COMPUTER COMMUNICATION NETWORKS

CT-376

LAB NO 3

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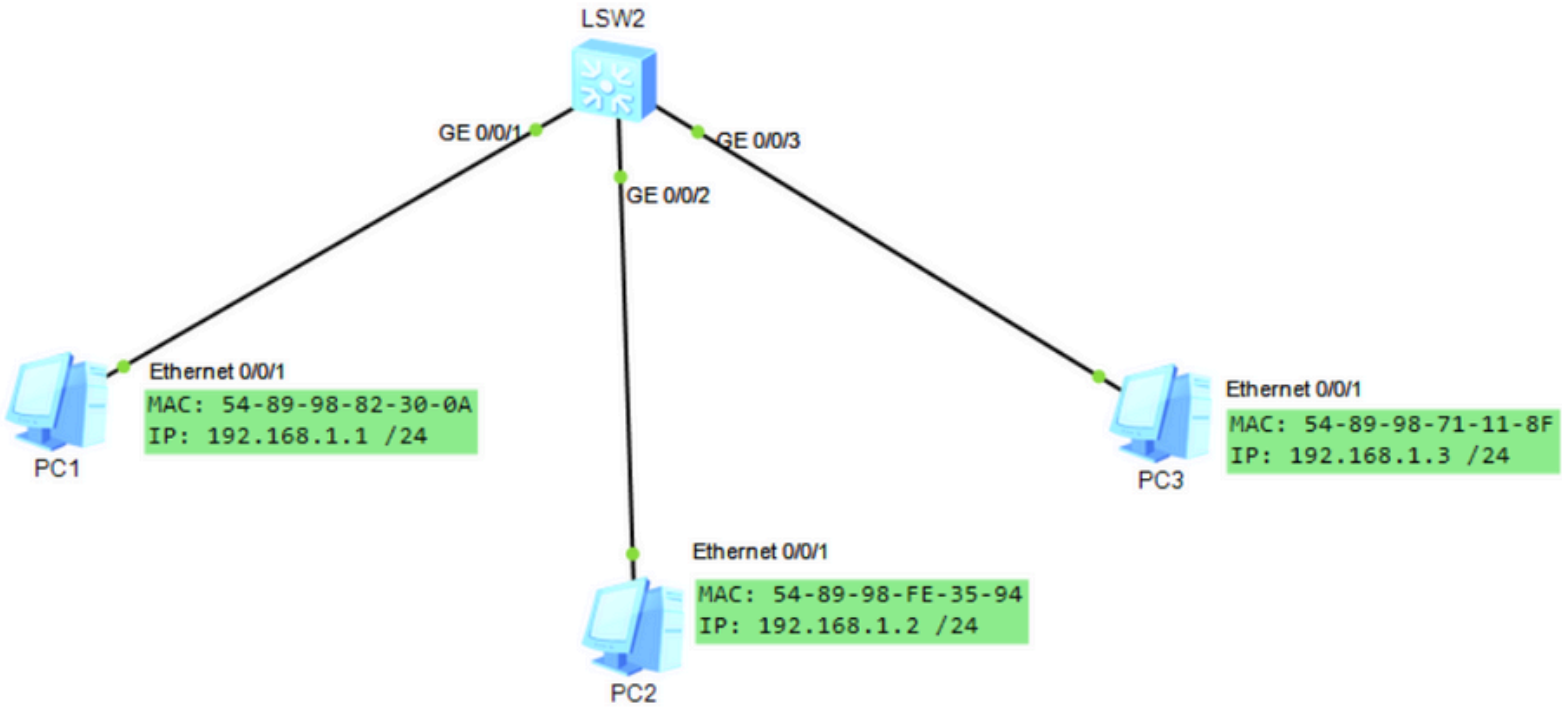
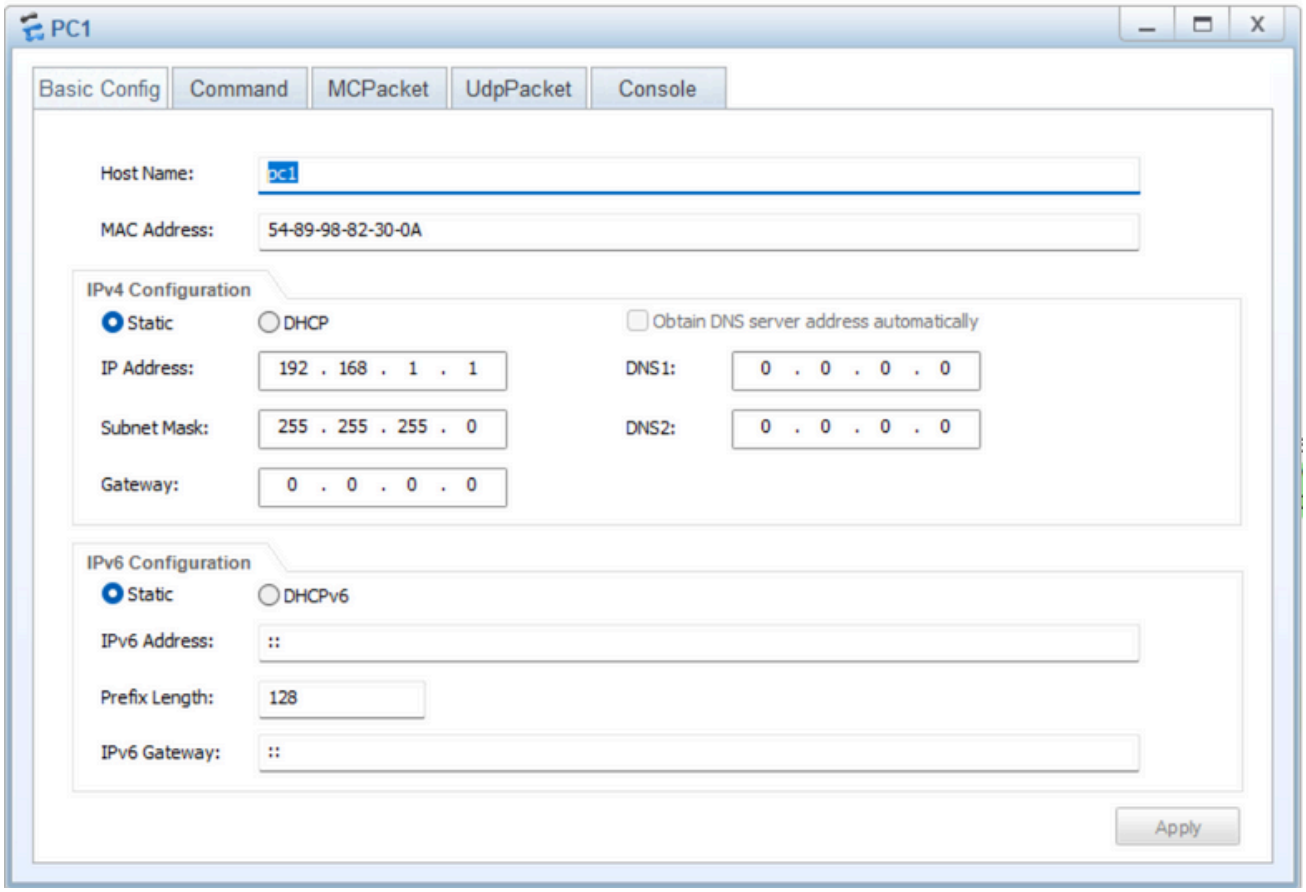
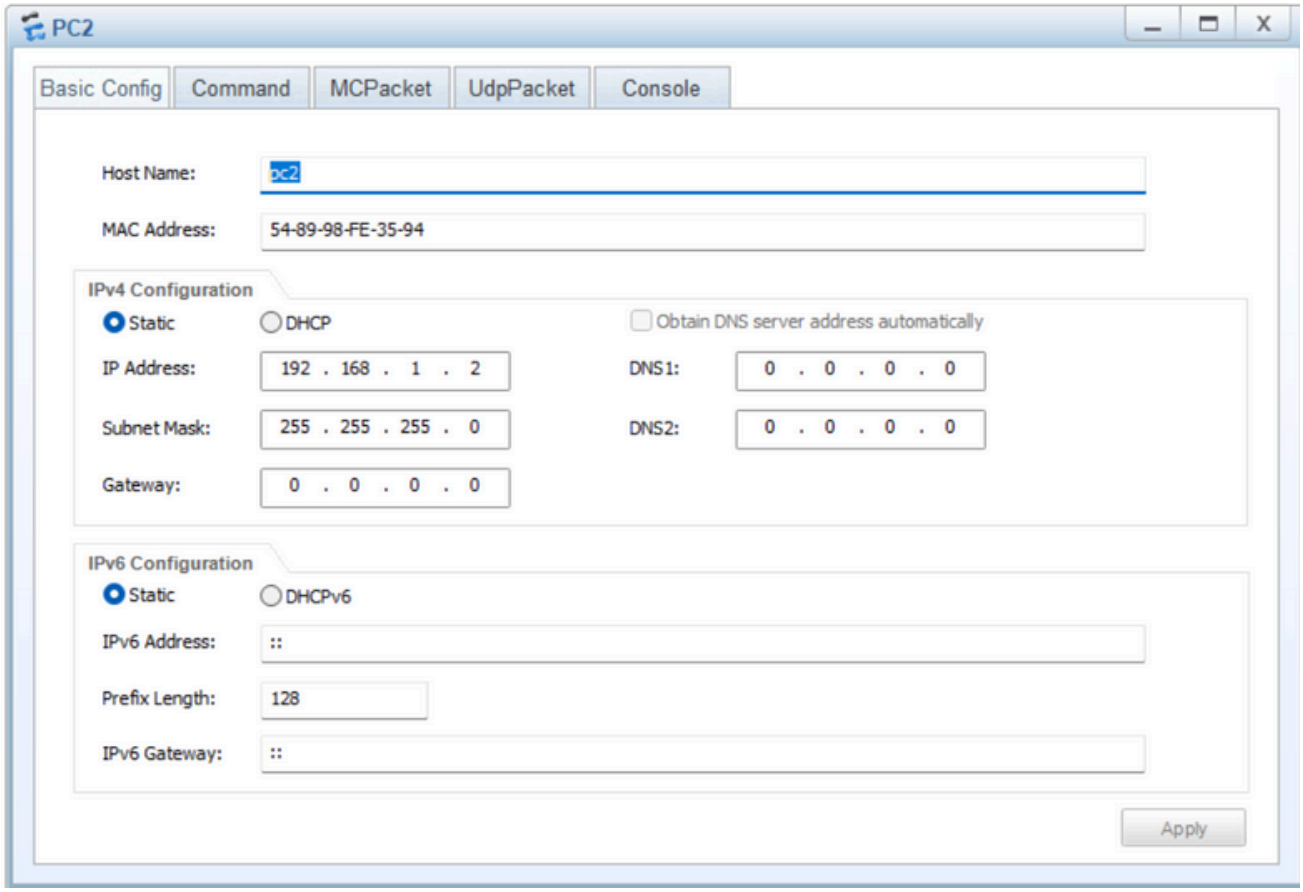
Batch:	2022 -2026
Semester:	spring 2025
Department:	CSIT
Specialization:	Data Science

