

# My Network Project

INTRO TO CYCBER

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## Scope

- Understanding the Basic Networking and Networking protocols
  - Ability to map network devices within an internal network
  - Comfortability to use Command prompt and other methods to discover internal networks
  - Comfortability to use 3rd party tool (Wireshark) to analysis network traffic within the internal and external domains.
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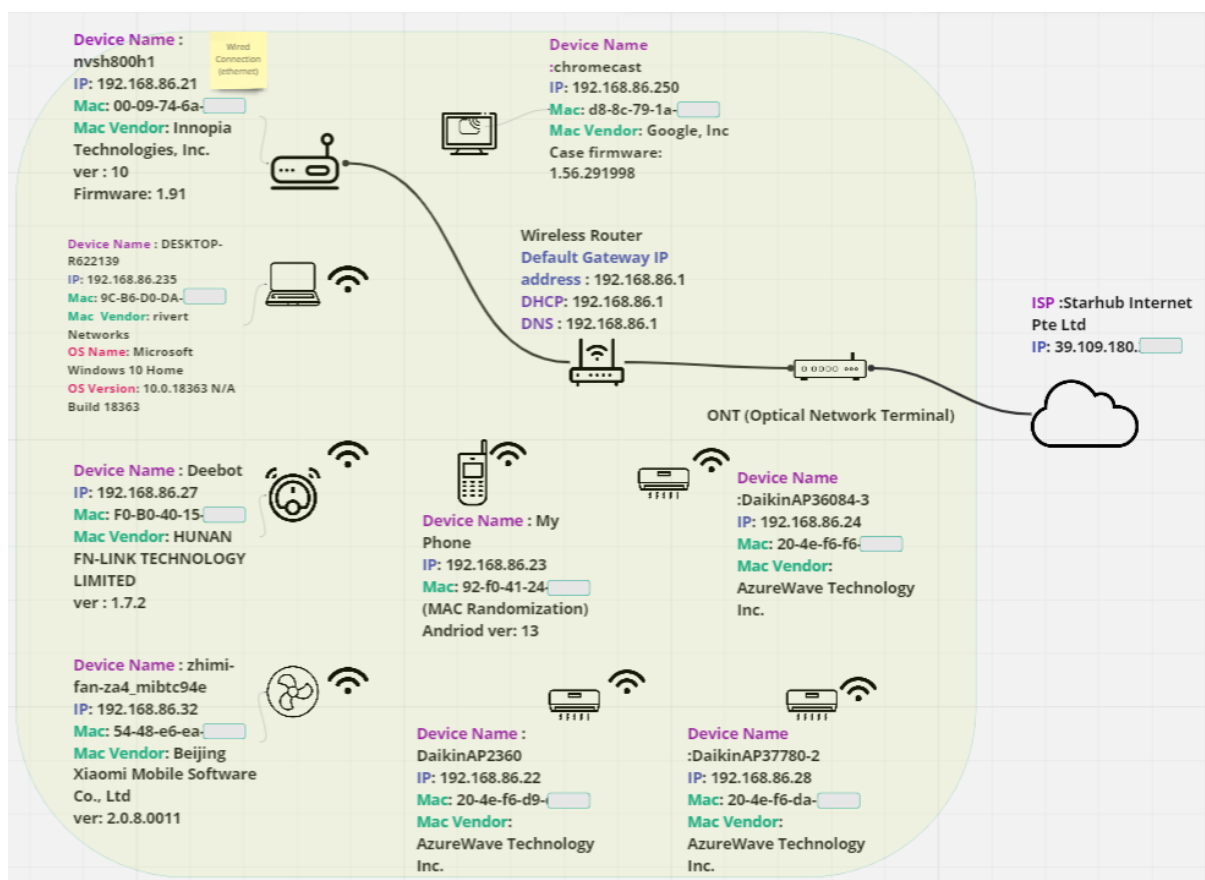
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Scenario 1 -

# Home Network Map

Network diagram below depicts a setup of a home network, where internet service is provided by a ISP through an ONT. A router is used to manage the local area network (LAN) and simultaneously acting as a Default gateway to other networks outside the LAN. 8 out the 9 nodes shares data wirelessly and one node directly connected via ethernet to the router.



