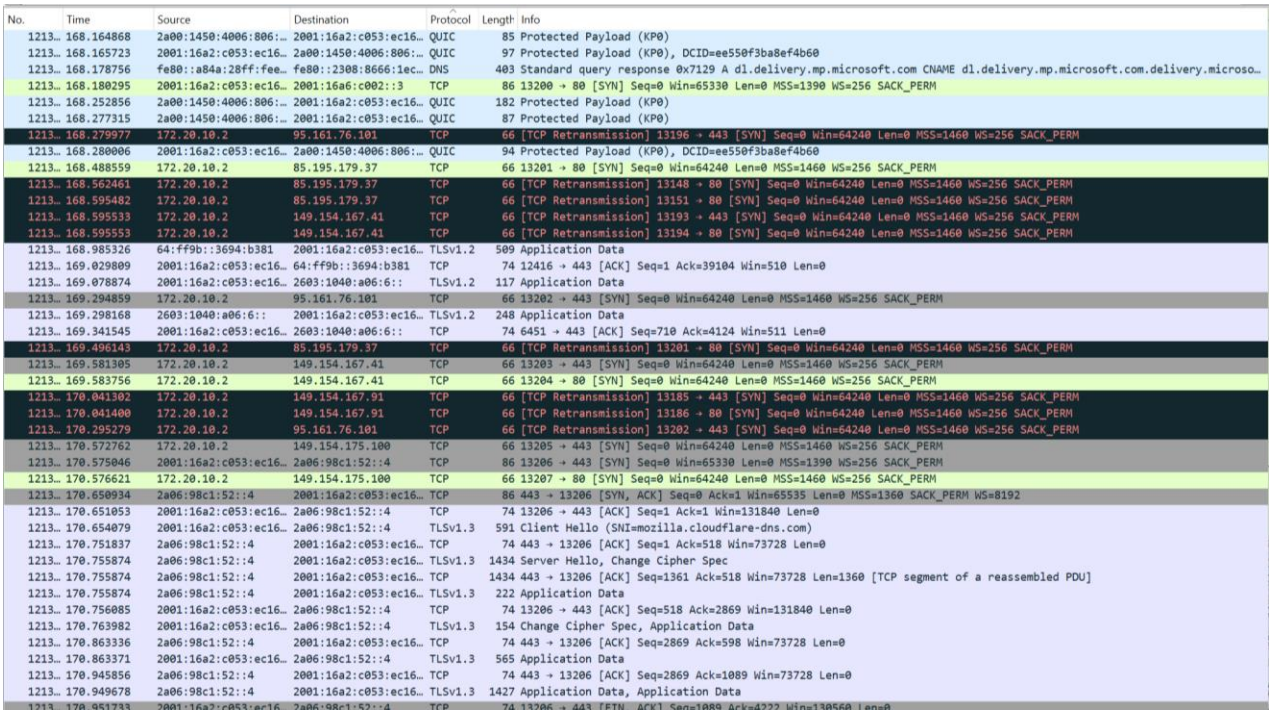
S471 – Web Technologies (Laboratory)	Qassim University جامعة القصيم College of Computer | كلية الحاسب	Lab 1
		The Internet Protocols

Lab Activities:

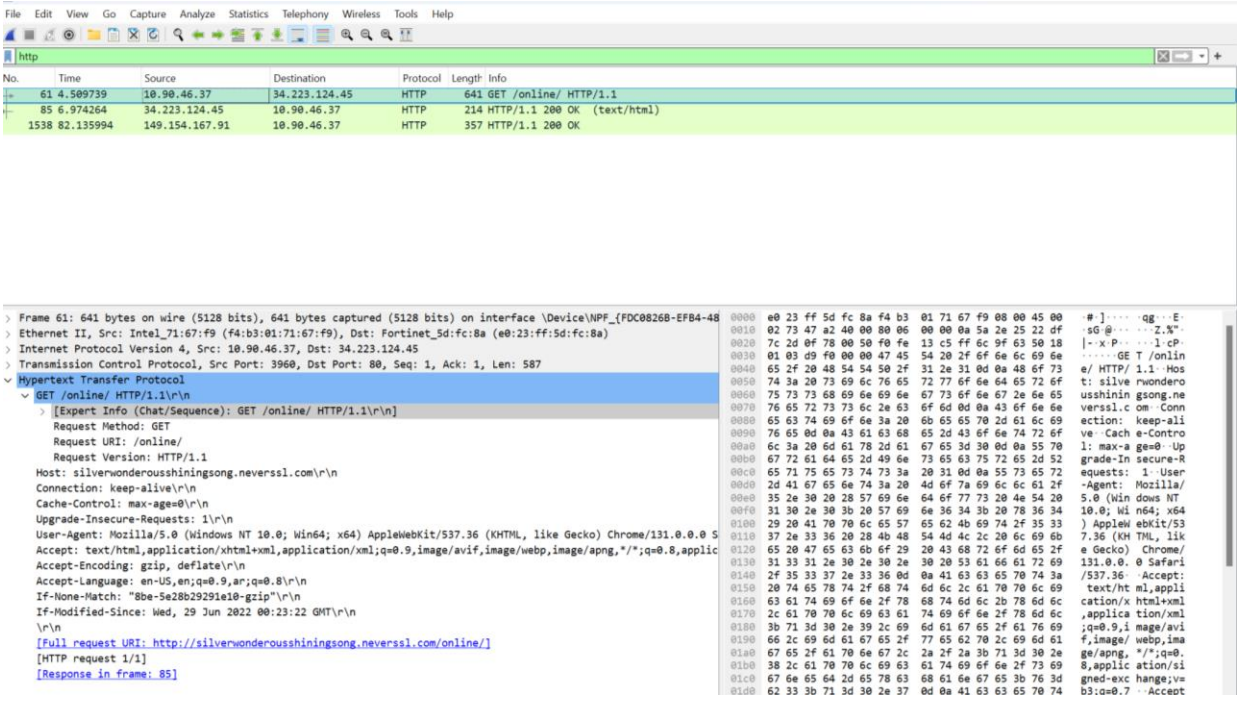
Part 1: Capturing HTTP Traffic.

Task 1: Start Wireshark and capture packets.