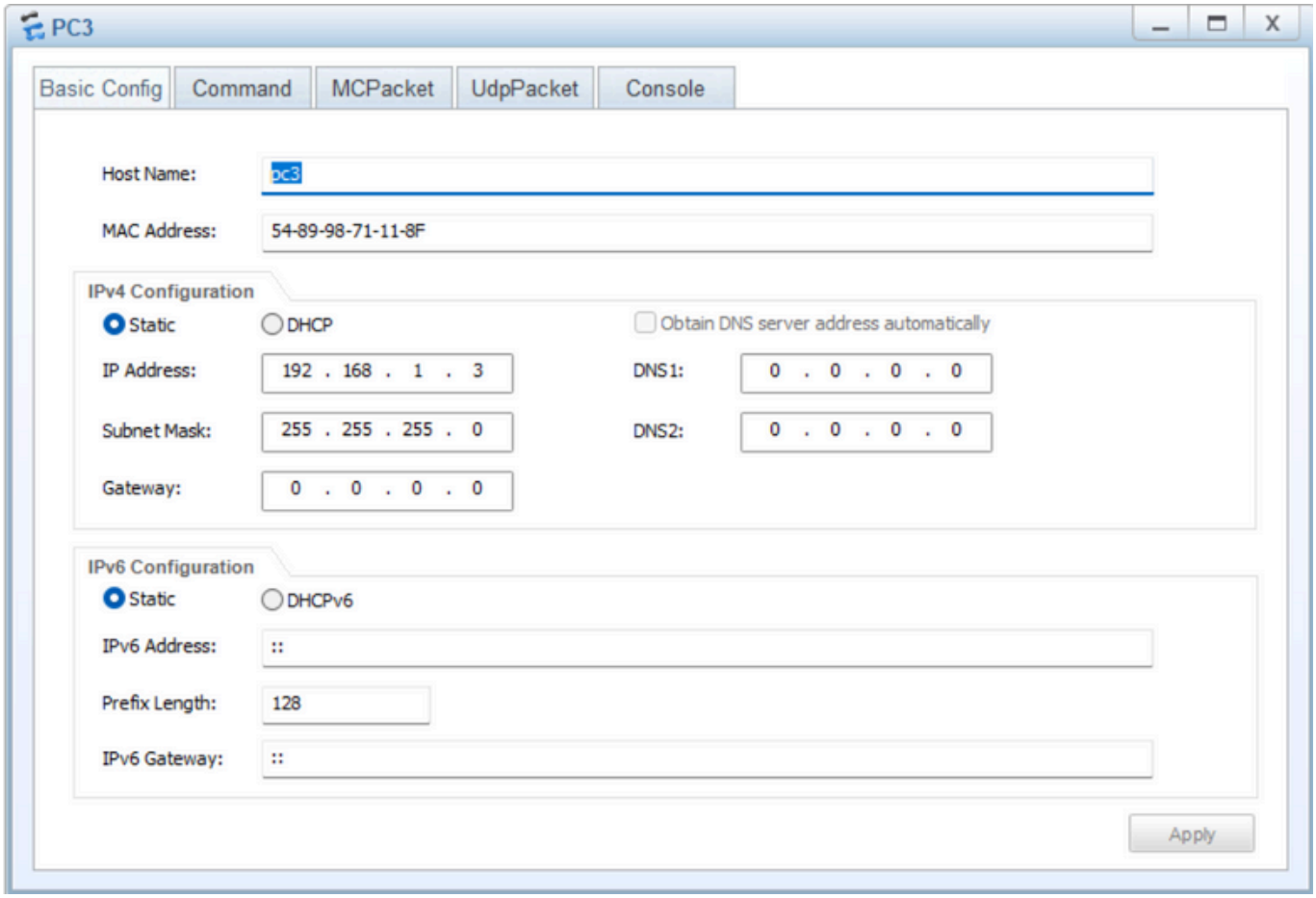
Lab Task (Lab # 03):

