	Protocol	Length	Info
27	3.086282008	10.145.165.182	69.43.111.82	HTTP	438	GET /~grovesd/ HTTP/1.1
30	3.330887352	69.43.111.82	10.145.165.182	HTTP	2321	HTTP/1.1 200 OK (text/html)
33	3.383878199	10.145.165.182	69.43.111.82	HTTP	415	GET /~grovesd/css/base.css HTTP/1.1
37	3.619880384	69.43.111.82	10.145.165.182	HTTP	2511	HTTP/1.1 200 OK (text/css)
44	3.636640499	10.145.165.182	69.43.111.82	HTTP	488	GET /~grovesd/images/big-bear.png HTTP/1.1
46	3.751557369	10.145.165.182	69.43.111.82	HTTP	456	GET /favicon.ico HTTP/1.1
49	3.785586928	10.145.165.182	142.250.183.170	HTTP	389	GET /ajax/libs/webfont/1/webfont.js HTTP/1.1
57	3.833690018	142.250.183.170	10.145.165.182	HTTP	917	HTTP/1.1 200 OK (text/javascript)
73	3.899759964	10.145.165.182	142.250.67.138	HTTP	438	GET /css?family=Bitter:400,700,400italic&subset=latin HTTP/1.1
75	3.977845161	69.43.111.82	10.145.165.182	HTTP	462	HTTP/1.1 404 Not Found (text/html)
79	4.009492461	142.250.67.138	10.145.165.182	HTTP	86	HTTP/1.1 200 OK (text/css)
86	4.060831368	10.145.165.182	142.250.192.35	HTTP	506	GET /s/bitter/v36/raxjHq0u8IVPmn7f4xp.woff2 HTTP/1.1
91	4.066411908	10.145.165.182	142.250.192.35	HTTP	526	GET /s/bitter/v36/raxjHq0u8IVPmn7epZnMyKBvHf5D6c4Pz-X3By.woff2 HTTP/1.1
184	4.103356079	69.43.111.82	10.145.165.182	HTTP	1696	HTTP/1.1 200 OK (PNG)
131	4.147533083	142.250.192.35	10.145.165.182	HTTP	1653	HTTP/1.1 200 OK (font/woff2)
137	4.155303195	142.250.192.35	10.145.165.182	HTTP	461	HTTP/1.1 200 OK (font/woff2)

b) Request- Header contains GET request.



Response- Header contains HTTP/1.1 200 OK



c) 16 HTTP packets are exchanged between client and server to load an entire webpage.

3.

a)