No.	Time	Source	Destination	Protocol	Length	Info
1213…	168.164868	2a00:1450:4006:806:…	2001:16a2:c053:ec16…	QUIC	85	Protected Payload (KP0)
1213…	168.165723	2001:16a2:c053:ec16…	2a00:1450:4006:806:…	QUIC	97	Protected Payload (KP0), DCID=ee550f3ba8ef4b60
1213…	168.178756	fe80::a84a:28ff:fee…	fe80::2308:8666:1ec…	DNS	403	Standard query response 0x7129 A dl.delivery.mp.microsoft.com CNAME dl.delivery.mp.microsoft.com.delivery.microso…
1213…	168.180295	2001:16a2:c053:ec16…	2001:16a6:c002::3	TCP	86	13200 → 80 [SYN] Seq=0 Win=65330 Len=0 MSS=1390 WS=256 SACK_PERM
1213…	168.252856	2a00:1450:4006:806:…	2001:16a2:c053:ec16…	QUIC	182	Protected Payload (KP0)
1213…	168.277315	2a00:1450:4006:806:…	2001:16a2:c053:ec16…	QUIC	87	Protected Payload (KP0)
1213…	168.279977	172.20.10.2	95.161.76.101	TCP	66	[TCP Retransmission] 13196 → 443 [SYN] Seq=0 Win=64240 Len=0 MSS=1460 WS=256 SACK_PERM
1213…	168.280006	2001:16a2:c053:ec16…	2a00:1450:4006:806:…	QUIC	94	Protected Payload (KP0), DCID=ee550f3ba8ef4b60
1213…	168.488559	172.20.10.2	85.195.179.37	TCP	66	13201 → 80 [SYN] Seq=0 Win=64240 Len=0 MSS=1460 WS=256 SACK_PERM
1213…	168.562461	172.20.10.2	85.195.179.37	TCP	66	[TCP Retransmission] 13148 → 80 [SYN] Seq=0 Win=64240 Len=0 MSS=1460 WS=256 SACK_PERM
1213…	168.595482	172.20.10.2	85.195.179.37	TCP	66	[TCP Retransmission] 13151 → 80 [SYN] Seq=0 Win=64240 Len=0 MSS=1460 WS=256 SACK_PERM
1213…	168.595533	172.20.10.2	149.154.167.41	TCP	66	[TCP Retransmission] 13193 → 443 [SYN] Seq=0 Win=64240 Len=0 MSS=1460 WS=256 SACK_PERM
1213…	168.595553	172.20.10.2	149.154.167.41	TCP	66	[TCP Retransmission] 13194 → 80 [SYN] Seq=0 Win=64240 Len=0 MSS=1460 WS=256 SACK_PERM
1213…	168.985326	64:ff9b::3694:b381	2001:16a2:c053:ec16…	TLSv1.2	509	Application Data
1213…	169.029809	2001:16a2:c053:ec16…	64:ff9b::3694:b381	TCP	74	12416 → 443 [ACK] Seq=1 Ack=39104 Win=510 Len=0
1213…	169.078874	2001:16a2:c053:ec16…	2603:1040:a06:6::	TLSv1.2	117	Application Data
1213…	169.294859	172.20.10.2	95.161.76.101	TCP	66	13202 → 443 [SYN] Seq=0 Win=64240 Len=0 MSS=1460 WS=256 SACK_PERM
1213…	169.298168	2603:1040:a06:6::	2001:16a2:c053:ec16…	TLSv1.2	248	Application Data
1213…	169.341545	2001:16a2:c053:ec16…	2603:1040:a06:6::	TCP	74	6451 → 443 [ACK] Seq=710 Ack=4124 Win=511 Len=0
1213…	169.496143	172.20.10.2	85.195.179.37	TCP	66	[TCP Retransmission] 13201 → 80 [SYN] Seq=0 Win=64240 Len=0 MSS=1460 WS=256 SACK_PERM