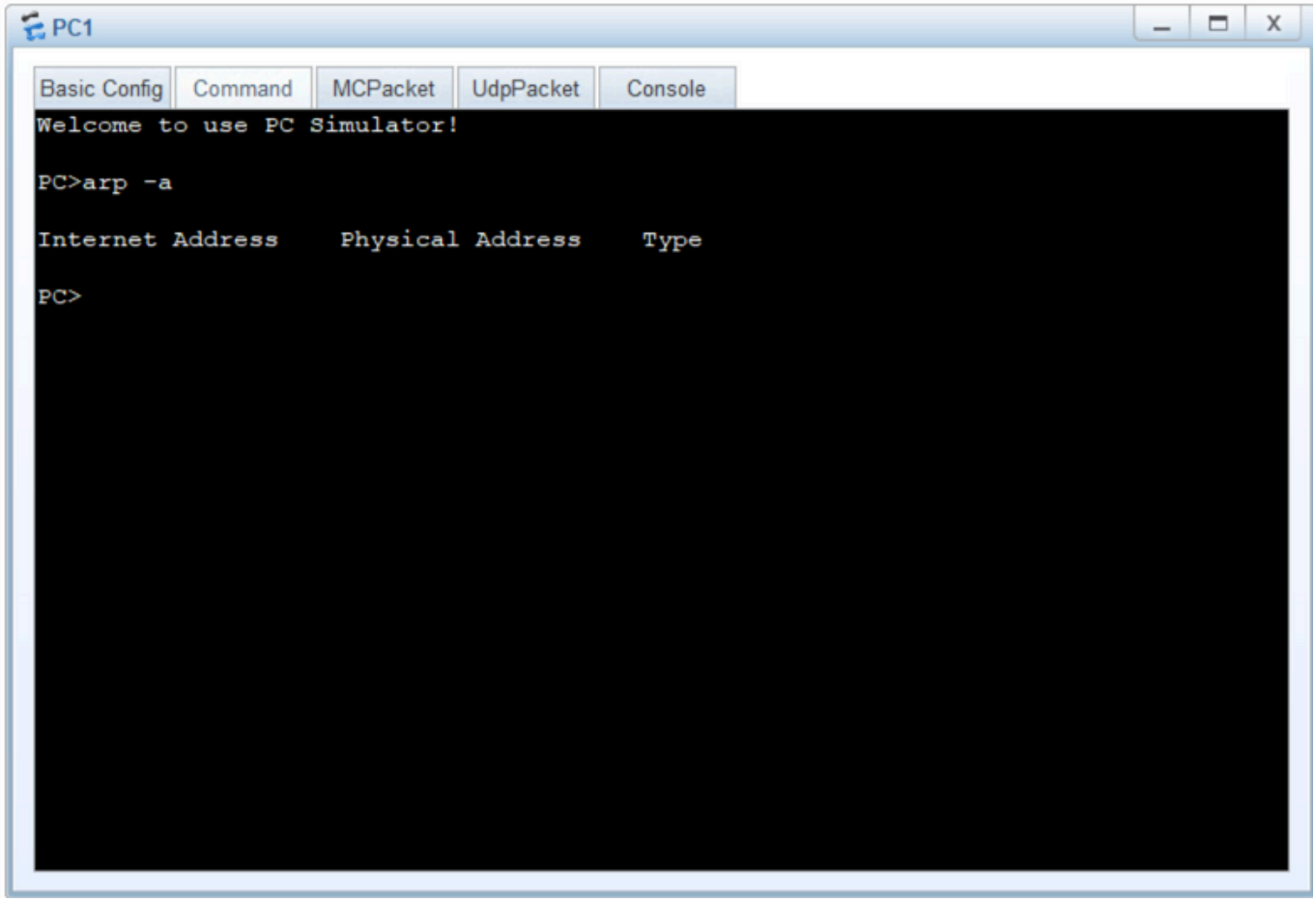
Create the following scenario in eNSP with the mentioned IP addresses. Please note the MAC address may vary system to system, mention your MAC addresses. Ping PC3 from PC1 and explain how the ARP table would be maintained and what would be the role of PC2 in this process. Also explain the difference between the static and dynamic ARP entries.