My IP address: 10.146.42.63

Friend IP address: 10.146.83.119

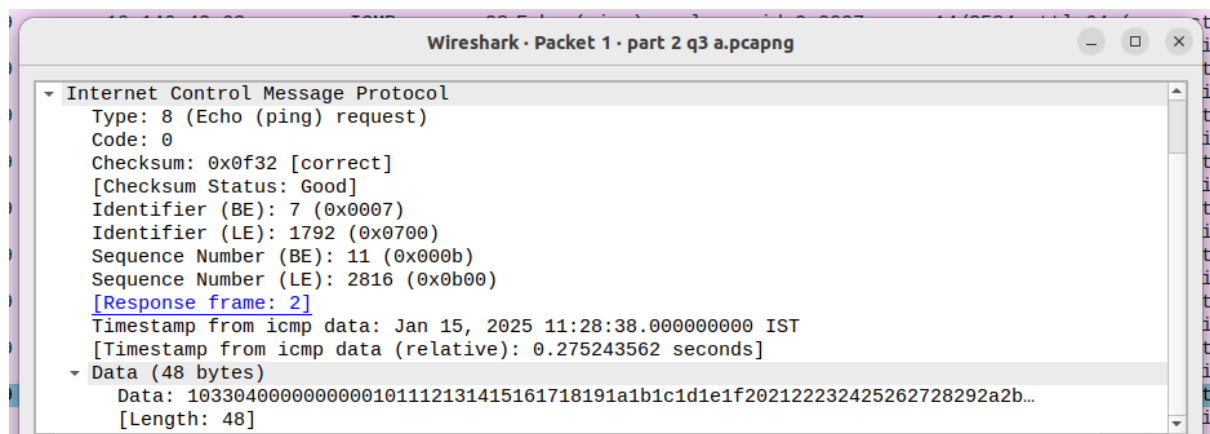
```
aayush@aayush-VivoBook-ASUSLaptop-... × aayush@aayush-VivoBook-ASUSLaptop-...

aayush@aayush-VivoBook-ASUSLaptop-X515EA-X515EA:~$ ping 10.146.83.119
PING 10.146.83.119 (10.146.83.119) 56(84) bytes of data.
64 bytes from 10.146.83.119: icmp_seq=1 ttl=64 time=213 ms
64 bytes from 10.146.83.119: icmp_seq=2 ttl=64 time=50.2 ms
64 bytes from 10.146.83.119: icmp_seq=3 ttl=64 time=96.0 ms
64 bytes from 10.146.83.119: icmp_seq=4 ttl=64 time=34.6 ms
64 bytes from 10.146.83.119: icmp_seq=5 ttl=64 time=78.3 ms
64 bytes from 10.146.83.119: icmp_seq=6 ttl=64 time=16.4 ms
64 bytes from 10.146.83.119: icmp_seq=7 ttl=64 time=61.6 ms
64 bytes from 10.146.83.119: icmp_seq=8 ttl=64 time=203 ms
64 bytes from 10.146.83.119: icmp_seq=9 ttl=64 time=41.3 ms
64 bytes from 10.146.83.119: icmp_seq=10 ttl=64 time=89.4 ms
64 bytes from 10.146.83.119: icmp_seq=11 ttl=64 time=25.7 ms
64 bytes from 10.146.83.119: icmp_seq=12 ttl=64 time=70.9 ms
64 bytes from 10.146.83.119: icmp_seq=13 ttl=64 time=121 ms
64 bytes from 10.146.83.119: icmp_seq=14 ttl=64 time=49.3 ms
64 bytes from 10.146.83.119: icmp_seq=15 ttl=64 time=91.5 ms
64 bytes from 10.146.83.119: icmp_seq=16 ttl=64 time=31.7 ms
64 bytes from 10.146.83.119: icmp_seq=17 ttl=64 time=74.0 ms
64 bytes from 10.146.83.119: icmp_seq=18 ttl=64 time=10.9 ms
64 bytes from 10.146.83.119: icmp_seq=19 ttl=64 time=56.6 ms
64 bytes from 10.146.83.119: icmp_seq=20 ttl=64 time=5.87 ms
64 bytes from 10.146.83.119: icmp_seq=21 ttl=64 time=36.5 ms
```