1213…	169.581305	172.20.10.2	149.154.167.41	TCP	66	13203 → 443 [SYN] Seq=0 Win=64240 Len=0 MSS=1460 WS=256 SACK_PERM
1213…	169.583756	172.20.10.2	149.154.167.41	TCP	66	13204 → 80 [SYN] Seq=0 Win=64240 Len=0 MSS=1460 WS=256 SACK_PERM
1213…	170.041302	172.20.10.2	149.154.167.91	TCP	66	[TCP Retransmission] 13185 → 443 [SYN] Seq=0 Win=64240 Len=0 MSS=1460 WS=256 SACK_PERM
1213…	170.041400	172.20.10.2	149.154.167.91	TCP	66	[TCP Retransmission] 13186 → 80 [SYN] Seq=0 Win=64240 Len=0 MSS=1460 WS=256 SACK_PERM
1213…	170.295279	172.20.10.2	95.161.76.101	TCP	66	[TCP Retransmission] 13202 → 443 [SYN] Seq=0 Win=64240 Len=0 MSS=1460 WS=256 SACK_PERM
1213…	170.572762	172.20.10.2	149.154.175.100	TCP	66	13205 → 443 [SYN] Seq=0 Win=64240 Len=0 MSS=1460 WS=256 SACK_PERM
1213…	170.575046	2001:16a2:c053:ec16…	2a06:98c1:52::4	TCP	86	13206 → 443 [SYN] Seq=0 Win=65330 Len=0 MSS=1390 WS=256 SACK_PERM
1213…	170.576621	172.20.10.2	149.154.175.100	TCP	66	13207 → 80 [SYN] Seq=0 Win=64240 Len=0 MSS=1460 WS=256 SACK_PERM
1213…	170.650934	2a06:98c1:52::4	2001:16a2:c053:ec16…	TCP	86	443 → 13206 [SYN, ACK] Seq=0 Ack=1 Win=65535 Len=0 MSS=1360 SACK_PERM WS=8192
1213…	170.651053	2001:16a2:c053:ec16…	2a06:98c1:52::4	TCP	74	13206 → 443 [ACK] Seq=1 Ack=1 Win=131840 Len=0
1213…	170.654079	2001:16a2:c053:ec16…	2a06:98c1:52::4	TLSv1.3	591	Client Hello (SNI=mozilla.cloudflare-dns.com)
1213…	170.751837	2a06:98c1:52::4	2001:16a2:c053:ec16…	TCP	74	443 → 13206 [ACK] Seq=1 Ack=518 Win=73728 Len=0
1213…	170.755874	2a06:98c1:52::4	2001:16a2:c053:ec16…	TLSv1.3	1434	Server Hello, Change Cipher Spec
1213…	170.755874	2a06:98c1:52::4	2001:16a2:c053:ec16…	TCP	1434	443 → 13206 [ACK] Seq=1361 Ack=518 Win=73728 Len=1360 [TCP segment of a reassembled PDU]
1213…	170.755874	2a06:98c1:52::4	2001:16a2:c053:ec16…	TLSv1.3	222	Application Data
1213…	170.756085	2001:16a2:c053:ec16…	2a06:98c1:52::4	TCP	74	13206 → 443 [ACK] Seq=518 Ack=2869 Win=131840 Len=0
1213…	170.763982	2001:16a2:c053:ec16…	2a06:98c1:52::4	TLSv1.3	154	Change Cipher Spec, Application Data
1213…	170.863336	2a06:98c1:52::4	2001:16a2:c053:ec16…	TCP	74	443 → 13206 [ACK] Seq=2869 Ack=598 Win=73728 Len=0
1213…	170.863371	2001:16a2:c053:ec16…	2a06:98c1:52::4	TLSv1.3	565	Application Data
1213…	170.945856	2a06:98c1:52::4	2001:16a2:c053:ec16…	TCP	74	443 → 13206 [ACK] Seq=2869 Ack=1089 Win=73728 Len=0
1213…	170.949678	2a06:98c1:52::4	2001:16a2:c053:ec16…	TLSv1.3	1427	Application Data, Application Data