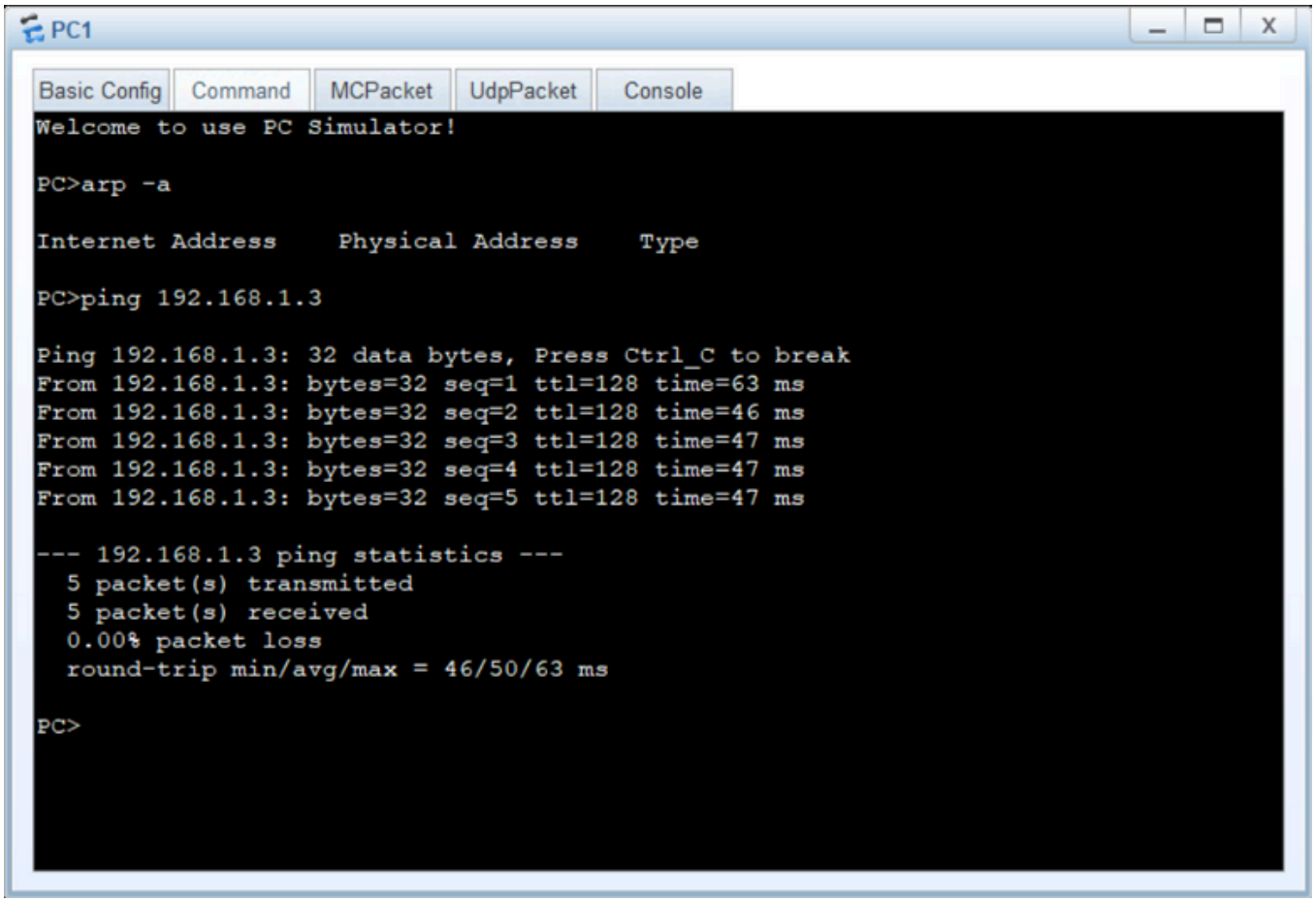


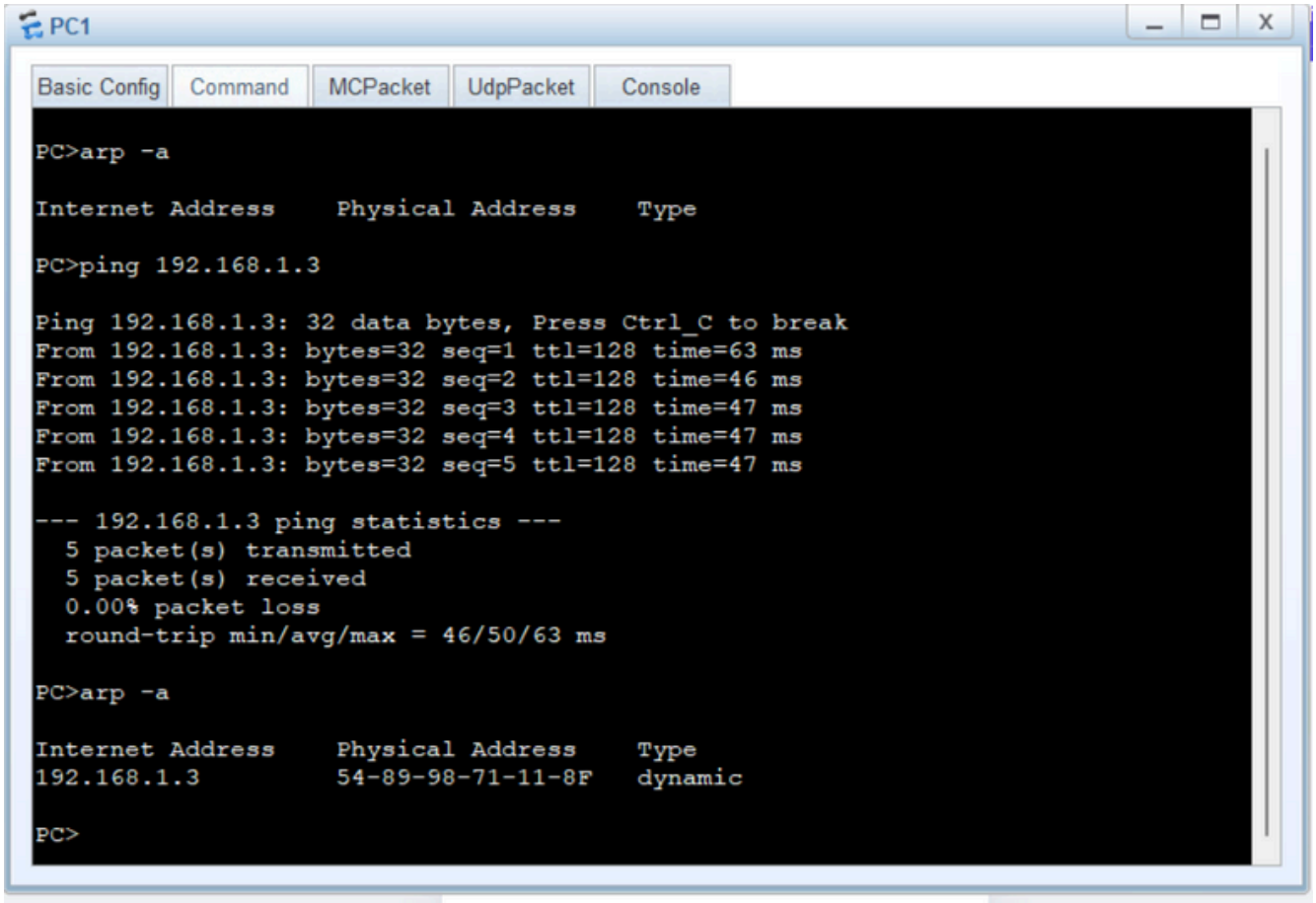

PC1
Basic Config
Command
MCPacket
UdpPacket
Console
Host Name:
pc1
MAC Address:
54-89-98-82-30-0A
IPv4 Configuration
Static
DHCP
Obtain DNS server address automatically
IP Address:
192 . 168 . 1 . 1
DNS1:
0 . 0 . 0 . 0
Subnet Mask:
255 . 255 . 255 . 0
DNS2:
0 . 0 . 0 . 0
Gateway:
0 . 0 . 0 . 0
IPv6 Configuration
Static
DHCPv6
IPv6 Address:
::
Prefix Length:
128
IPv6 Gateway:
::
Apply


PC2
Basic Config
Command
MCPacket
UdpPacket
Console
Host Name:
pc2
MAC Address:
54-89-98-FE-35-94
IPv4 Configuration
Static
DHCP
Obtain DNS server address automatically
IP Address:
192 . 168 . 1 . 2
DNS1:
0 . 0 . 0 . 0
Subnet Mask:
255 . 255 . 255 . 0
DNS2:
0 . 0 . 0 . 0
Gateway:
0 . 0 . 0 . 0
IPv6 Configuration
Static
DHCPv6
IPv6 Address:
::
Prefix Length:
128
IPv6 Gateway:
::
Apply


PC3
Basic Config
Command
MCPacket
UdpPacket
Console
Host Name:
pc3
MAC Address:
54-89-98-71-11-8F
IPv4 Configuration
Static
DHCP
Obtain DNS server address automatically
IP Address:
192 . 168 . 1 . 3
DNS1:
0 . 0 . 0 . 0
Subnet Mask:
255 . 255 . 255 . 0
DNS2:
0 . 0 . 0 . 0
Gateway:
0 . 0 . 0 . 0
IPv6 Configuration
Static
DHCPv6
IPv6 Address:
::
Prefix Length:
128
IPv6 Gateway:
::
Apply