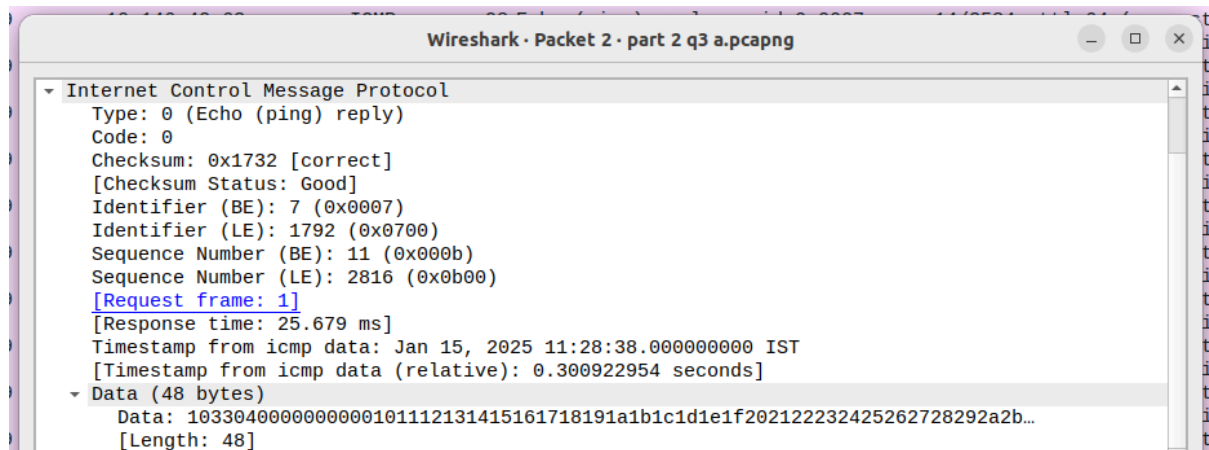
No.	Time	Source	Destination	Protocol	Length	Info
1	0.000000000	10.146.42.63	10.146.83.119	ICMP	98	Echo (ping) request id=0x0007, seq=11/2816, ttl=64 (request in 2)
2	0.025679392	10.146.83.119	10.146.42.63	ICMP	98	Echo (ping) reply id=0x0007, seq=11/2816, ttl=64 (request in 1)
3	1.000993110	10.146.42.63	10.146.83.119	ICMP	98	Echo (ping) request id=0x0007, seq=12/3072, ttl=64 (request in 4)
4	1.071822691	10.146.83.119	10.146.42.63	ICMP	98	Echo (ping) reply id=0x0007, seq=12/3072, ttl=64 (request in 3)
5	2.002145797	10.146.42.63	10.146.83.119	ICMP	98	Echo (ping) request id=0x0007, seq=13/3328, ttl=64 (request in 7)
7	2.122902942	10.146.83.119	10.146.42.63	ICMP	98	Echo (ping) reply id=0x0007, seq=13/3328, ttl=64 (request in 5)
9	3.004164443	10.146.42.63	10.146.83.119	ICMP	98	Echo (ping) request id=0x0007, seq=14/3584, ttl=64 (request in 10)
10	3.053463313	10.146.83.119	10.146.42.63	ICMP	98	Echo (ping) reply id=0x0007, seq=14/3584, ttl=64 (request in 9)
22	4.005805278	10.146.42.63	10.146.83.119	ICMP	98	Echo (ping) request id=0x0007, seq=15/3840, ttl=64 (request in 23)
23	4.097241598	10.146.83.119	10.146.42.63	ICMP	98	Echo (ping) reply id=0x0007, seq=15/3840, ttl=64 (request in 22)
36	5.007085909	10.146.42.63	10.146.83.119	ICMP	98	Echo (ping) request id=0x0007, seq=16/4096, ttl=64 (request in 37)
37	5.038760904	10.146.83.119	10.146.42.63	ICMP	98	Echo (ping) reply id=0x0007, seq=16/4096, ttl=64 (request in 36)
40	6.009133813	10.146.42.63	10.146.83.119	ICMP	98	Echo (ping) request id=0x0007, seq=17/4352, ttl=64 (request in 41)
41	6.083133535	10.146.83.119	10.146.42.63	ICMP	98	Echo (ping) reply id=0x0007, seq=17/4352, ttl=64 (request in 40)
42	7.019447398	10.146.42.63	10.146.83.119	ICMP	98	Echo (ping) request id=0x0007, seq=18/4608, ttl=64 (request in 43)
43	7.021361973	10.146.83.119	10.146.42.63	ICMP	98	Echo (ping) reply id=0x0007, seq=18/4608, ttl=64 (request in 42)
44	8.011745080	10.146.42.63	10.146.83.119	ICMP	98	Echo (ping) request id=0x0007, seq=19/4864, ttl=64 (request in 45)
45	8.068288639	10.146.83.119	10.146.42.63	ICMP	98	Echo (ping) reply id=0x0007, seq=19/4864, ttl=64 (request in 44)
50	9.013612361	10.146.42.63	10.146.83.119	ICMP	98	Echo (ping) request id=0x0007, seq=20/5120, ttl=64 (request in 51)
51	9.019456418	10.146.83.119	10.146.42.63	ICMP	98	Echo (ping) reply id=0x0007, seq=20/5120, ttl=64 (request in 50)
53	10.014816693	10.146.42.63	10.146.83.119	ICMP	98	Echo (ping) request id=0x0007, seq=21/5376, ttl=64 (request in 54)
54	10.051295352	10.146.83.119	10.146.42.63	ICMP	98	Echo (ping) reply id=0x0007, seq=21/5376, ttl=64 (request in 53)
64	11.016610342	10.146.42.63	10.146.83.119	ICMP	98	Echo (ping) request id=0x0007, seq=22/5632, ttl=64 (request in 65)
65	11.095497915	10.146.83.119	10.146.42.63	ICMP	98	Echo (ping) reply id=0x0007, seq=22/5632, ttl=64 (request in 64)
74	12.018687887	10.146.42.63	10.146.83.119	ICMP	98	Echo (ping) request id=0x0007, seq=23/5888, ttl=64 (request in 75)
75	12.035635239	10.146.83.119	10.146.42.63	ICMP	98	Echo (ping) reply id=0x0007, seq=23/5888, ttl=64 (request in 74)