Task 2: Filter HTTP packets and analyze them.



File Edit View Go Capture Analyze Statistics Telephony Wireless Tools Help

http

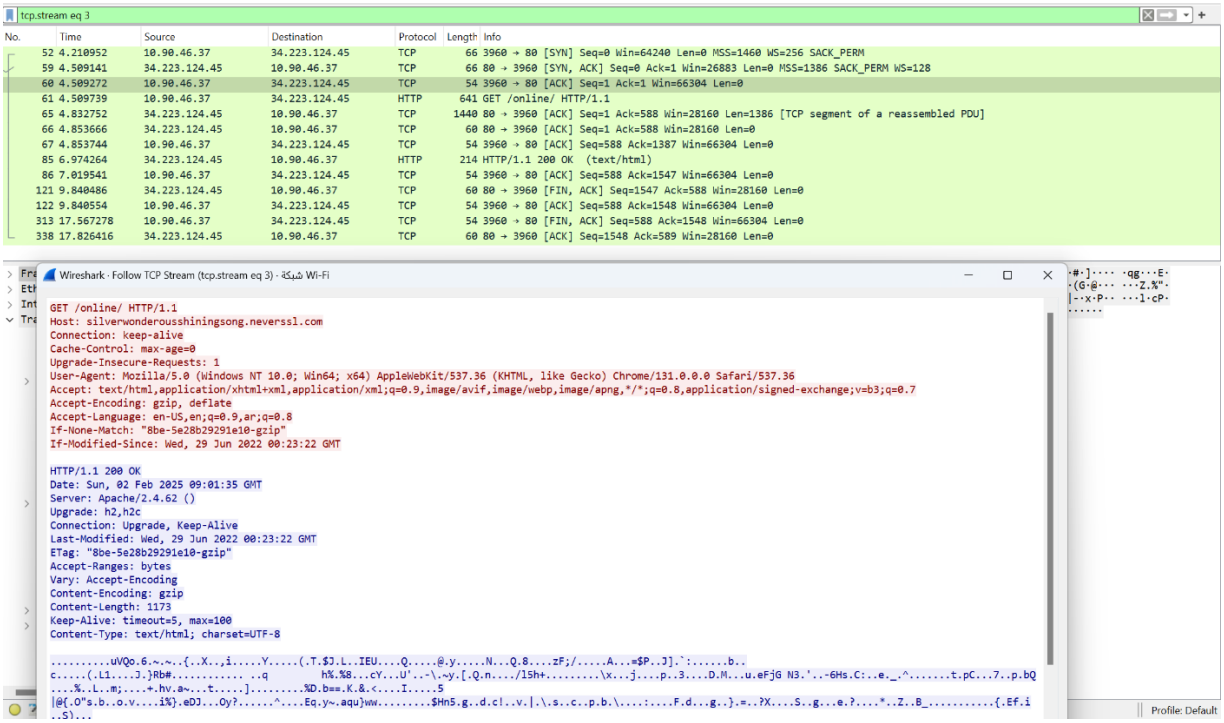
No.	Time	Source	Destination	Protocol	Length	Info
61	4.509739	10.90.46.37	34.223.124.45	HTTP	641	GET /online/ HTTP/1.1
85	6.974264	34.223.124.45	10.90.46.37	HTTP	214	HTTP/1.1 200 OK (text/html)
1538	82.135994	149.154.167.91	10.90.46.37	HTTP	357	HTTP/1.1 200 OK

```
> Frame 61: 641 bytes on wire (5128 bits), 641 bytes captured (5128 bits) on interface \Device\NPF_{FDC0826B-EFB4-48
> Ethernet II, Src: Intel_71:67:f9 (f4:b3:01:71:67:f9), Dst: Fortinet_5d:fc:8a (e0:23:ff:5d:fc:8a)
> Internet Protocol Version 4, Src: 10.90.46.37, Dst: 34.223.124.45
> Transmission Control Protocol, Src Port: 3960, Dst Port: 80, Seq: 1, Ack: 1, Len: 587
v Hypertext Transfer Protocol
  v GET /online/ HTTP/1.1\r\n
    > [Expert Info (Chat/Sequence): GET /online/ HTTP/1.1\r\n]
      Request Method: GET
      Request URI: /online/
      Request Version: HTTP/1.1
    Host: silverwonderousshiningsong.neverssl.com\r\n
    Connection: keep-alive\r\n
    Cache-Control: max-age=0\r\n
    Upgrade-Insecure-Requests: 1\r\n
    User-Agent: Mozilla/5.0 (Windows NT 10.0; Win64; x64) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/131.0.0.0 S
    Accept: text/html,application/xhtml+xml,application/xml;q=0.9,image/avif,image/webp,image/apng,*/*;q=0.8,applic
    Accept-Encoding: gzip, deflate\r\n
    Accept-Language: en-US,en;q=0.9,ar;q=0.8\r\n
    If-None-Match: "8be-5e28b29291e10-gzip"\r\n
    If-Modified-Since: Wed, 29 Jun 2022 00:23:22 GMT\r\n
    \r\n
    [Full request URI: http://silverwonderousshiningsong.neverssl.com/online/]
    [HTTP request 1/1]
    [Response in frame: 85]
```