Credit : digram drawn in miro, icons obtained from Google Images

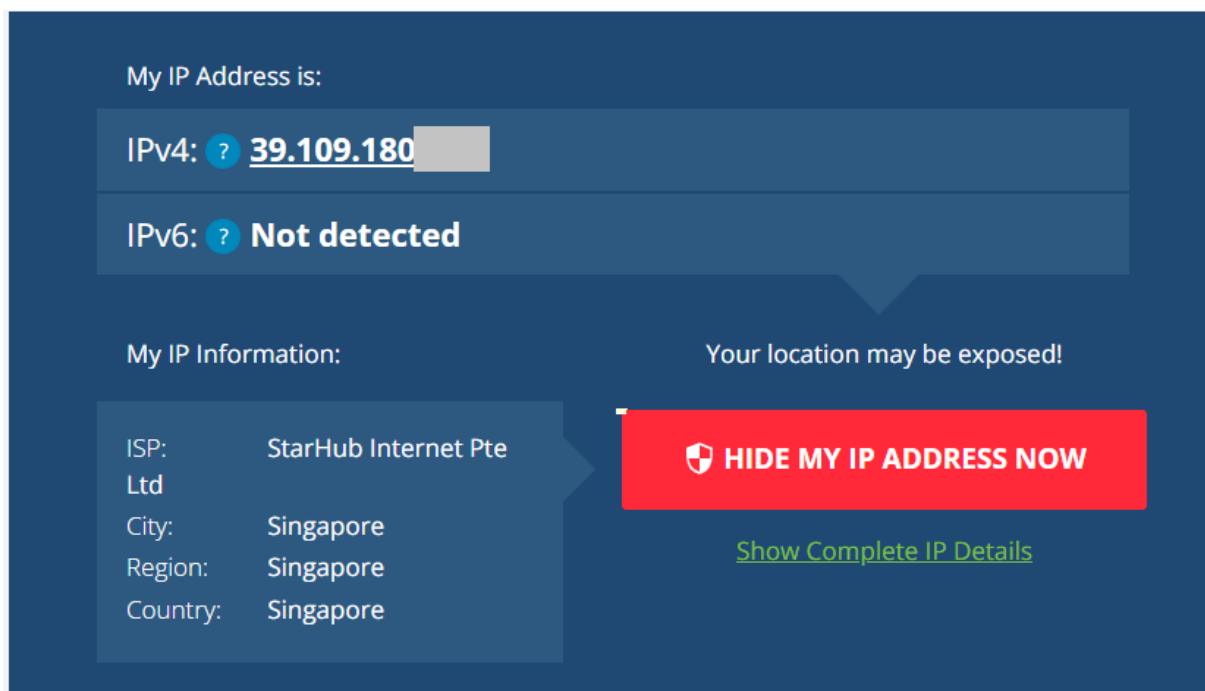


MAC address last two bytes has been covered for privacy purpose as the Vendor details has been exposed.

# Commands and Websites

## Internet Service Provider (ISP)

External IP address which is the Internet Protocol address provided by the ISP. The following site was used to retrieve the IPv4 address and the service provider.



Link - <https://whatismyipaddress.com/>

## Default Gateway

The default gateway is a physical hardware in this case the Home's Wi-Fi router which separates the home network from the Internet (other networks). The command "**ipconfig**" is used to determine the IP address of the Default gateway.

```
Wireless LAN adapter Wi-Fi:

Connection-specific DNS Suffix . : lan
Link-local IPv6 Address . . . . . : fe80::90ae:d2c3:78f1:86cb%21
IPv4 Address. . . . . : 192.168.86.235
Subnet Mask . . . . . : 255.255.255.0
Default Gateway . . . . . : 192.168.86.1
```

Credit - <https://nordvpn.com/blog/what-is-a-default-gateway/#:~:text=Default gateway definition,is the Wi-Fi router.>

## DHCP and DNS

The DHCP (Dynamic Host Configuration Protocol) is a protocol that automatically provides a device /host with an unique IP address to identify itself within a network. The DNS (Domain Name System) assist to translate internet Domain names (understandable to end user) into IP address. Command “**ipconfig /all**” is is use to determine both DHCP and DNS

```
Lease Expires . . . . . : Saturday, August 19, 2023 2:51:49 PM
Default Gateway . . . . . : 192.168.86.1
DHCP Server . . . . . : 192.168.86.1
DHCPv6 IAID . . . . . : 144488144
DHCPv6 Client DUID. . . . . : 00-01-00-01-20-4B-FB-F1-D4-81-D7-88-7D-BE
DNS Servers . . . . . : 192.168.86.1
NetBIOS over Tcpip. . . . . : Enabled
```

