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PERSON-IN-THE-MIDDLE VIA ARP SPOOFING

a) What is Kali's main interface's MAC address? (The main interface is probably called eth0, but check ifconfig to be sure);
00:0c:29:2f:90:c6
b) What is Kali's main interface's IP address?
192.168.221.129
c) What is Metasploitable's main interface's MAC address?
00:0c:29:35:f7:36
d) What is Metasploitable's main interface's IP address?
192.168.221.128
e) Show Kali's routing table. (Use "netstat -r" to see it with symbolic names, or "netstat -rn" to see it with numerical addresses.

```
┌──(kali㉿kali)-[~]
└─$ netstat -r
Kernel IP routing table
Destination     Gateway         Genmask         Flags   MSS Window  irtt Ifac
e
default         192.168.221.2   0.0.0.0         UG        0 0          0 eth0
192.168.221.0   0.0.0.0         255.255.255.0   U         0 0          0 eth0
```

f) Show Kali's ARP cache. (Use "arp" or "arp -n".)

```
┌──(kali㉿kali)-[~]
└─$ arp -n
Address                  HWtype  HWaddress           Flags Mask            If
ace
192.168.221.254          ether   00:50:56:f4:54:d6   C                     et
h0
192.168.221.128          ether   00:0c:29:35:f7:36   C                     et
h0
192.168.221.2            ether   00:50:56:e8:1d:31   C                     et
h0
```

g) Show Metasploitable's routing table.

```
msfadmin@metasploitable:~$ netstat -r
Kernel IP routing table
Destination     Gateway         Genmask         Flags   MSS Window  irtt Iface
192.168.221.0   *               255.255.255.0   U         0 0          0 eth0
default         192.168.221.2   0.0.0.0         UG        0 0          0 eth0
msfadmin@metasploitable:~$
```

h) Show Metasploitable's ARP cache.

```
msfadmin@metasploitable:~$ arp -n
Address                  HWtype  HWaddress           Flags Mask            Iface
192.168.221.2            ether   00:50:56:E8:1D:31   C                     eth0
192.168.221.129          ether   00:0C:29:2F:90:C6   C                     eth0
msfadmin@metasploitable:~$
```

i) Suppose the user of Metasploitable wants to get the CS338 sandbox page via the command "curl http://cs338.jeffondich.com/". To which MAC address should Metasploitable send the TCP SYN packet to get the whole HTTP query started? Explain why.

Metasploitable uses the MAC address in the ARP table, which is 00:0C:29:2F:90:C6

j) Fire up Wireshark on Kali. Start capturing packets for "tcp port http". On Metasploitable, execute "curl http://cs338.jeffondich.com/". On Kali, stop capturing. Do you see an HTTP response on Metasploitable? Do you see any captured packets in Wireshark on Kali?

No, we do not see any captured packets in Wireshark on Kali. Metasploitable does receive the HTTP response.

k) Now, it's time to be Mal (who will, today, merely eavesdrop). Use Ettercap to do ARP spoofing (also known as ARP Cache Poisoning) with Metasploitable as your target. There are many online tutorials on how to do this (here's one). Find one you like, and start spoofing your target. NOTE: most of these tutorials are showing an old user interface for Ettercap, which may make them confusing. The steps you're trying to take within Ettercap are:
   i) Start sniffing (not bridged sniffing) on eth0
   ii) Scan for Hosts
   iii) View the Hosts list
   iv) Select your Metasploit VM from the Host List
   v) Add that host as Target 1
   vi) Start ARP Poisoning (including Sniff Remote Connections)
   vii) Do your stuff with wireshark and Metasploit
   viii) Stop ARP Poisoning

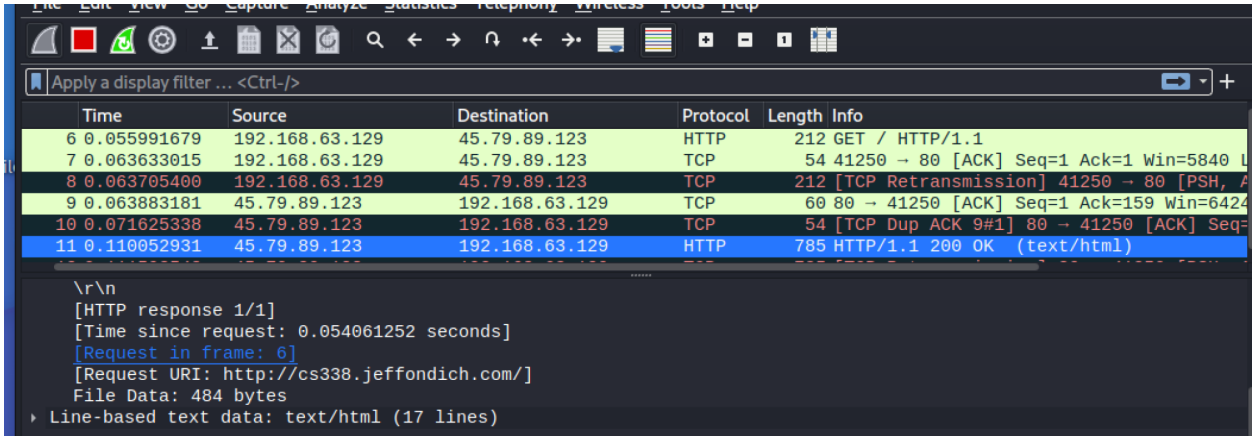
   I'll post some screenshots on Slack of how I got Ettercap to do these things. Honestly, I don't know who redesigned this user interface to make it so much harder to do things, but they did. (Common enough in the Linux UI world.)

l) Show Metasploitable's ARP cache. How has it changed?