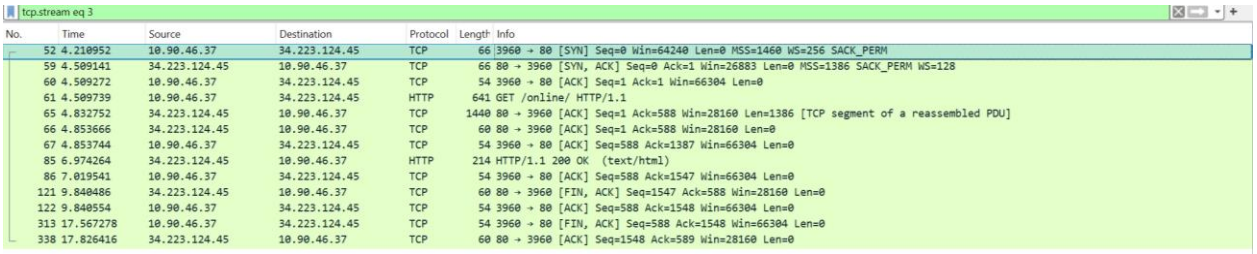
```
0000  e0 23 ff 5d fc 8a f4 b3  01 71 67 f9 08 00 45 00   ·#·]···· ·qg···E·
0010  02 73 47 a2 40 00 80 06  00 00 0a 5a 2e 25 22 df   ·sG·@··· ···Z.%"·
0020  7c 2d 0f 78 00 50 f0 fe  13 c5 ff 6c 9f 63 50 18   |-·x·P·· ···l·cP·
0030  01 03 d9 f0 00 00 47 45  54 20 2f 6f 6e 6c 69 6e   ·····GE T /onlin
0040  65 2f 20 48 54 54 50 2f  31 2e 31 0d 0a 48 6f 73   e/ HTTP/ 1.1··Hos
0050  74 3a 20 73 69 6c 76 65  72 77 6f 6e 64 65 72 6f   t: silve rwondero
0060  75 73 73 68 69 6e 69 6e  67 73 6f 6e 67 2e 6e 65   usshinin gsong.ne
0070  76 65 72 73 73 6c 2e 63  6f 6d 0d 0a 43 6f 6e 6e   verssl.c om··Conn
0080  65 63 74 69 6f 6e 3a 20  6b 65 65 70 2d 61 6c 69   ection:  keep-ali
0090  76 65 0d 0a 43 61 63 68  65 2d 43 6f 6e 74 72 6f   ve··Cach e-Contro
00a0  6c 3a 20 6d 61 78 2d 61  67 65 3d 30 0d 0a 55 70   l: max-a ge=0··Up
00b0  67 72 61 64 65 2d 49 6e  73 65 63 75 72 65 2d 52   grade-In secure-R
00c0  65 71 75 65 73 74 73 3a  20 31 0d 0a 55 73 65 72   equests:  1··User
00d0  2d 41 67 65 6e 74 3a 20  4d 6f 7a 69 6c 6c 61 2f   -Agent:  Mozilla/
00e0  35 2e 30 20 28 57 69 6e  64 6f 77 73 20 4e 54 20   5.0 (Win dows NT
00f0  31 30 2e 30 3b 20 57 69  6e 36 34 3b 20 78 36 34   10.0; Wi n64; x64
0100  29 20 41 70 70 6c 65 57  65 62 4b 69 74 2f 35 33   ) AppleW ebKit/53
0110  37 2e 33 36 20 28 4b 48  54 4d 4c 2c 20 6c 69 6b   7.36 (KH TML, lik
0120  65 20 47 65 63 6b 6f 29  20 43 68 72 6f 6d 65 2f   e Gecko)  Chrome/
0130  31 33 31 2e 30 2e 30 2e  30 20 53 61 66 61 72 69   131.0.0. 0 Safari
0140  2f 35 33 37 2e 33 36 0d  0a 41 63 63 65 70 74 3a   /537.36·· ·Accept:
0150  20 74 65 78 74 2f 68 74  6d 6c 2c 61 70 70 6c 69    text/ht ml,appli
0160  63 61 74 69 6f 6e 2f 78  68 74 6d 6c 2b 78 6d 6c   cation/x html+xml
0170  2c 61 70 70 6c 69 63 61  74 69 6f 6e 2f 78 6d 6c   ,applica tion/xml
0180  3b 71 3d 30 2e 39 2c 69  6d 61 67 65 2f 61 76 69   ;q=0.9,i mage/avi
0190  66 2c 69 6d 61 67 65 2f  77 65 62 70 2c 69 6d 61   f,image/ webp,ima
01a0  67 65 2f 61 70 6e 67 2c  2a 2f 2a 3b 71 3d 30 2e   ge/apng, */*;q=0.
01b0  38 2c 61 70 70 6c 69 63  61 74 69 6f 6e 2f 73 69   8,applic ation/si
01c0  67 6e 65 64 2d 65 78 63  68 61 6e 67 65 3b 76 3d   gned-exc hange;v=
01d0  62 33 3b 71 3d 30 2e 37  0d 0a 41 63 63 65 70 74   b3;q=0.7 ··Accept
```