Credit :<https://learn.microsoft.com/en-us/windows-server/networking/technologies/dhcp/dhcp-top>

<https://aws.amazon.com/route53/what-is-dns/>

## Primary Device - Notebook

### Host and Network Details

The following device was primarily used to discover the Home network. Details of the device can be retrieved using the command “**systeminfo**”. Details such a computer name, operating system and hardware properties are listed for analysis.

Name	Values	Description
Host Name:	DESKTOP-R622139	Name of the host terminal where the command is executed from
OS Name	Microsoft Windows 10 Home	Operating System installed in host
OS Version	10.0.18363 N/A Build 18363	Version of OS in host

Name	Values	Description
Network Card(s):	Killer Wireless-n/a/ac 1535 Wireless Network Adapter	It provides information about the network card.
	Connection Name: Wi-Fi	Wireless Network adapter
	DHCP Enabled: Yes	Detection of enablement of DHCP
	DHCP Server: 192.168.86.1	DHCP IP
	IP address(es) [01]:192.168.86.235 [02]:fe80::90ae:d2c3:78f1:86cb	IP address assigned to the Host by DHCP

```

Host Name:          DESKTOP-R622139
OS Name:            Microsoft Windows 10 Home
OS Version:         10.0.18363 N/A Build 18363
OS Manufacturer:   Microsoft Corporation
OS Configuration:  Standalone Workstation
OS Build Type:       Multiprocessor Free
Registered Owner:   N/A

```

```

[23]: KB5003169
Network Card(s):    5 NIC(s) Installed.
[01]: Killer E2500 Gigabit Ethernet Controller
                   Connection Name: Ethernet
                   Status:          Media disconnected
[02]: Killer Wireless-n/a/ac 1535 Wireless Network Adapter
                   Connection Name: Wi-Fi
                   DHCP Enabled:    Yes
                   DHCP Server:     192.168.86.1
                   IP address(es)
                   [01]: 192.168.86.235
                   [02]: fe80::90ae:d2c3:78f1:86cb
[03]: Bluetooth Device (Personal Area Network)
                   Connection Name: Bluetooth Network Connection 2
                   Status:          Media disconnected

```

## Host MAC Details

Command “**ipconfig /all**” provides the MAC address of the network adapter or a more comprehensive search with the command “**getmac /v /fo list**” to view all MAC addresses within the host system if one is not familiar with the Transport name with “**getmac**” command.

```

Wireless LAN adapter Wi-Fi:

Connection-specific DNS Suffix  . : lan
Description . . . . . : Killer Wireless-n/a/ac 1535 Wireless Network Adapter
Physical Address. . . . . : 9C-B6-D0-DA-
DHCP Enabled. . . . . : Yes
Autoconfiguration Enabled . . . . : Yes
Link-local IPv6 Address . . . . . : fe80::90ae:d2c3:78f1:86cb%21(Preferred)
IPv4 Address. . . . . : 192.168.86.235(Preferred)
Subnet Mask . . . . . : 255.255.255.0
Lease Obtained. . . . . : Wednesday, August 16, 2023 12:29:24 AM
Lease Expires . . . . . : Friday, August 18, 2023 4:02:13 PM
Default Gateway . . . . . : 192.168.86.1
DHCP Server . . . . . : 192.168.86.1
DHCPv6 IAID . . . . . : 144488144
DHCPv6 Client DUID. . . . . : 00-01-00-01-20-4B-FB-F1-D4-81-D7-88-7D-BE
DNS Servers . . . . . : 192.168.86.1
NetBIOS over Tcpi. . . . . : Enabled

