

ASSIGNMENT 4

Purva Naresh Rumde

Problem ID	Captured Flag	Steps
P1	flag{3V1L_817_3xf117R4710N_4_7H3_W1N_51D43c8000034d0c}	Open the pcap file in Wireshark. Apply a filter to display only packets with the reserved bit set to 0. Examine each filtered packet and record the last character from each packet, as it represents part of the flag.
P2	flag{74573_Y0u_c4N_533}	Open the file in Wireshark. Apply a filter to display traffic with the specified source and destination IP addresses. Locate and extract the 6th stream. Use CyberChef to decode the contents and obtain an image. Convert the image from hexadecimal format to retrieve the flag.
P3	flag{9ebd4718347e389aaa2a3241624a 15}	Mount the disk image. List all hidden files. Locate the .docx file and open it in CyberChef. Extract all contents from the .docx file. Utilize the image containing a QR code and input the extracted text into CyberChef. Decode the text from base64 and hexadecimal to obtain the flag.
P4		

Detailed Explanations (Including Screenshots)

Q1.

1. Open the pcap file in Wireshark.
2. Apply a filter to display only packets with the reserved bit set to 0.
3. Examine each filtered packet and record the last character from each packet, as it represents part of the flag.
4. After loading the PCAP file into Wireshark, I examined several packets and identified a distinct pattern in the reserve bit for a specific set of packets.
5. I discovered that certain packets had their reserve bit set to zero, while others had different values. Using Wireshark's filter option, I isolated packets with the reserve bit set to zero.
6. Once filtered, I observed that the last byte in the hexadecimal dump indicated a flag.

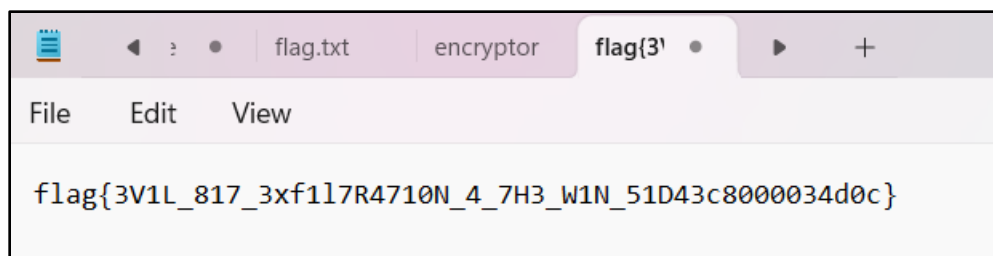
7. By systematically analyzing each filtered packet and recording the last characters, I compiled the following sequence of characters on my notepad.

```

.....0..... = IG bit: Individual address (unicast)
Type: IPv4 (0x0800)
v Internet Protocol Version 4, Src: 10.0.1.10, Dst: 10.0.1.5
  0100 .... = Version: 4
  .... 0101 = Header Length: 20 bytes (5)
  v Differentiated Services Field: 0x00 (DSCP: CS0, ECN: Not-ECT)
    0000 00.. = Differentiated Services Codepoint: Default (0)
    .... ..00 = Explicit Congestion Notification: Not ECN-Capable Transport (0)
  Total Length: 29
  Identification: 0x0001 (1)
  v 000. .... = Flags: 0x0
    0... .... = Reserved bit: Not set
    .0.. .... = Don't fragment: Not set
    ..0. .... = More fragments: Not set
    ...0 0000 0000 0000 = Fragment Offset: 0
  Time to Live: 64
  Protocol: UDP (17)

```

The screenshot shows the Wireshark interface with a packet list and packet details pane. The packet list shows several UDP packets from 10.0.1.10 to 10.0.1.5. The packet details pane shows the structure of an IPv4 packet, including the Internet Protocol Version 4 header, Differentiated Services Field, Total Length, Identification, and Flags. A context menu is open over the packet list, showing options like 'Expand Subtrees', 'Collapse Subtrees', 'Expand All', 'Collapse All', 'Apply as Column', 'Apply as Filter', 'Prepare as Filter', 'Conversation Filter', 'Colorize with Filter', 'Follow', 'Copy', 'Show Packet Bytes...', 'Export Packet Bytes...', 'Wiki Protocol Page', 'Filter Field Reference', 'Protocol Preferences', 'Decode As...', 'Go to Linked Packet', and 'Show Linked Packet in New Window'. The 'Apply as Filter' option is selected, and a sub-menu is open showing the filter 'ip.flags.rb == False'.