PC1
Basic Config
Command
MCPacket
UdpPacket
Console
Welcome to use PC Simulator!
PC>arp -a
Internet Address Physical Address Type
PC>


PC1
Basic Config
Command
MCPacket
UdpPacket
Console
Welcome to use PC Simulator!
PC>arp -a
Internet Address Physical Address Type
PC>ping 192.168.1.3
Ping 192.168.1.3: 32 data bytes, Press Ctrl_C to break
From 192.168.1.3: bytes=32 seq=1 ttl=128 time=63 ms
From 192.168.1.3: bytes=32 seq=2 ttl=128 time=46 ms
From 192.168.1.3: bytes=32 seq=3 ttl=128 time=47 ms
From 192.168.1.3: bytes=32 seq=4 ttl=128 time=47 ms
From 192.168.1.3: bytes=32 seq=5 ttl=128 time=47 ms
--- 192.168.1.3 ping statistics ---
5 packet(s) transmitted
5 packet(s) received
0.00% packet loss
round-trip min/avg/max = 46/50/63 ms
PC>


PC1
Basic Config
Command
MCPacket
UdpPacket
Console
PC>arp -a
Internet Address Physical Address Type
PC>ping 192.168.1.3
Ping 192.168.1.3: 32 data bytes, Press Ctrl_C to break
From 192.168.1.3: bytes=32 seq=1 ttl=128 time=63 ms
From 192.168.1.3: bytes=32 seq=2 ttl=128 time=46 ms
From 192.168.1.3: bytes=32 seq=3 ttl=128 time=47 ms
From 192.168.1.3: bytes=32 seq=4 ttl=128 time=47 ms
From 192.168.1.3: bytes=32 seq=5 ttl=128 time=47 ms
--- 192.168.1.3 ping statistics ---
5 packet(s) transmitted
5 packet(s) received
0.00% packet loss
round-trip min/avg/max = 46/50/63 ms
PC>arp -a
Internet Address Physical Address Type
192.168.1.3 54-89-98-71-11-8F dynamic
PC>

When PC1 pings PC3, the following process occurs:

Step 1: PC1 Checks ARP Table

PC1 first checks its ARP table to see if it already has the MAC address of PC3 (192.168.1.3).
If it is found, PC1 directly sends the ICMP (ping) request to PC3.

Step 2: ARP Request (If MAC Not Found)

If PC3's MAC address is not in PC1's ARP table, PC1 sends an ARP Request:
Broadcast Frame: "Who has IP 192.168.1.3? Tell me your MAC address!"
Destination MAC: FF:FF:FF:FF:FF:FF (broadcast to all devices in the network).

Step 3: Role of PC2 (Switching the Request)

Since PC1 and PC3 are not directly connected, the ARP request passes through PC2 (the switch).
PC2 does not respond because it is just a switch and does not process ARP requests beyond switching them to the correct port.
PC2 forwards the ARP request to all ports except the one from which it received the request.

Step 4: PC3 Responds

PC3 receives the ARP request and replies with an ARP Reply:
"I am 192.168.1.3, and my MAC address is 54-89-98-D3-80-AB."
This ARP reply is sent directly to PC1.

Step 5: ARP Table Update

PC1 stores PC3's IP-MAC mapping in its ARP table.
Now, PC1 can send the ICMP (ping) request to PC3 using the learned MAC address.

Step 6: PC3 Learns PC1's MAC Address

Since PC3 also sees PC1's ARP request, it stores PC1's IP and MAC address in its own ARP table.

Static vs Dynamic ARP Entries

1. Dynamic ARP Entries

Automatically learned when a device sends an ARP request.
Stored temporarily and will be removed if not used for a certain period.
Example: When PC1 pings PC3, their MAC addresses are dynamically added to each other's ARP tables.

2. Static ARP Entries

Manually configured by the user using the arp -s command.
Permanently stored and do not expire.
Useful for security and stability in cases where MAC addresses must remain fixed.
Example: If you manually set PC3’s MAC address in PC1’s ARP table