

CS-315 COMPUTER NETWORKS LAB-8 (NAT & SMTP)

PART-1 (NAT):

Inside:

| No. | Time | Source | Destination | Protocol | Length | Info |
|-----|-------------|------------------------|------------------------|----------|--------|--|
| 1 | 0.000000000 | 192.168.10.11 | 138.76.29.8 | TCP | 74 | 53924 → 80 [SYN] Seq=0 Win=64240 Len=0 MSS=1460 SACK_PERM TSval=322727249 TSecr=0 WS=128 |
| 2 | 0.002891700 | 138.76.29.8 | 192.168.10.11 | TCP | 74 | 80 → 53924 [SYN, ACK] Seq=0 Ack=1 Win=65160 Len=0 MSS=1460 SACK_PERM TSval=802266926 TSecr=... |
| 3 | 0.002878917 | 192.168.10.11 | 138.76.29.8 | TCP | 66 | 53924 → 80 [ACK] Seq=1 Ack=1 Win=64256 Len=0 TSval=322727252 TSecr=802266926 |
| 4 | 0.027362245 | 192.168.10.11 | 138.76.29.8 | HTTP | 396 | GET / HTTP/1.1 |
| 5 | 0.029390199 | 138.76.29.8 | 192.168.10.11 | TCP | 66 | 80 → 53924 [ACK] Seq=1 Ack=331 Win=64896 Len=0 TSval=802266954 TSecr=322727277 |
| 6 | 0.030672101 | 138.76.29.8 | 192.168.10.11 | HTTP | 613 | HTTP/1.1 200 OK (text/html) |
| 7 | 0.031464845 | 192.168.10.11 | 138.76.29.8 | TCP | 66 | 53924 → 80 [ACK] Seq=331 Ack=548 Win=64128 Len=0 TSval=322727281 TSecr=802266955 |
| 8 | 0.231407421 | 192.168.10.11 | 138.76.29.8 | HTTP | 317 | GET /favicon.ico HTTP/1.1 |
| 9 | 0.232896589 | 138.76.29.8 | 192.168.10.11 | TCP | 66 | 80 → 53924 [ACK] Seq=548 Ack=582 Win=64768 Len=0 TSval=802267157 TSecr=322727481 |
| 10 | 0.233074462 | 138.76.29.8 | 192.168.10.11 | HTTP | 555 | HTTP/1.1 404 Not Found (text/html) |
| 11 | 0.233703166 | 192.168.10.11 | 138.76.29.8 | TCP | 66 | 53924 → 80 [ACK] Seq=582 Ack=1037 Win=64128 Len=0 TSval=322727483 TSecr=802267158 |
| 12 | 5.189772327 | PCSSystemtec_82:36:... | PCSSystemtec_89:c7:... | ARP | 42 | Who has 192.168.10.11? Tell 192.168.10.254 |
| 13 | 5.191799501 | PCSSystemtec_89:c7:... | PCSSystemtec_82:36:... | ARP | 60 | 192.168.10.11 is at 08:00:27:89:c7:7c |
| 14 | 5.234545253 | 138.76.29.8 | 192.168.10.11 | TCP | 66 | 80 → 53924 [FIN, ACK] Seq=1037 Ack=582 Win=64768 Len=0 TSval=802272158 TSecr=322727483 |

