

Penetration Testing Logbook

Student:

Alessandro BUONERBA

Module Leader:

Dr Anatolij BEZEMSKIJ

Computer Science (Cybersecurity)
Penetration Testing and Ethical Vulnerability Scanning
COMP-1671

Department of Computing & Mathematical Sciences
Liberal Arts & Sciences



University of Greenwich
London, United Kingdom

December 2021

CONTENTS

List of Figures	iii
1 LAB 1: PASSIVE ENUMERATION	1
1.1 Connect to FTP	1
1.2 Find unique IPv4 addresses	2
1.3 Application-layer Protocols	2
1.4 Name of the protocols	3
1.5 Network Diagram	3
1.6 Discussion	4
1.7 TCP Dump	4
1.8 Reflection	4
BIBLIOGRAPHY	5

LIST OF FIGURES

Figure 1.1	Connect to the FTP and get the .pcap file	1
Figure 1.2	Open .pcap with Wireshark	1
Figure 1.3	Unique IPv4 addresses	2
Figure 1.4	Protocol Hierarchy	2
Figure 1.5	Network Diagram	3
Figure 1.6	TCP Dump	4

LAB 1: PASSIVE ENUMERATION

Contrarily from active enumeration, passive enumeration is a technique that does not rely on explicit communication with a target system (Cooper, 2020). To perform a passive enumeration, a network monitor tool such as Wireshark is often used.

1.1 CONNECT TO FTP

The first part of the task is to connect to the FTP server and download the .pcap file with all the captured network traffic.

```
(kali@kali)-[~]
$ ftp 192.168.69.164 21
Connected to 192.168.69.164.
220 (vsFTPD 2.3.4)
Name (192.168.69.164:kali): anonymous
331 Please specify the password.
Password:
230 Login successful.
Remote system type is UNIX.
Using binary mode to transfer files.
ftp> ls
200 PORT command successful. Consider using PASV.
150 Here comes the directory listing.
drwxr-xr-x  4 107      65534      4096 Mar 03  2020 buffers
drwxr-xr-x  2 107      65534      4096 Mar 12  2020 passive
drwxr-xr-x  2 107      65534      4096 Sep 15 03:18 reverse
drwxr-xr-x  2 107      65534      4096 Oct 27  2020 webapp
226 Directory send OK.
ftp> cd passive
250 Directory successfully changed.
ftp> ls
200 PORT command successful. Consider using PASV.
150 Here comes the directory listing.
-rw-r--r--  1 107      65534      45 Mar 12  2020 execution.txt
-rw-r--r--  1 107      65534    221341 Jan 20  2020 initialization_pcap.pcap
226 Directory send OK.
ftp> get initialization_pcap.pcap
local: initialization_pcap.pcap remote: initialization_pcap.pcap
200 PORT command successful. Consider using PASV.
150 Opening BINARY mode data connection for initialization_pcap.pcap (221341 bytes).
226 Transfer complete.
221341 bytes received in 0.02 secs (11.4348 MB/s)
ftp>
```