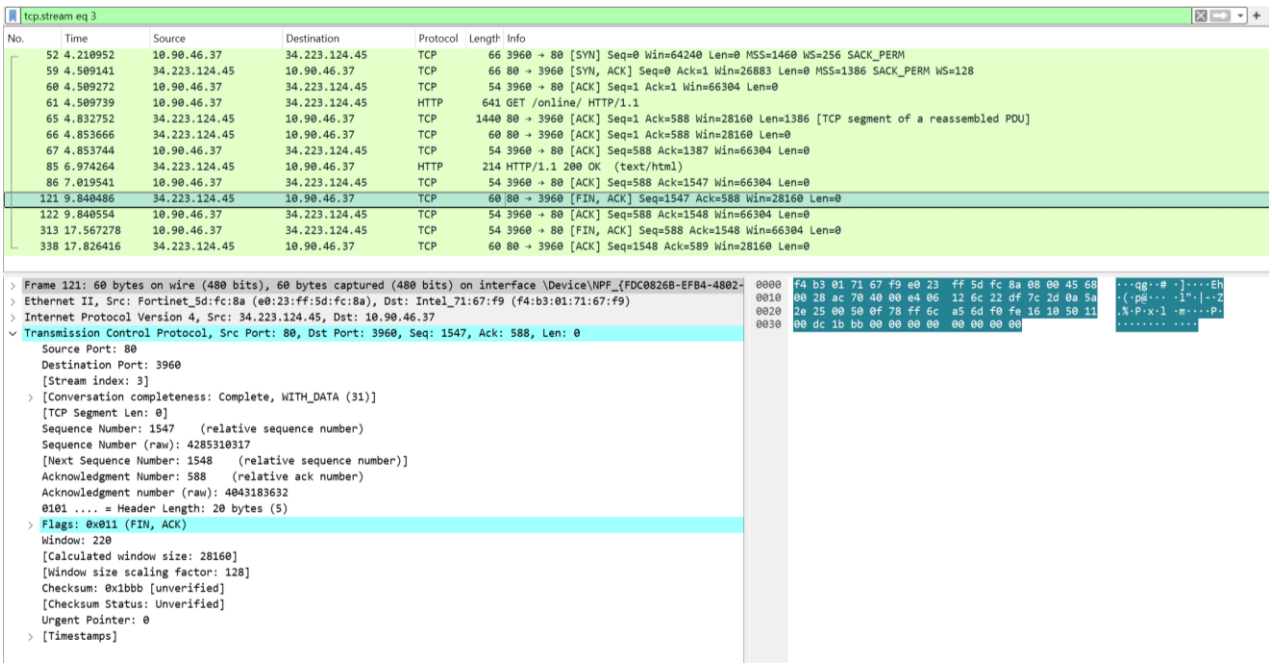
Part 2: Analyzing TCP/IP Traffic.