| | |
|--|--|
| > Frame 4: 396 bytes on wire (3168 bits), 396 bytes captured (3168 bits) on interface eth1, id 0 | 0000 08 00 27 82 36 d7 08 00 27 89 c7 7c 08 00 45 00 ... 6 E |
| > Ethernet II, Src: PCSSystemtec_89:c7:7c (08:00:27:89:c7:7c), Dst: PCSSystemtec_82:36:d7 (08:00:2 | 0010 01 7e 62 96 40 00 40 06 64 dc c0 a8 0a 0b 8a 4c ... b @ @ d |
| > Internet Protocol Version 4, Src: 192.168.10.11, Dst: 138.76.29.8 | 0020 1d 08 d2 a4 00 50 a2 b5 4a 2b 99 71 bd 0e 80 18 ... P ... J + q ... |
| > Transmission Control Protocol, Src Port: 53924, Dst Port: 80, Seq: 1, Ack: 1, Len: 330 | 0030 01 f6 1b ea 00 00 01 01 08 0a 13 3c 6d 6d 2f d1 < mm / |
| > Hypertext Transfer Protocol | 0040 9f 2e 47 45 54 20 2f 20 48 54 54 50 2f 31 2e 31 ... GET / HTTP/1.1 |
| > GET / HTTP/1.1\r\n | 0050 00 0a 48 6f 73 74 3a 20 31 33 38 2e 37 36 2e 32 ... Host: 138.76.29.8 |
| Host: 138.76.29.8\r\n | 0060 39 2e 38 0d 0a 55 73 65 72 2d 41 67 65 6e 74 3a ... 9.8 Use r-Agent |
| User-Agent: Mozilla/5.0 (X11; Ubuntu; Linux x86_64; rv:75.0) Gecko/20100101 Firefox/75.0\r\n | 0070 20 4d 6f 7a 69 6c 6c 61 2f 35 2e 30 20 28 58 31 ... Mozilla /5.0 (X |
| Accept: text/html,application/xhtml+xml,application/xml;q=0.9,image/webp,*/*;q=0.8\r\n | 0080 31 3b 20 55 62 75 6e 74 75 3b 20 4c 69 6e 75 78 ... 1; Ubuntu u; Linu |
| Accept-Language: en-US,en;q=0.5\r\n | 0090 20 78 38 36 5f 36 34 3b 20 72 76 3a 37 35 2e 30 ... x86_64; rv:75.0 |
| Accept-Encoding: gzip, deflate\r\n | 00a0 29 20 47 65 63 6b 6f 2f 32 30 31 30 30 31 30 31 ...) Gecko/ 2010010 |
| Connection: keep-alive\r\n | 00b0 20 46 69 72 65 66 6f 78 2f 37 35 2e 30 0d 0a 41 ... Firefox /75.0 |
| Upgrade-Insecure-Requests: 1\r\n | 00c0 63 63 65 70 74 3a 20 74 65 78 74 2f 68 74 6d 6c ... ccept: t ext/htm |
| \r\n | 00d0 2c 61 70 70 6c 69 63 61 74 69 6f 6e 2f 78 68 74 ... , applica tion/xh |
| [Full request URI: http://138.76.29.8/] | 00e0 6d 6c 2b 78 6d 6c 2c 61 70 70 6c 69 63 61 74 69 ... ml+xml,a pplicat |
| [HTTP request 1/2] | 00f0 6f 6e 2f 78 6d 6c 3b 71 3d 30 2e 39 2c 69 6d 61 ... on/xml;q =0.9,im |
| [Response in frame: 61] | 0100 67 65 2f 77 65 62 70 2c 2a 2f 2a 3b 71 3d 30 2e ... ge/webp, */*;q=0 |
| | 0110 38 0d 0a 41 63 63 65 70 74 2d 4c 61 6e 67 75 61 ... 8 Accep t-Langu |
| | 0120 67 65 3a 20 65 6e 2d 55 53 2c 65 6e 3b 71 3d 30 ... ge: en-U S,en;q= |
| | 0130 2e 35 0d 0a 41 63 63 65 70 74 2d 45 6e 63 6f 645 Acce pt-Enco |

- IP Address of the client = 192.168.10.11
TCP Source port no = 53924
IP Address of the (destination)server = 138.76.29.8
TCP Destination port no = 80
- From the above screenshot, the HTTP GET was captured at t=0.027362245 and the HTTP OK was captured at t=0.030672101[time from first packet capture (from screenshot)].
- Source IP address = 138.76.29.8

Destination IP address = 192.168.10.11

TCP Source port no = 80

TCP Destination port no = 53924

Outside:

| No. | Time | Source | Destination | Protocol | Length | Info |
|-----|-------------|------------------------|------------------------|----------|--------|--|
| 1 | 0.000000000 | 10.0.1.254 | 138.76.29.8 | TCP | 74 | 53924 → 80 [SYN] Seq=0 Win=64240 Len=0 MSS=1460 SACK_PERM TSval=322727249 TSecr=0 WS=128 |
| 2 | 0.002058086 | 138.76.29.8 | 10.0.1.254 | TCP | 74 | 80 → 53924 [SYN, ACK] Seq=0 Ack=1 Win=65160 Len=0 MSS=1460 SACK_PERM TSval=802266926 TSecr=... |
| 3 | 0.002853940 | 10.0.1.254 | 138.76.29.8 | TCP | 66 | 53924 → 80 [ACK] Seq=1 Ack=1 Win=64256 Len=0 TSval=322727252 TSecr=802266926 |
| 4 | 0.027356291 | 10.0.1.254 | 138.76.29.8 | HTTP | 396 | GET / HTTP/1.1 |
| 5 | 0.029338911 | 138.76.29.8 | 10.0.1.254 | TCP | 66 | 80 → 53924 [ACK] Seq=1 Ack=331 Win=64896 Len=0 TSval=802266954 TSecr=322727277 |
| 6 | 0.030625966 | 138.76.29.8 | 10.0.1.254 | HTTP | 613 | HTTP/1.1 200 OK (text/html) |
| 7 | 0.031448670 | 10.0.1.254 | 138.76.29.8 | TCP | 66 | 53924 → 80 [ACK] Seq=331 Ack=548 Win=64128 Len=0 TSval=322727281 TSecr=802266955 |
| 8 | 0.231400190 | 10.0.1.254 | 138.76.29.8 | HTTP | 317 | GET /favicon.ico HTTP/1.1 |
| 9 | 0.232863610 | 138.76.29.8 | 10.0.1.254 | TCP | 66 | 80 → 53924 [ACK] Seq=548 Ack=582 Win=64768 Len=0 TSval=802267157 TSecr=322727481 |
| 10 | 0.233043313 | 138.76.29.8 | 10.0.1.254 | HTTP | 555 | HTTP/1.1 404 Not Found (text/html) |
| 11 | 0.233687113 | 10.0.1.254 | 138.76.29.8 | TCP | 66 | 53924 → 80 [ACK] Seq=582 Ack=1037 Win=64128 Len=0 TSval=322727483 TSecr=802267158 |
| 12 | 5.189837924 | PCSSystemtec_43:65:... | PCSSystemtec_22:fd:... | ARP | 42 | Who has 10.0.1.253? Tell 10.0.1.254 |
| 13 | 5.191700729 | PCSSystemtec_22:fd:... | PCSSystemtec_43:65:... | ARP | 60 | 10.0.1.253 is at 08:00:27:22:fd:74 |

> Frame 4: 396 bytes on wire (3168 bits), 396 bytes captured (3168 bits) on interface eth0, id 0

> Ethernet II, Src: PCSSystemtec_43:65:cd (08:00:27:43:65:cd), Dst: PCSSystemtec_22:fd:74 (08:00:27:43:65:cd)

> Internet Protocol Version 4, Src: 10.0.1.254, Dst: 138.76.29.8

> Transmission Control Protocol, Src Port: 53924, Dst Port: 80, Seq: 1, Ack: 1, Len: 330

> Hypertext Transfer Protocol

> GET / HTTP/1.1\r\n

Host: 138.76.29.8\r\n

User-Agent: Mozilla/5.0 (X11; Ubuntu; Linux x86_64; rv:75.0) Gecko/20100101 Firefox/75.0\r\n

Accept: text/html,application/xhtml+xml,application/xml;q=0.9,image/webp,*/*;q=0.8\r\n

Accept-Language: en-US,en;q=0.5\r\n

Accept-Encoding: gzip, deflate\r\n

Connection: keep-alive\r\n

Upgrade-Insecure-Requests: 1\r\n

\r\n

[Full request URI: http://138.76.29.8/]

[HTTP request 1/2]

[Response in frame: 6]

[Next request in frame: 0]

0040 9f 2e 47 45 54 20 2f 20 48 54 54 50 2f 31 2e 31 ..GET / HTTP/1.1

0050 0d 0a 48 6f 73 74 3a 20 31 33 38 2e 37 36 2e 32 ..Host: 138.76.29.8

0060 39 2e 38 0d 0a 55 73 65 72 2d 41 67 65 6e 74 3a 9.8. Use r-Agent

0070 20 4d 6f 7a 69 6c 6c 61 2f 35 2e 30 28 58 31 Mozilla /5.0 (X

0080 31 3b 20 55 62 75 6e 74 75 3b 20 4c 69 6e 75 78 ; Ubuntu; Linu

0090 20 78 38 36 5f 36 34 3b 20 72 76 3a 37 35 2e 30 x86_64; rv:75.0

00a0 29 20 47 65 63 6b 6f 2f 32 30 31 30 30 31 30 31) Gecko/ 20100101

00b0 20 46 69 72 65 66 6f 78 2f 37 35 2e 30 0d 0a 41 Firefox /75.0...