Figure 1.1: Connect to the FTP and get the .pcap file

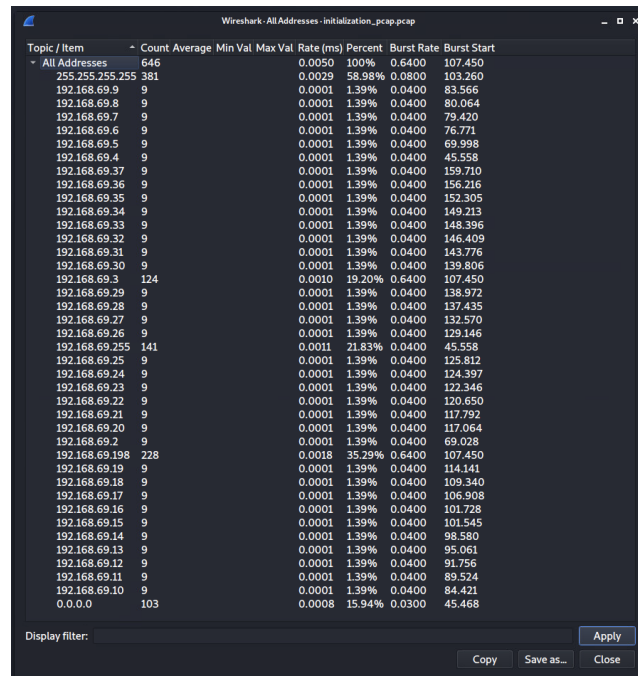
Now that the file has been downloaded, it can be found in the home directory and we can start the analysis of the network traffic through Wireshark following the tasks assigned to this lab.

```
(kali@kali)-[~]
$ ls
Desktop  Documents  Downloads  initialization_pcap.pcap  Music  Pictures  Public  Templates  Videos
(kali@kali)-[~]
$ wireshark initialization_pcap.pcap
```

Figure 1.2: Open .pcap with Wireshark

1.2 FIND UNIQUE IPV4 ADDRESSES

The first task asks to find the unique IPs that are stored and captured. We can achieve that through the top menu, selecting statistics and IPv4 addresses. The result is shown in the figure below.

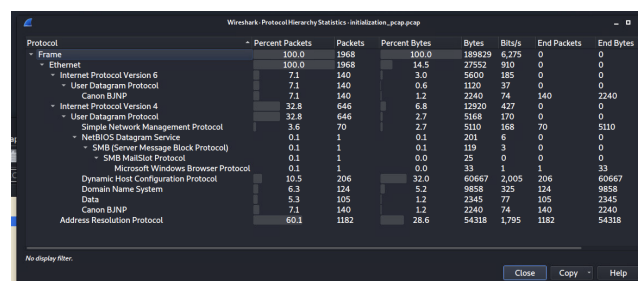


Topic / Item	Count	Average	Min Val	Max Val	Rate (ms)	Percent	Burst Rate	Burst Start
All Addresses	646				0.0050	100%	0.6400	107.450
255.255.255.255	381				0.0029	58.98%	0.0800	103.260
192.168.69.9	9				0.0001	1.39%	0.0400	83.566
192.168.69.8	9				0.0001	1.39%	0.0400	80.064
192.168.69.7	9				0.0001	1.39%	0.0400	79.420
192.168.69.6	9				0.0001	1.39%	0.0400	76.771
192.168.69.5	9				0.0001	1.39%	0.0400	69.998
192.168.69.4	9				0.0001	1.39%	0.0400	45.558
192.168.69.37	9				0.0001	1.39%	0.0400	159.710
192.168.69.36	9				0.0001	1.39%	0.0400	156.216
192.168.69.35	9				0.0001	1.39%	0.0400	152.305
192.168.69.34	9				0.0001	1.39%	0.0400	149.213
192.168.69.33	9				0.0001	1.39%	0.0400	148.396
192.168.69.32	9				0.0001	1.39%	0.0400	146.409
192.168.69.31	9				0.0001	1.39%	0.0400	143.776
192.168.69.30	9				0.0001	1.39%	0.0400	139.806
192.168.69.3	124				0.0010	19.20%	0.6400	107.450
192.168.69.29	9				0.0001	1.39%	0.0400	138.972
192.168.69.28	9				0.0001	1.39%	0.0400	137.435
192.168.69.27	9				0.0001	1.39%	0.0400	132.570
192.168.69.26	9				0.0001	1.39%	0.0400	129.146
192.168.69.255	141				0.0011	21.83%	0.0400	45.558
192.168.69.25	9				0.0001	1.39%	0.0400	125.812
192.168.69.24	9				0.0001	1.39%	0.0400	124.397
192.168.69.23	9				0.0001	1.39%	0.0400	122.346
192.168.69.22	9				0.0001	1.39%	0.0400	120.650
192.168.69.21	9				0.0001	1.39%	0.0400	117.792
192.168.69.20	9				0.0001	1.39%	0.0400	117.064
192.168.69.2	9				0.0001	1.39%	0.0400	69.028
192.168.69.198	228				0.0018	35.29%	0.6400	107.450
192.168.69.19	9				0.0001	1.39%	0.0400	114.141
192.168.69.18	9				0.0001	1.39%	0.0400	109.340
192.168.69.17	9				0.0001	1.39%	0.0400	106.908
192.168.69.16	9				0.0001	1.39%	0.0400	101.728
192.168.69.15	9				0.0001	1.39%	0.0400	101.545
192.168.69.14	9				0.0001	1.39%	0.0400	98.580
192.168.69.13	9				0.0001	1.39%	0.0400	95.061
192.168.69.12	9				0.0001	1.39%	0.0400	91.756
192.168.69.11	9				0.0001	1.39%	0.0400	89.524
192.168.69.10	9				0.0001	1.39%	0.0400	84.421
0.0.0.0	103				0.0008	15.94%	0.0300	45.468