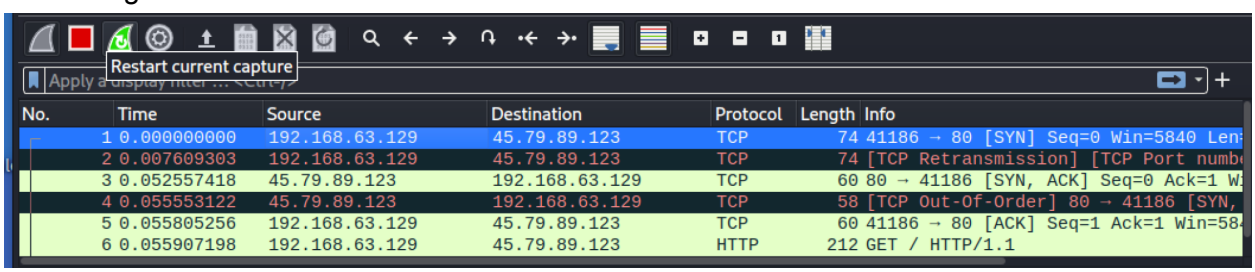
```
msfadmin@metasploitable:~$ arp -n
Address                  HWtype  HWaddress           Flags Mask            Iface
192.168.63.1             ether   F6:34:F0:4E:2B:65   C                     eth0
192.168.63.2             ether   00:50:56:F9:EF:93   C                     eth0
192.168.63.254           ether   00:50:56:F9:89:F1   C                     eth0
msfadmin@metasploitable:~$ arp -n
Address                  HWtype  HWaddress           Flags Mask            Iface
192.168.63.1             ether   00:0C:29:8A:81:9B   C                     eth0
192.168.63.2             ether   00:0C:29:8A:81:9B   C                     eth0
192.168.63.254           ether   00:0C:29:8A:81:9B   C                     eth0
msfadmin@metasploitable:~$ _
```

   Now, all the MAC addresses have been changed by the spoofing. They are all the same now.

m) Without actually doing it yet, predict what will happen if you execute "curl http://cs338.jeffondich.com/" on Metasploitable now. Specifically, to what MAC address



will Metasploitable send the TCP SYN packet? Explain why.
It will send the requests to the wrong address (00:0c:29:8a:81:9b) since the arp table has been changed. Metaspolitable has no way of knowing that the address it was given was wrong.



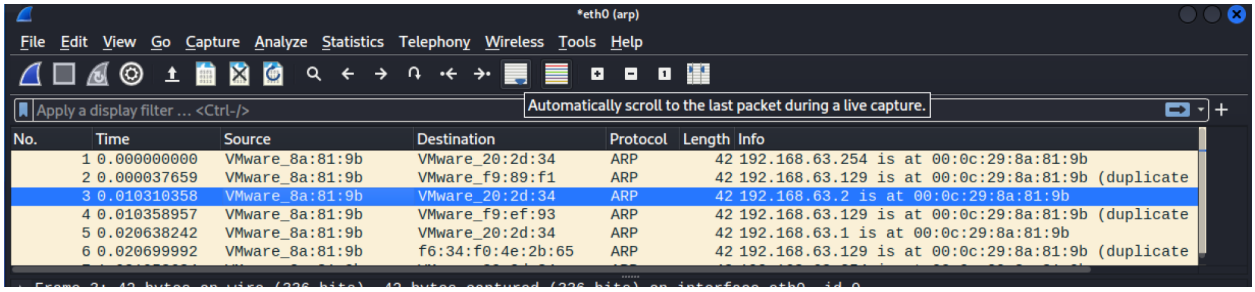
n) Start Wireshark capturing "tcp port http" again.

o) Execute "curl http://cs338.jeffondich.com/" on Metasploitable. On Kali, stop capturing. Do you see an HTTP response on Metasploitable? Do you see captured packets in Wireshark? Can you tell from Kali what messages went back and forth between Metasploitable and cs338.jeffondich.com?
Yes. We are able to see the SYN ACK packet as well as the HTTP 200 OK response and everything else. We have successfully done a MITM attack.

p) Explain in detail what happened. How did Kali change Metasploitable's ARP cache? (If you want to watch the attack in action, try stopping the PITM/MITM attack by selecting "Stop mitm attack(s)" from Ettercap's Mitm menu, starting a Wireshark capture for "arp", and restarting the ARP poisoning attack in Ettercap.)

Kali broadcasted repeated ARP messages to Metasploitable that told what IP address went with what (wrong) MAC addresses. Thus, Metasploitable updated its ARP table

with the incorrect info.



q) If you wanted to design an ARP spoofing detector, what would you have your detector do? (As you think about this, consider under what circumstances your detector might generate false positives.)

Ideally, we'd want there to be no duplicates in IP or in Mac address. However, if someone's IP address changed by using a VPN or something, that may cause a false positive. I think blocking/flagging packets for suspicious IP addresses would also work or flagging the repeated and consistent sending of unrequested ARP packets.