Q2.

1. Open the file in Wireshark.
2. Apply a filter to display traffic with the specified source and destination IP addresses.
3. Locate and extract the 6th stream.
4. Use CyberChef to decode the contents and obtain an image.
5. Convert the image from hexadecimal format to retrieve the flag.

I analyzed the file in Wireshark to examine the generated packets, particularly focusing on those originating from 173.194.29.9 and destined for 192.168.1.111, which appeared to be repeated multiple times and part of internal traffic.

By applying a filter to isolate packets with the specified source and destination addresses, I refined my analysis to focus solely on relevant packets.

Upon inspecting the packet streams, I identified the sixth stream as containing substantial content. Notably, at the end of this packet's content, there was a string ending with an equals sign, indicative of a base64 representation.

Using CyberChef, I decoded the base64-encoded string and discovered the presence of a JFIF file signature, signaling an image file. Consequently, I utilized text-to-image translation to obtain the image.

Despite considerable efforts to decode the image using techniques like steganography, no meaningful information was revealed. However, further experimentation in CyberChef revealed

that decoding from hexadecimal produced the flag.

CLASSIFIED.pcapng

File Edit View Go Capture Analyze Statistics Telephony Wireless Tools Help

ip.src == 173.194.29.9 && ip.dst == 192.168.1.111

No.	Time	Source	Destination	Protocol	Length	Info
1	0.000000000	192.168.1.111	8.8.8.8	DNS	75	Standard query 0xe826 A www.youtube.com
2	0.000213185	192.168.1.111	74.125.21.136	TLSv1.2	365	Application Data
3	0.000250170	192.168.1.111	74.125.21.136	TLSv1.2	384	Application Data
4	0.000409813	192.168.1.111	8.8.8.8	DNS	75	Standard query 0x3af2 AAAA www.youtube.com
5	0.028623164	8.8.8.8	192.168.1.111	DNS	365	Standard query response 0xe826 A www.youtube.com
6	0.028633075	8.8.8.8	192.168.1.111	DNS	137	Standard query response 0x3af2 AAAA www.youtube.com
7	0.030642950	74.125.21.136	192.168.1.111	TCP	66	443 → 56732 [ACK] Seq=1 Ack=300 Win=810 Len=0
8	0.030650792	74.125.21.136	192.168.1.111	TCP	66	443 → 56732 [ACK] Seq=1 Ack=618 Win=810 Len=0
9	0.037814631	192.168.1.111	173.194.29.9	TLSv1.2	1180	Application Data
10	0.070820458	173.194.29.9	192.168.1.111	TLSv1.2	1486	Application Data
11	0.070839001	192.168.1.111	173.194.29.9	TCP	66	35752 → 443 [ACK] Seq=1115 Ack=1421 Win=989 Len=0
12	0.071155337	173.194.29.9	192.168.1.111	TCP	1486	443 → 35752 [ACK] Seq=1421 Ack=1115 Win=193 Len=0
13	0.071159271	192.168.1.111	173.194.29.9	TCP	66	35752 → 443 [ACK] Seq=1115 Ack=2841 Win=992 Len=0
14	0.071334376	173.194.29.9	192.168.1.111	TCP	1486	443 → 35752 [ACK] Seq=2841 Ack=1115 Win=193 Len=0
15	0.071337507	192.168.1.111	173.194.29.9	TCP	66	35752 → 443 [ACK] Seq=1115 Ack=4261 Win=994 Len=0
16	0.071681555	173.194.29.9	192.168.1.111	TCP	1486	443 → 35752 [ACK] Seq=4261 Ack=1115 Win=193 Len=0
17	0.071685091	192.168.1.111	173.194.29.9	TCP	66	35752 → 443 [ACK] Seq=1115 Ack=5681 Win=996 Len=0
18	0.072046357	173.194.29.9	192.168.1.111	TCP	1486	443 → 35752 [ACK] Seq=5681 Ack=1115 Win=193 Len=0