Figure 1.3: Unique IPv4 addresses

1.3 APPLICATION-LAYER PROTOCOLS

The second task asks to find the application-layer protocols that are used in the captured network traffic. This can be displayed using the Protocol Hierarchy command. The result is shown in the figure below.



Protocol	Percent Packets	Packets	Percent Bytes	Bytes	Bits/s	End Packets	End Bytes
Frame	100.0	1968	100.0	189829	6,275	0	0
Ethernet	100.0	1968	14.5	27552	910	0	0
Internet Protocol Version 6	7.1	140	3.0	5600	185	0	0
User Datagram Protocol	7.1	140	0.6	1120	37	0	0
Canon B/NP	7.1	140	1.2	2240	74	140	2240
Internet Protocol Version 4	32.8	646	6.8	12920	427	0	0
User Datagram Protocol	32.8	646	2.7	5168	170	0	0
Simple Network Management Protocol	3.6	70	2.7	5110	168	70	5110
NetBIOS Datagram Service	0.1	1	0.1	201	6	0	0
SMB (Server Message Block Protocol)	0.1	1	0.1	119	3	0	0
SMB MailSlot Protocol	0.1	1	0.0	25	0	0	0
Microsoft Windows Browser Protocol	0.1	1	0.0	33	1	1	33
Dynamic Host Configuration Protocol	10.5	206	32.0	60667	2,005	206	60667
Domain Name System	6.3	124	5.2	9658	325	124	9658
Data	5.3	105	1.2	2345	77	105	2345
Canon B/NP	7.1	140	1.2	2240	74	140	2240
Address Resolution Protocol	60.1	1182	28.6	54318	1,795	1182	54318

Figure 1.4: Protocol Hierarchy

1.4 NAME OF THE PROTOCOLS

The application-layer protocols are the following.

- SNMP (Single Network Management Protocol): responsible for the management of network devices, allows the communication between them independently of their spec (Scarpatti, 2020).
- DNS (Domain Name System): responsible for the resolution of domain names to IP addresses (Insam, 2020).
- DHCP (Dynamic Host Configuration Protocol): responsible for the dynamic configuration of network devices. This protocol is used to automatically assign IPs to network devices (IBM, 2021).
- SMB (Server Message Block): responsible for the communication between shared devices such as printers on a network (Sheldon and Scarpatti, 2020).

1.5 NETWORK DIAGRAM

This task will allow us to have a visual representation of the analysis of the network. Below the diagram with the active protocols and devices.