00c0 63 63 65 70 74 3a 20 74 65 78 74 2f 68 74 6d 6c ccept: t ext/html

00d0 2c 61 70 70 6c 69 63 61 74 69 6f 6e 2f 78 68 74 ,applic ation/xh

00e0 6d 6c 2b 78 6d 6c 2c 61 70 70 6c 69 63 61 74 69 ml+xml,a pplicat

00f0 6f 6e 2f 78 6d 6c 3b 71 3d 30 2e 39 2c 69 6d 61 on/xml;q =0.9,im

0100 67 65 2f 77 65 62 70 2c 2a 2f 2a 3b 71 3d 30 2e ge/webp, /*;q=0

0110 38 0d 0a 41 63 63 65 70 74 2d 4c 61 6e 67 75 61 8. Accep t-Langu

0120 67 65 3a 20 65 6e 2d 55 53 2c 65 6e 3b 71 3d 30 ge: en-U S,en;q=

0130 2e 35 0d 0a 41 63 63 65 70 74 2d 45 6e 63 6f 64 .5. Acce pt-Enco

0140 69 6e 67 3a 20 67 7a 69 70 2c 20 64 65 66 6c 61 ing: gzi p, defl

0150 74 65 0d 0a 43 6f 6e 6e 65 63 74 69 6f 6e 3a 20 te Conn ection:

0160 6b 65 65 70 2d 61 6c 69 76 65 0d 0a 55 70 67 72 keep-ali ve Upg

0170 61 64 65 2d 49 6e 73 65 63 75 72 65 2d 52 65 71 ade-Inse cure-Re

0180 75 65 73 74 73 3a 20 31 0d 0a 0d 0a uests: 1 ...

4. From the above screenshot, the time at which the HTTP GET message appears is t = 0.027356291 [time from first packet capture (from screenshot)]

5. Source IP address = 10.0.1.254

Destination IP address = 138.76.29.8

Source port no = 53924

Destination port no = 80

6. Among the four fields, the Source IP address is different from the answer in question 1.

7. We can see in the above two screenshots that no fields were changed in the HTTP GET message.
8. Among the given/following fields, only the (Header)Checksum is changed in the IP datagram.

Inside: Header Checksum: 0x64dc

Outside: Header Checksum: 0x2492

9. From the above screenshot, the time at which the HTTP OK message appears is $t = 0.030625966$ [time from first packet capture (from screenshot)].
10. Source IP address = 138.76.29.8
Destination IP address = 10.0.1.254
Source port no = 80
Destination port no = 53924
11. Source IP address = 138.76.29.8
Destination IP address = 192.168.10.11
Source Port no = 80
Destination Port no = 53924

PART-2 (SMTP)

Below are the screenshots that prove successful mail delivery.

SMTP Mail Testing

External

Inbox x



smtplab23@gmail.com

to ▼

Hello!! Welcome to CS-315.

I love computer networks!

```
PS C:\AlphaParadise\1.CSE\SEM6\COMPUTER NETWORKS\CS-315_Computer_Networks_Lab\lab8> python .\210010050_client.py
Enter Email Destination: 210010050@iitdh.ac.in
Enter Subject: SMTP Mail Testing
Enter Message: Hello!! Welcome to CS-315
220 smtp.gmail.com ESMTP v14-20020aa799ce000000b006e653488443sm301218pfi.51 - gsmtip

250 smtp.gmail.com at your service

C:\AlphaParadise\1.CSE\SEM6\COMPUTER NETWORKS\CS-315_Computer_Networks_Lab\lab8\210010050_client.py:44: DeprecationWarni
ng: ssl.wrap_socket() is deprecated, use SSLContext.wrap_socket()
  sslClientSocket = ssl.wrap_socket(clientSocket)
b'334 VXNlcm5hbWU6\r\n'
b'334 UGFzc3dvcmQ6\r\n'
b'235 2.7.0 Accepted\r\n'
250 2.1.0 OK v14-20020aa799ce000000b006e653488443sm301218pfi.51 - gsmtip

250 2.1.5 OK v14-20020aa799ce000000b006e653488443sm301218pfi.51 - gsmtip

354 Go ahead v14-20020aa799ce000000b006e653488443sm301218pfi.51 - gsmtip

250 2.0.0 OK 1709730307 v14-20020aa799ce000000b006e653488443sm301218pfi.51 - gsmtip

221 2.0.0 closing connection v14-20020aa799ce000000b006e653488443sm301218pfi.51 - gsmtip
```