CLASSIFIED.pcapng

File Edit View Go Capture Analyze Statistics Telephony Wireless Tools Help

ip.src == 173.194.29.9 && ip.dst == 192.168.1.111

No.	Time	Source	Destination	Protocol	Length	Info
10	0.070820458	173.194.29.9	192.168.1.111	TLSv1.2	1486	Application Data
12	0.071155337	173.194.29.9	192.168.1.111	TCP	1486	443 → 35752 [ACK] Seq=1421 Ack=1115 Win=193 Len=0
14	0.071334376	173.194.29.9	192.168.1.111	TCP	1486	443 → 35752 [ACK] Seq=2841 Ack=1115 Win=193 Len=0
16	0.071681555	173.194.29.9	192.168.1.111	TCP	1486	443 → 35752 [ACK] Seq=4261 Ack=1115 Win=193 Len=0
18	0.072046357	173.194.29.9	192.168.1.111	TCP	1486	443 → 35752 [ACK] Seq=5681 Ack=1115 Win=193 Len=0
20	0.072397479	173.194.29.9	192.168.1.111	TCP	1486	443 → 35752 [ACK] Seq=7101 Ack=1115 Win=193 Len=0
22	0.072730980	173.194.29.9	192.168.1.111	TCP	1486	443 → 35752 [ACK] Seq=8521 Ack=1115 Win=193 Len=0
24	0.073024722	173.194.29.9	192.168.1.111	TCP	1486	443 → 35752 [ACK] Seq=9941 Ack=1115 Win=193 Len=0
26	0.073328319	173.194.29.9	192.168.1.111	TCP	1486	443 → 35752 [ACK] Seq=11361 Ack=1115 Win=193 Len=0
28	0.073648321	173.194.29.9	192.168.1.111	TCP	1486	443 → 35752 [ACK] Seq=12781 Ack=1115 Win=193 Len=0
30	0.073924876	173.194.29.9	192.168.1.111	TCP	1486	443 → 35752 [ACK] Seq=14201 Ack=1115 Win=193 Len=0
32	0.074345396	173.194.29.9	192.168.1.111	TCP	1486	443 → 35752 [ACK] Seq=15621 Ack=1115 Win=193 Len=0
34	0.074622600	173.194.29.9	192.168.1.111	TCP	1486	443 → 35752 [ACK] Seq=17041 Ack=1115 Win=193 Len=0
36	0.074985697	173.194.29.9	192.168.1.111	TCP	1486	443 → 35752 [ACK] Seq=18461 Ack=1115 Win=193 Len=0
38	0.075317405	173.194.29.9	192.168.1.111	TCP	1486	443 → 35752 [ACK] Seq=19881 Ack=1115 Win=193 Len=0
40	0.075575489	173.194.29.9	192.168.1.111	TCP	1486	443 → 35752 [ACK] Seq=21301 Ack=1115 Win=193 Len=0
42	0.075987993	173.194.29.9	192.168.1.111	TCP	1486	443 → 35752 [ACK] Seq=22721 Ack=1115 Win=193 Len=0
44	0.076255788	173.194.29.9	192.168.1.111	TCP	1486	443 → 35752 [ACK] Seq=24141 Ack=1115 Win=193 Len=0

Mark/Unmark Packet Ctrl+M

Ignore/Unignore Packet Ctrl+D

Set/Unset Time Reference Ctrl+T

Time Shift... Ctrl+Shift+T

Packet Comments

Edit Resolved Name

Apply as Filter

Prepare as Filter

Conversation Filter

Colorize Conversation

SCTP

Follow

Copy

Protocol Preferences

Decode As...

Show Packet in New Window

> Frame 10: 1486 bytes on wire (11888 bits) on interface enp0s3, id 0

> Ethernet II, Src: Ubiquiti_88:6b:76:88:6b:76, Dst: 02:00:00:00:00:00

> Internet Protocol Version 4, Src: 173.194.29.9, Dst: 192.168.1.111

> Transmission Control Protocol, Src Port: 443, Dst Port: 35752, Seq: 1421, Ack: 1115, Len: 1420

> Transport Layer Security, Protocol: TLSv1.2, Length: 1486, Content Type: Application Data

1226 10.899796920 192.168.1.1
1227 10.899819154 192.168.1.1
1228 10.899840866 192.168.1.1
1229 10.899854378 192.168.1.1
1230 10.899888291 192.168.1.1
1231 10.899914949 192.168.1.1
1232 10.899960151 192.168.1.1
1233 10.899963898 192.168.1.1

> Frame 1230: 1260 bytes on wire
> Ethernet II, Src: PCSyste...
> Internet Protocol Version 4, Sr...
> Transmission Control Protocol,
> Data (1194 bytes)

Packet 1230. 138 client pkts, 0 server pkts, 0 turns. Click to select.