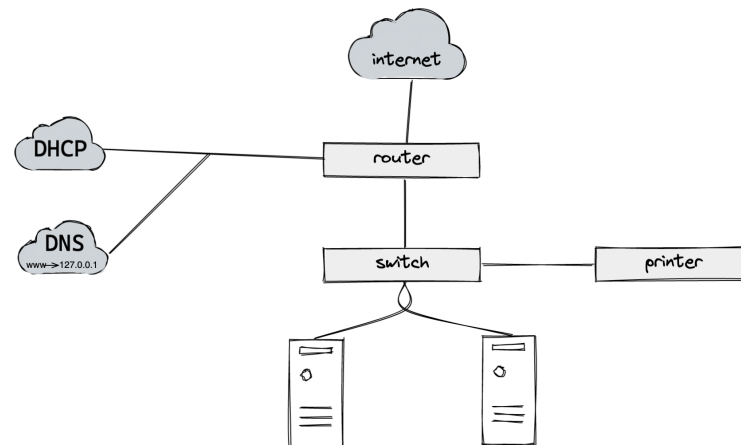


Figure 1.5: Network Diagram

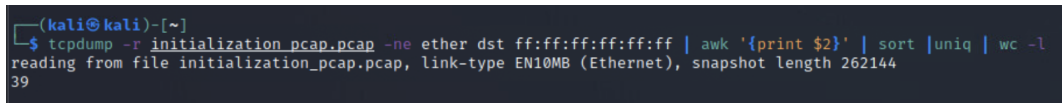
Following the explanation of the protocols, further analysis portrays the use of internet protocol. The protocols in use are UDP, SNMP, DHCP and DNS, meaning computers and shared devices on the network. We can also certify using a BJNP protocol, meaning that the shared device on the network is a Canon printer.

1.6 DISCUSSION

The network traffic analysis suggests that a user uses the shared device since there is a BJNP protocol. There are also ACKs and NAKs portraying active communication between the devices of the network. Some of the UDP packets were broadcasting an std discovery all to find all the services on the network.

1.7 TCP DUMP

Following the instructions and the man page for the tcpdump command, I have been able to reproduce a one liner to output a number of unique MAC addresses in the provided and previously used .pcap file. Below a picture with the result.



```
(kali@kali)-[~]
$ tcpdump -r initialization_pcap.pcap -ne ether dst ff:ff:ff:ff:ff:ff | awk '{print $2}' | sort | uniq | wc -l
reading from file initialization_pcap.pcap, link-type EN10MB (Ethernet), snapshot length 262144
39
```

Figure 1.6: TCP Dump

The flag `-r` is used to read the file and the flag `-ne` before `ether dst` looks for ethernet destinations with the MAC address format specified right after it. The command `awk` is used to separate them while printing the second argument to get the second column. It will then sort and check for unique entries for then count everything with the last `wc -l` command

1.8 REFLECTION

This has been a very fun lab. I have learned a lot more about Wireshark and how to analyse a .pcap file. Even though I have never used tcpdump, there were many examples and exhaustive official documentation.

BIBLIOGRAPHY

- Cooper, Zach (2020). *What's the Difference between Active and Passive Reconnaissance?* URL: <https://www.itpro.co.uk/penetration-testing/34465/whats-the-difference-between-active-and-passive-reconnaissance> (visited on 10/07/2021).
- IBM (2021). *IBM Docs*. URL: <https://prod.ibmdocs-production-dal-6099123ce774e592a519d7c33db8265e-0000.us-south.containers.appdomain.cloud/docs/en/aix/7.1?topic=tcpp-tcpip-address-parameter-assignment-dynamic-host-configuration-protocol> (visited on 10/07/2021).
- Insam, Edward (2020). *Application Layer Protocol - an Overview*. URL: <https://www.sciencedirect.com/topics/computer-science/application-layer-protocol> (visited on 10/07/2021).
- Scarpati, Jessica (2020). *What Is Simple Network Management Protocol (SNMP)? Definition from Search-Networking*. URL: <https://www.techtarget.com/searchnetworking/definition/SNMP> (visited on 10/07/2021).
- Sheldon, Robert and Jessica Scarpati (2020). *What Is the Server Message Block (SMB) Protocol? How Does It Work?* URL: <https://www.techtarget.com/searchnetworking/definition/Server-Mess age-Block-Protocol> (visited on 10/07/2021).