```

```

Connection Name: Ethernet
Network Adapter: Killer E2500 Gigabit Ethernet Controller
Physical Address: D4-81-D7-88-
Transport Name: Media disconnected

Connection Name: Wi-Fi
Network Adapter: Killer Wireless-n/a/ac 1535 Wireless Network Adapter
Physical Address: 9C-B6-D0-DA-
Transport Name: \Device\Tcpip_{D6DACDD0-FBBF-4682-9D74-6DDCB73A86C1}

Connection Name: Bluetooth Network Connection 2
Network Adapter: Bluetooth Device (Personal Area Network) #2
Physical Address: 9C-B6-D0-DA-
Transport Name: Media disconnected

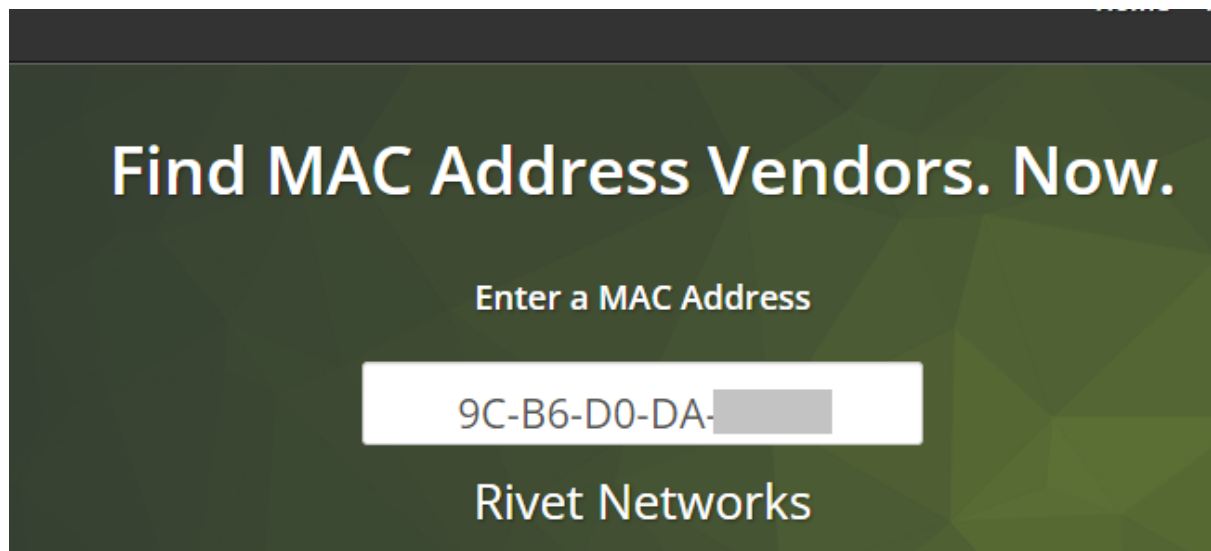
```

Credit : <https://learn.microsoft.com/en-us/windows-server/administration/windows-commands/systeminfo>

<https://networking.grok.lsu.edu/article.aspx?articleid=15960>

## Host Network Adaptor Vendor

The vendor of the network card for above mentioned the MAC address can be determined via an online platform.



Credit : <https://macvendors.com/>

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## Devices within local network

ARP - Address Resolution Protocol is a networking protocol that is used to map a network address, such as an IP address, to a physical (MAC) address. ARP table is a cache that stores the mapping of IP addresses to their corresponding MAC addresses in the target system. Command "**arp -a**" displays IP address, MAC address and Type (Dynamic and Static)

The following list is available from the arp command.

```
Interface: 192.168.86.235 --- 0x15
Internet Address      Physical Address      Type
192.168.86.1          1c-f2-9a-c6-          dynamic
192.168.86.21          00-09-74-6a-          dynamic
192.168.86.32          54-48-e6-ea-          dynamic
192.168.86.250         d8-8c-79-1a-          dynamic
192.168.86.255         ff-ff-ff-ff-          static
224.0.0.22            01-00-5e-00-          static
224.0.0.251           01-00-5e-00-          static
224.0.0.252           01-00-5e-00-          static
239.255.255.250       01-00-5e-7f-          static
255.255.255.255       ff-ff-ff-ff-          static

C:\WINDOWS\system32>
```

IP address	MAC	Note
192.168.86.1	1c-f2-9a-c6	Wireless router
192.168.86.21	00-09-74-6a	nvsh800h1
192.168.86.32	54-48-e6-ea	zhimi-fan-za4_mibtc94e
192.168.86.250	d8-8c-79-1a	chromecast