Entire conversation (173 kb) Show data as ASCII Stream 6

Find: Find Next

gchq.github.io/CyberChef/#recipe=From_Base64('A-Za-z0-9%3D',true,false)

Download CyberChef

Last build: 3 hours ago - Version 10 is here! Read about the new features here

Operations

Search...

Favourites

To Base64

From Base64

To Hex

From Hex

To Hexdump

From Hexdump

URL Decode

Regular expression

Entropy

Fork

Magic

Data format

Encryption / Encoding

Recipe

From Base64

Alphabet A-Za-z0-9+/=

☒ Remove non-alphabet chars ☐ Strict mode

STEP **BAKE!** ☒ Auto Bake

Input

Output

Raw Bytes

128230 687

I mounted the file and ran the ls command to list all the files present in the folder. Since the contents were not visible, I ran the command with the -a option to print all the hidden files.

```
(kali@purva)-[/media/kali/E3E8-4B401]
$ ls

(kali@purva)-[/media/kali/E3E8-4B401]
$ ls -la
total 12
drwxr-xr-x  3 kali kali 4096 Dec 31  1969 .
drwxr-xr-x+ 4 root root 4096 Feb 21 21:25 ..
drwxr-xr-x  4 kali kali 4096 Feb  4 2018 .Trash-1000
```

I entered the Trash-1000 folder. Here, I was able to find two directories named files and info:

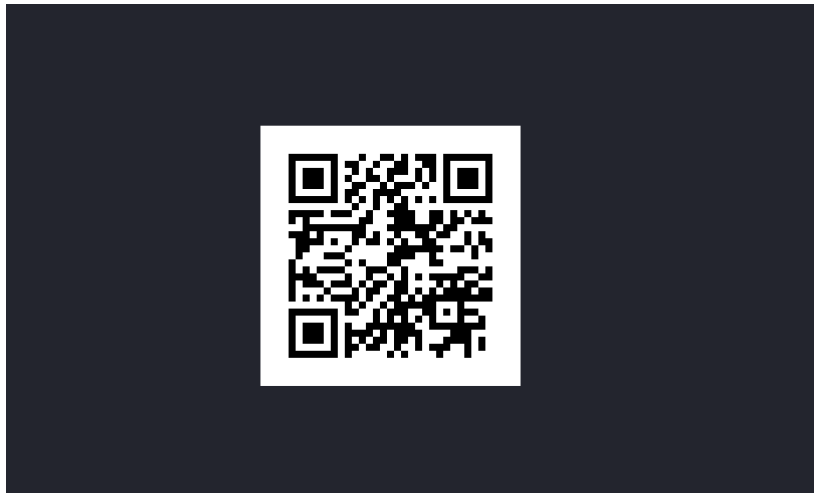
```
(kali@purva)-[/media/kali/E3E8-4B401/.Trash-1000]
$ ls
files  info
```

Within the files folder, I found a document file name flag, hinting that this file relates to the flag:

```
(kali@purva)-[/media/kali/E3E8-4B401/.Trash-1000]
$ cd files

(kali@purva)-[/media/kali/E3E8-4B401/.Trash-1000/files]
$ ls
Flag.docx
```

I opened the file in cyberchef and had to unzip it to reveal the contents. Within, I found a QR image. I got a piece of text when I scanned this code.



I was able to extract the flag by converting from base 64:

Recipe		Input
From Base64		ZmxhZ3s5ZWJkNDcxODM0N2UzODlhYWVhYTYyNDUyMjRhZmI0NX0=
Alphabet A-Za-z0-9+/=		
<input checked="" type="checkbox"/> Remove non-alphabet chars		
<input type="checkbox"/> Strict mode		
		line 52 1
		Output
		{flag{9ebd4718347e389aaa2a3241624afb15}}