Both request and reply are received above.

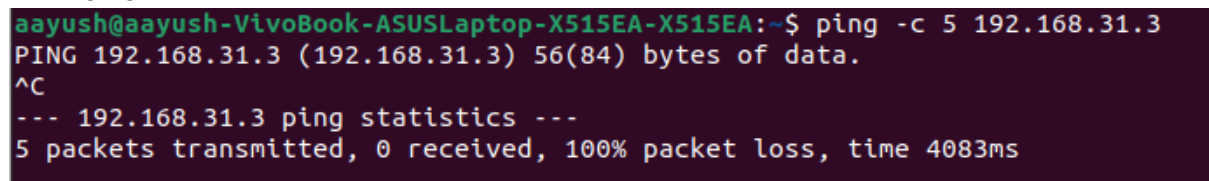
Request



Response



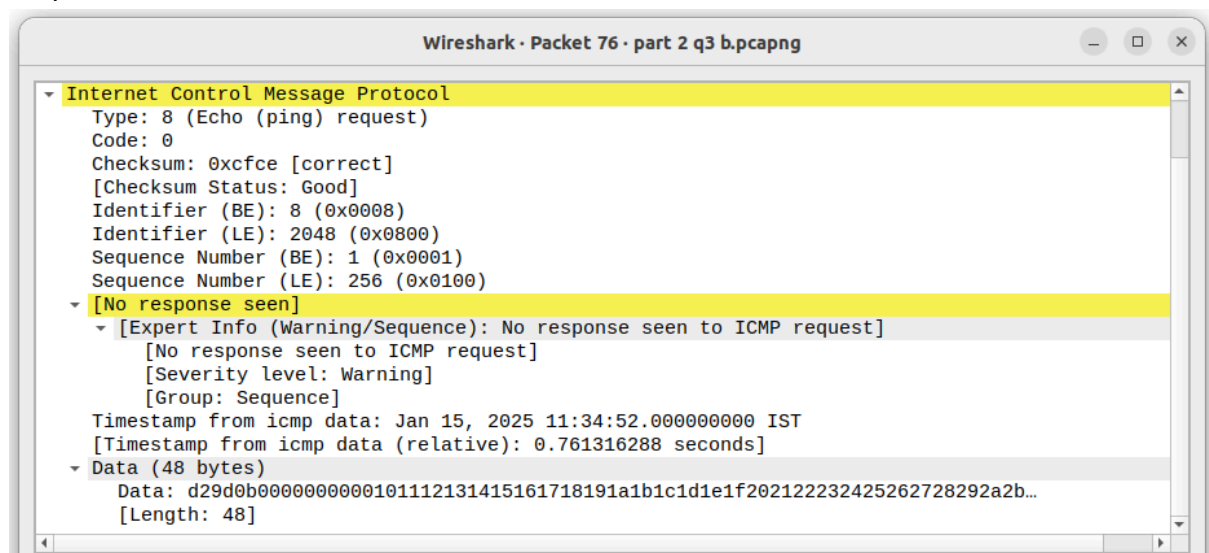
b) Pinging unreachable host 192.168.31.3