*Note: IP addresses that are not retrieved via the arp command was manually crossed referenced from the vendor router's management page. OS version names are taken from respective application manually.*

*Credit : <https://macvendors.com/> (MAC Vendor of individual devices are listed the network diagram)*

The “**nslookup <IP address>**” command is used to query Domain Name System (DNS) servers and retrieve information about a specific domain or IP address. This reverse DNS lookup command is used to discover the description of the device link to the IP address.

```
C:\WINDOWS\system32>nslookup 192.168.86.21
Server:  UnKnown
Address:  192.168.86.1

Name:     nvsh800h1.lan
Address:  192.168.86.21
```

```
C:\WINDOWS\system32>nslookup 192.168.86.32
Server:  UnKnown
Address:  192.168.86.1

Name:     zhimi-fan-za4_mibtc94e.lan
Address:  192.168.86.32
```



```
C:\WINDOWS\system32>nslookup 192.168.86.250
Server:    UnKnown
Address:    192.168.86.1

Name:      chromecast.lan
Address:    192.168.86.250
```

## Other Device within local network (routing table)

The following list is generated via the vendor's router management app "Google Home" .

IP address	MAC	Note
192.168.86.27	<b>F0-B0-40-15</b>	Deebot
192.168.86.23	<b>92-f0-41-24</b>	My Phone (MAC Randomization)
192.168.86.22	<b>20-4e-f6-d9</b>	AP2360
192.168.86.28	<b>20-4e-f6-da</b>	AP37780-2
192.168.86.24	<b>20-4e-f6-f6</b>	AP36084-3
192.168.86.21	<b>00-09-74-6a</b>	nvsh800h1
192.168.86.32	<b>54-48-e6-ea</b>	zhimi-fan-za4_mibtc94e

Credit : <https://macvendors.com/> (MAC Vendor of individual devices are listed the network diagram)

MAC address

20:4e:f6:f6: 

IP address

192.168.86.24

[Pin](#)

Device speed



89.7 Mbps

Internet speed – last tested 18 Aug

### MAC address

20:4e:f6:da: [REDACTED]

### IP address

192.168.86.28

[Pin](#)

### Device speed



**89.7 Mbps**

Internet speed – last tested 18 Aug

### MAC address

20:4e:f6:d9: [REDACTED]

### IP address

192.168.86.22

[Pin](#)

### Device speed



**89.7 Mbps**

Internet speed – last tested 18 Aug

### MAC address type

[Randomised MAC](#)

### MAC address

92:f0:41:24: [REDACTED]

### IP address

192.168.86.23  
fe80::90f0:41ff:fe24:1430

MAC address

54:48:e6:ea: [redacted]

IP address

192.168.86.32

[Pin](#)

Device speed



89.7 Mbps

Internet speed – last tested 18 Aug

MAC address

f0:b0:40:15: [redacted]

IP address

192.168.86.27

[Pin](#)

Device speed



89.7 Mbps

Internet speed – last tested 18 Aug

MAC address

00:09:74:6a: [redacted]

IP address

192.168.86.21

[Pin](#)

Device speed



89.7 Mbps

Internet speed – last tested 18 Aug

## MAC Randomization

Android devices using Android 10 OS (Android Q) have a new feature to randomizes the MAC address for different Wi-Fi connections. This help to prevent listeners from using MAC addresses to build a history of device or user activity, increasing user privacy and security. This feature is usually enabled by default but can be deactivated for specific Wi-Fi networks.

Credit : <https://techzone.vmware.com/blog/how-control-mac-randomization-samsung-devices>

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## Wireshark

This tool helps to capture network packages and allows an individual to analyse the network traffics, and inspect burst within the traffic and contents of network transactions.

### Scenario 1 -

Inspect a PCAP file to determine network traffic to [www.koobits.com](http://www.koobits.com) and the individual that has been accessing the site.

Step 1 - to determine the IP address of the Domain name "[www.koobits.com](http://www.koobits.com)", command "**ping**" can be used to determine the address. The address would be "172.67.42.104".