Task 1: Filter TCP packets



Task 2: Analyze TCP handshake and investigate Data Transfer and Termination

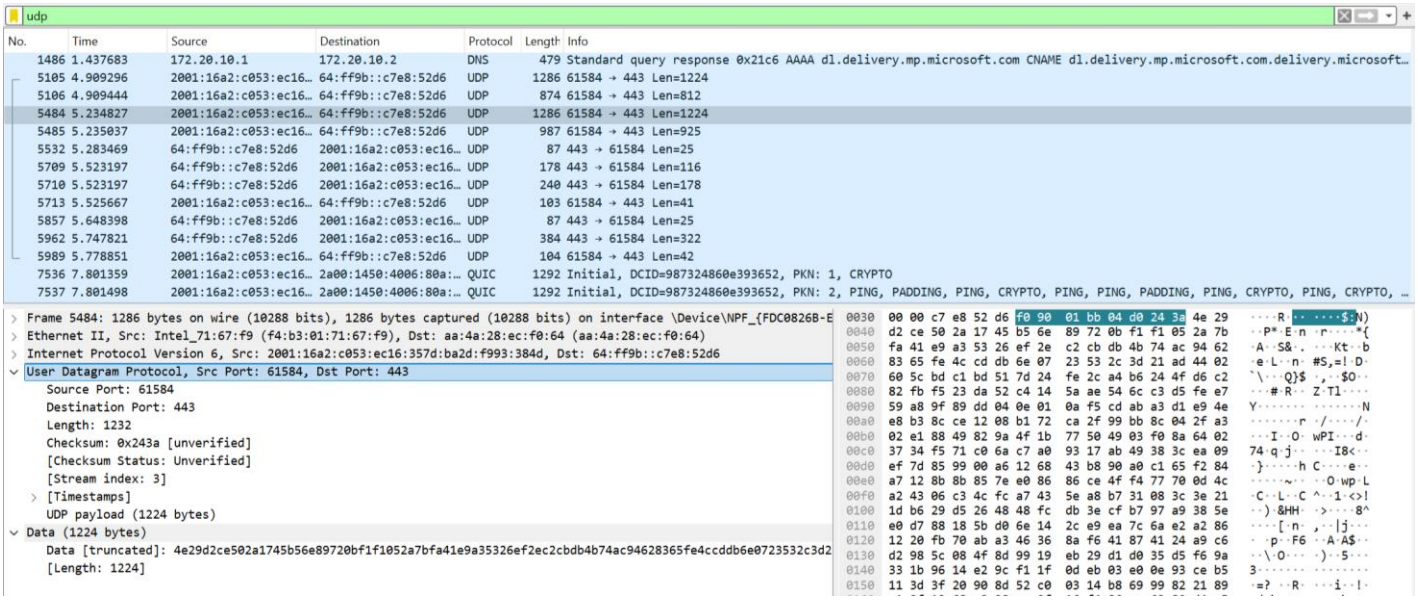




Part 3: Capturing and Analyzing UDP Traffic

Task 1: Generate UDP traffic and capture packets

Task 2: Filter and analysis UDP Packets



Part 4: Comparing TCP and UDP by filling in the following tables. Save your work (e.g., in an MS Word document), and upload it to your online git repo.

Task 1: Fill in the following table and provide reasons.

	TCP or UDP	Reasons
Reliability and Connection Establishment	TCP	it sets up a connection before sending data. It makes sure all data is received and will resend if anything is lost.
Data Integrity and Ordering	TCP	It keeps data in the right order and checks for errors, so nothing gets mixed up. UDP does not do this.

Task 2: Identify the use Cases and Performance of TCP and UDP.

	TCP	UDP
Use cases	Best for things that need all data to be correct, like websites (HTTP/HTTPS), emails, and file downloads.	Best for fast communication where some data loss is okay, like video calls, online games, and live streaming.
Performance	Slower because it checks for errors and resends lost data.	Faster because it doesn't check for errors or resend lost data

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