No.	Time	Source	Destination	Protocol	Length	Info
76	2.509556182	10.146.42.63	192.168.31.3	ICMP	98	Echo (ping) request id=0x0008, seq=1/256, ttl=64 (no response found!)
89	3.520584334	10.146.42.63	192.168.31.3	ICMP	98	Echo (ping) request id=0x0008, seq=2/512, ttl=64 (no response found!)
90	4.544626968	10.146.42.63	192.168.31.3	ICMP	98	Echo (ping) request id=0x0008, seq=3/768, ttl=64 (no response found!)
98	5.568476267	10.146.42.63	192.168.31.3	ICMP	98	Echo (ping) request id=0x0008, seq=4/1024, ttl=64 (no response found!)
103	6.592624046	10.146.42.63	192.168.31.3	ICMP	98	Echo (ping) request id=0x0008, seq=5/1280, ttl=64 (no response found!)

Request sent but reply not received.

Request



c) Traceroute to unreachable host (192.168.31.3)

```

aayush@aayush-VivoBook-ASUSLaptop-X515EA-X515EA:~$ traceroute 192.168.31.3
traceroute to 192.168.31.3 (192.168.31.3), 30 hops max, 60 byte packets
 1 _gateway (10.145.128.2) 4.337 ms 4.279 ms 4.258 ms
 2 192.168.255.18 (192.168.255.18) 5.637 ms 5.619 ms 5.599 ms
 3 10.119.228.129 (10.119.228.129) 5.640 ms 5.623 ms 5.605 ms
 4 10.173.35.1 (10.173.35.1) 87.235 ms 87.216 ms 10.173.35.253 (10.173.35.253) 87.199 ms
 5 10.255.238.166 (10.255.238.166) 87.231 ms 87.213 ms 87.195 ms
 6 10.152.7.38 (10.152.7.38) 87.212 ms 98.531 ms 98.480 ms
 7 * * *
 8 * * *
 9 * * *
10 * * *
11 * * *
12 * * *
13 * * *
14 * * *
15 * * *
16 * * *
17 * * *
18 * * *
19 * * *
20 * * *
21 * * *
22 * * *
23 * * *
24 * * *
25 * * *
26 * * *
27 * * *
28 * * *
29 * * *
30 * * *

```

icmp							
No.	Time	Source	Destination	Protocol	Length	Info	
265	13.967932145	10.145.128.2	10.145.165.182	ICMP	102	Time-to-live exceeded (Time to live exceeded in transit)	
266	13.967932305	10.145.128.2	10.145.165.182	ICMP	102	Time-to-live exceeded (Time to live exceeded in transit)	
267	13.967932359	10.145.128.2	10.145.165.182	ICMP	102	Time-to-live exceeded (Time to live exceeded in transit)	
269	13.969330417	192.168.255.18	10.145.165.182	ICMP	70	Time-to-live exceeded (Time to live exceeded in transit)	
270	13.969330699	192.168.255.18	10.145.165.182	ICMP	70	Time-to-live exceeded (Time to live exceeded in transit)	
271	13.969330752	192.168.255.18	10.145.165.182	ICMP	70	Time-to-live exceeded (Time to live exceeded in transit)	
272	13.969390419	10.119.228.129	10.145.165.182	ICMP	70	Time-to-live exceeded (Time to live exceeded in transit)	
273	13.969390558	10.119.228.129	10.145.165.182	ICMP	70	Time-to-live exceeded (Time to live exceeded in transit)	
274	13.969390622	10.119.228.129	10.145.165.182	ICMP	70	Time-to-live exceeded (Time to live exceeded in transit)	
287	14.051037775	10.173.35.1	10.145.165.182	ICMP	186	Time-to-live exceeded (Time to live exceeded in transit)	
288	14.051037897	10.173.35.253	10.145.165.182	ICMP	186	Time-to-live exceeded (Time to live exceeded in transit)	
289	14.051038152	10.173.35.1	10.145.165.182	ICMP	186	Time-to-live exceeded (Time to live exceeded in transit)	
291	14.051086387	10.255.238.166	10.145.165.182	ICMP	182	Time-to-live exceeded (Time to live exceeded in transit)	
292	14.051086456	10.255.238.166	10.145.165.182	ICMP	182	Time-to-live exceeded (Time to live exceeded in transit)	
293	14.051086504	10.255.238.166	10.145.165.182	ICMP	182	Time-to-live exceeded (Time to live exceeded in transit)	
294	14.051119188	10.152.7.38	10.145.165.182	ICMP	110	Time-to-live exceeded (Time to live exceeded in transit)	
326	14.125856105	10.152.7.38	10.145.165.182	ICMP	110	Time-to-live exceeded (Time to live exceeded in transit)	
327	14.125856420	10.152.7.38	10.145.165.182	ICMP	110	Time-to-live exceeded (Time to live exceeded in transit)	
630	42.976653989	10.145.165.182	142.250.77.42	ICMP	590	Destination unreachable (Port unreachable)	