If the Domain has multiple addresses allocated, "**nslookup**" command can be used to retrieve the IP addresses

This can information can be reaffirmed via an online tool by searching for Reverse IP lookup (nslookup)

```
C:\WINDOWS\system32>ping www.koobits.com

Pinging www.koobits.com [172.67.42.104] with 32 bytes of data:
Reply from 172.67.42.104: bytes=32 time=11ms TTL=56
Reply from 172.67.42.104: bytes=32 time=12ms TTL=56
Reply from 172.67.42.104: bytes=32 time=13ms TTL=56
Reply from 172.67.42.104: bytes=32 time=11ms TTL=58

Ping statistics for 172.67.42.104:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 11ms, Maximum = 13ms, Average = 11ms
```

```

C:\WINDOWS\system32>nslookup www.koobits.com
Server: UnKnown
Address: 192.168.86.1

Non-authoritative answer:
Name: www.koobits.com
Addresses: 2606:4700:10::6816:4596
           2606:4700:10::ac43:2a68
           2606:4700:10::6816:4496
           172.67.42.104
           104.22.69.150
           104.22.68.150

```

### [ViewDNS.info](#) > [Tools](#) > **Reverse IP Lookup**

Takes a domain or IP address and does a reverse lookup to quickly shows all other domains host sites or identifying other sites on the same shared hosting server.

Domain / IP:

Reverse IP results for koobits.com (104.22.68.150, 104.22.69.150, 172.67.42.104)  
=====

Domain	Last Resolved Date
koobits.com	2023-08-18

Credit : <https://viewdns.info/>

Step 2 - The above mention step can also be determined through the Wireshark tool, where filter set as “**dns**” and further drill down with a domain name search within a packet.

The tool gives opportunity to determine the DNS server and the target terminal where quires are being triggered form/to the DNS.

No.	Time	Source	Destination	Protocol	Length	Info
215	7.135229	192.168.86.235	192.168.86.1	DNS	85	Standard query 0xb704 A lh3.googleusercontent.com
216	7.135607	192.168.86.235	192.168.86.1	DNS	85	Standard query 0x3fc4 HTTPS lh3.googleusercontent.com
219	7.152995	192.168.86.1	192.168.86.235	DNS	130	Standard query response 0xb704 A lh3.googleusercontent.com CNAME googlehosted.l.googleusercontent.com A 172.253.119.104
220	7.152995	192.168.86.1	192.168.86.235	DNS	171	Standard query response 0x3fc4 HTTPS lh3.googleusercontent.com CNAME googlehosted.l.googleusercontent.com SOA ns1.google.com
276	8.998746	192.168.86.235	192.168.86.1	DNS	75	Standard query 0x4d89 A www.koobits.com
277	8.999047	192.168.86.235	192.168.86.1	DNS	75	Standard query 0x4aea HTTPS www.koobits.com
278	9.000183	192.168.86.235	192.168.86.1	DNS	80	Standard query 0xd69a A cdnjs.cloudflare.com
279	9.000347	192.168.86.235	192.168.86.1	DNS	80	Standard query 0xc000 HTTPS cdnjs.cloudflare.com
286	9.004946	192.168.86.235	192.168.86.1	DNS	83	Standard query 0x5613 A safebrowsing.google.com
287	9.005178	192.168.86.235	192.168.86.1	DNS	83	Standard query 0xe145 HTTPS safebrowsing.google.com
288	9.008070	192.168.86.235	192.168.86.1	DNS	79	Standard query 0x7911 A ajax.googleapis.com
291	9.008341	192.168.86.235	192.168.86.1	DNS	79	Standard query 0xad78 HTTPS ajax.googleapis.com
295	9.033138	192.168.86.1	192.168.86.235	DNS	123	Standard query response 0x4d89 A www.koobits.com A 104.22.69.150 A 104.22.68.150 A 172.67.42.104
296	9.033138	192.168.86.1	192.168.86.235	DNS	213	Standard query response 0x4aea HTTPS www.koobits.com HTTPS A 104.22.69.150 A 104.22.68.150 A 172.67.42.104
297	9.033138	192.168.86.1	192.168.86.235	DNS	166	Standard query response 0x5613 A safebrowsing.google.com CNAME sb.l.google.com A 74.125.200.136 A 74.125.200.191
298	9.033436	192.168.86.1	192.168.86.235	DNS	152	Standard query response 0xe145 HTTPS safebrowsing.google.com CNAME sb.l.google.com SOA ns1.google.com
299	9.033436	192.168.86.1	192.168.86.235	DNS	241	Standard query response 0xc000 HTTPS cdnjs.cloudflare.com HTTPS A 104.17.25.14 A 104.17.24.14 AAAA 2606:4700:c60:6800::68
300	9.033436	192.168.86.1	192.168.86.235	DNS	95	Standard query response 0x7911 A ajax.googleapis.com A 74.125.24.95

Step 3 - Selecting targeted IP address as the source and further inspection of the packet in the ethernet header provides details for target system's MAC address and manufacture (disregarding MAC address spoofing in this scenario).

No.	Time	Source	Destination	Protocol	Length	Info
276	8.998746	192.168.86.235	192.168.86.1	DNS	75	Standard query 0x4d89 A www.koobits.com

> Frame 276: 75 bytes on wire (600 bits), 75 bytes captured (600 bits) on interface \Device\NPF_{D6D...}	0000	1c f2 9a c6 a2 80
▼ Ethernet II, Src: RivetNet_da:5c:45 (9c:b6:d0:da:5c:45), Dst: Google_c6:a2:80 (1c:f2:9a:c6:a2:80)	0010	00 3d 40 39 00 06
> Destination: Google_c6:a2:80 (1c:f2:9a:c6:a2:80)	0020	56 01 f4 f0 00 35
▼ Source: RivetNet_da:5c:45 (9c:b6:d0:da:5c:45)	0030	00 00 00 00 00 06
Address: RivetNet_da:5c:45 (9c:b6:d0:da:5c:45)	0040	74 73 03 63 6f 6c
.... .. = LG bit: Globally unique address (factory default)		
.... .. = IG bit: Individual address (unicast)		
Type: IPv4 (0x0800)		

## Scenario 2 -

Inspect a PCAPNG file to determine network traffic to an unsecure site and the individual that has been accessing it.

Step 1- Set filter to “http” to search for an unsecure protocol. Result shows source IP address with the MAC address information of the targeted system accessing an unsecure site. Further to this, a POST msg was sent to targeted to domain.

Step 2 - Analyzing the HTTP Content, the packet shares information on the Host name referring too <http://testphp.vulnweb.com/> and URI used to POST a msg to the host. From the HTML Form URL the tool also shares the Username and Password of the user trying to sign for a service on an unsecure site.

No.	Time	Source	Destination	Protocol	Length	Info
234	5.654386	192.168.86.235	44.228.249.3	HTTP	524	GET /login.php HTTP/1.1
242	5.875422	44.228.249.3	192.168.86.235	HTTP	1342	HTTP/1.1 200 OK (text/html)
2481	70.296438	192.168.86.235	44.228.249.3	HTTP	746	POST /userinfo.php HTTP/1.1 (application/x-www-form-urlencoded)
2555	70.516031	44.228.249.3	192.168.86.235	HTTP	471	HTTP/1.1 200 OK (text/html)

- Transmission Control Protocol, Seq: 1023, Win: 0, Len: 0
- ▼ Hypertext Transfer Protocol
    - > POST /userinfo.php HTTP/1.1\r\nHost: testphp.vulnweb.com\r\nConnection: keep-alive\r\n
    - > Content-Length: 40\r\nCache-Control: max-age=0\r\nUpgrade-Insecure-Requests: 1\r\nOrigin: http://testphp.vulnweb.com\r\nContent-Type: application/x-www-form-urlencoded\r\nUser-Agent: Mozilla/5.0 (Windows NT 10.0; Win64; x64) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/104.0.0.0 Safari/537.36\r\nAccept: text/html,application/xhtml+xml,application/xml;q=0.9,image/avif,image/webp,image/apng,\*/\*;q=0.8\r\nReferer: http://testphp.vulnweb.com/login.php\r\nAccept-Encoding: gzip, deflate\r\nAccept-Language: en-US,en;q=0.9,ta;q=0.8,ar;q=0.7,ms;q=0.6\r\n\r\n
    - [\[Full request URI: http://testphp.vulnweb.com/userinfo.php\]](#)
    - [\[HTTP request 2/2\]](#)
    - [\[Prev request in frame: 234\]](#)
    - [\[Response in frame: 2555\]](#)
    - File Data: 40 bytes
  - ▼ HTML Form URL Encoded: application/x-www-form-urlencoded
    - > Form item: "uname" = "MichaelJakson"
    - > Form item: "pass" = "TellMEURPass123"