Traceroute to reachable host (www.google.com)

```

aayush@aayush-VivoBook-ASUSLaptop-X515EA-X515EA:~$ traceroute www.google.com
traceroute to www.google.com (142.250.192.132), 30 hops max, 60 byte packets
 1 _gateway (10.145.128.2) 2.698 ms 2.651 ms 2.624 ms
 2 192.168.255.18 (192.168.255.18) 5.770 ms 5.727 ms 5.705 ms
 3 10.119.228.129 (10.119.228.129) 3.688 ms 3.666 ms 3.645 ms
 4 10.173.35.1 (10.173.35.1) 93.643 ms 10.173.35.253 (10.173.35.253) 93.654 ms 93.633 ms
 5 10.255.238.166 (10.255.238.166) 93.525 ms 93.504 ms 93.484 ms
 6 10.152.7.214 (10.152.7.214) 93.518 ms 82.434 ms 82.384 ms
 7 72.14.204.62 (72.14.204.62) 85.576 ms 142.250.172.80 (142.250.172.80) 88.109 ms 72.14.204.62 (72.14.204.62) 87.038 ms
 8 * * *
 9 192.178.86.246 (192.178.86.246) 87.976 ms 216.239.54.146 (216.239.54.146) 88.090 ms 192.178.86.202 (192.178.86.202) 87.604 ms
10 142.250.238.81 (142.250.238.81) 85.587 ms 172.253.50.147 (172.253.50.147) 86.599 ms 192.178.110.244 (192.178.110.244) 87.947 ms
11 bom12s18-in-f4.1e100.net (142.250.192.132) 85.530 ms 86.771 ms 192.178.110.111 (192.178.110.111) 79.920 ms

```


icmp						
No.	Time	Source	Destination	Protocol	Length	Info
49	2.946947075	10.145.128.2	10.145.165.182	ICMP	102	Time-to-live exceeded (Time to live exceeded in transit)
50	2.946947347	10.145.128.2	10.145.165.182	ICMP	102	Time-to-live exceeded (Time to live exceeded in transit)
51	2.946947397	10.145.128.2	10.145.165.182	ICMP	102	Time-to-live exceeded (Time to live exceeded in transit)
53	2.948119782	10.119.228.129	10.145.165.182	ICMP	70	Time-to-live exceeded (Time to live exceeded in transit)
54	2.948119987	10.119.228.129	10.145.165.182	ICMP	70	Time-to-live exceeded (Time to live exceeded in transit)
55	2.948120070	10.119.228.129	10.145.165.182	ICMP	70	Time-to-live exceeded (Time to live exceeded in transit)
56	2.950114032	192.168.255.18	10.145.165.182	ICMP	70	Time-to-live exceeded (Time to live exceeded in transit)
57	2.950114191	192.168.255.18	10.145.165.182	ICMP	70	Time-to-live exceeded (Time to live exceeded in transit)
58	2.950114244	192.168.255.18	10.145.165.182	ICMP	70	Time-to-live exceeded (Time to live exceeded in transit)
79	3.038082778	10.255.238.166	10.145.165.182	ICMP	182	Time-to-live exceeded (Time to live exceeded in transit)
80	3.038083007	10.255.238.166	10.145.165.182	ICMP	182	Time-to-live exceeded (Time to live exceeded in transit)
81	3.038083054	10.255.238.166	10.145.165.182	ICMP	182	Time-to-live exceeded (Time to live exceeded in transit)
82	3.038138225	10.173.35.1	10.145.165.182	ICMP	186	Time-to-live exceeded (Time to live exceeded in transit)
83	3.038137799	10.152.7.214	10.145.165.182	ICMP	110	Time-to-live exceeded (Time to live exceeded in transit)
84	3.038170652	10.173.35.253	10.145.165.182	ICMP	186	Time-to-live exceeded (Time to live exceeded in transit)
85	3.038170712	10.173.35.253	10.145.165.182	ICMP	186	Time-to-live exceeded (Time to live exceeded in transit)
87	3.038802515	10.152.7.214	10.145.165.182	ICMP	110	Time-to-live exceeded (Time to live exceeded in transit)
88	3.038802687	10.152.7.214	10.145.165.182	ICMP	110	Time-to-live exceeded (Time to live exceeded in transit)
89	3.042018605	72.14.204.62	10.145.165.182	ICMP	102	Time-to-live exceeded (Time to live exceeded in transit)
104	3.078867845	72.14.204.62	10.145.165.182	ICMP	102	Time-to-live exceeded (Time to live exceeded in transit)
105	3.079877679	142.250.172.80	10.145.165.182	ICMP	110	Time-to-live exceeded (Time to live exceeded in transit)
106	3.079887397	192.178.86.246	10.145.165.182	ICMP	102	Time-to-live exceeded (Time to live exceeded in transit)
116	3.172123444	142.250.192.132	10.145.165.182	ICMP	70	Destination unreachable (Port unreachable)
117	3.172124629	142.250.238.81	10.145.165.182	ICMP	102	Time-to-live exceeded (Time to live exceeded in transit)
118	3.173156943	172.253.50.147	10.145.165.182	ICMP	102	Time-to-live exceeded (Time to live exceeded in transit)
119	3.173381991	142.250.192.132	10.145.165.182	ICMP	70	Destination unreachable (Port unreachable)
120	3.174123011	192.178.86.202	10.145.165.182	ICMP	110	Time-to-live exceeded (Time to live exceeded in transit)
121	3.174523239	192.178.110.244	10.145.165.182	ICMP	110	Time-to-live exceeded (Time to live exceeded in transit)
122	3.174559104	216.239.54.146	10.145.165.182	ICMP	110	Time-to-live exceeded (Time to live exceeded in transit)
140	3.701048278	192.178.110.111	10.145.165.182	ICMP	110	Time-to-live exceeded (Time to live exceeded in transit)
141	3.701466644	172.253.50.147	10.145.165.182	ICMP	102	Time-to-live exceeded (Time to live exceeded in transit)
142	3.701466969	172.253.50.147	10.145.165.182	ICMP	102	Time-to-live exceeded (Time to live exceeded in transit)
143	3.702551959	142.250.238.81	10.145.165.182	ICMP	102	Time-to-live exceeded (Time to live exceeded in transit)
144	3.702582880	142.250.192.132	10.145.165.182	ICMP	70	Destination unreachable (Port unreachable)
145	3.702583053	142.250.192.132	10.145.165.182	ICMP	70	Destination unreachable (Port unreachable)

The reachable host successfully completes the traceroute, confirming proper routing and network connectivity.

The unreachable host does not respond to ICMP Echo requests, likely due to a connectivity issue caused by a firewall or the host being unavailable.