

Address Resolution Protocol (ARP)

Aim

To construct a simple Local Area Network (LAN) using Cisco Packet Tracer and demonstrate how the Address Resolution Protocol (ARP) resolves IPv4 addresses into MAC addresses by capturing and analyzing ARP request and ARP reply packets.

Problem statement

Construct simple LAN and understand the concept and operation of Address Resolution Protocol(ARP) using Cisco Packet Tracer. Utilize PCs, 8 port switch and LAN cable

Scope of the solution

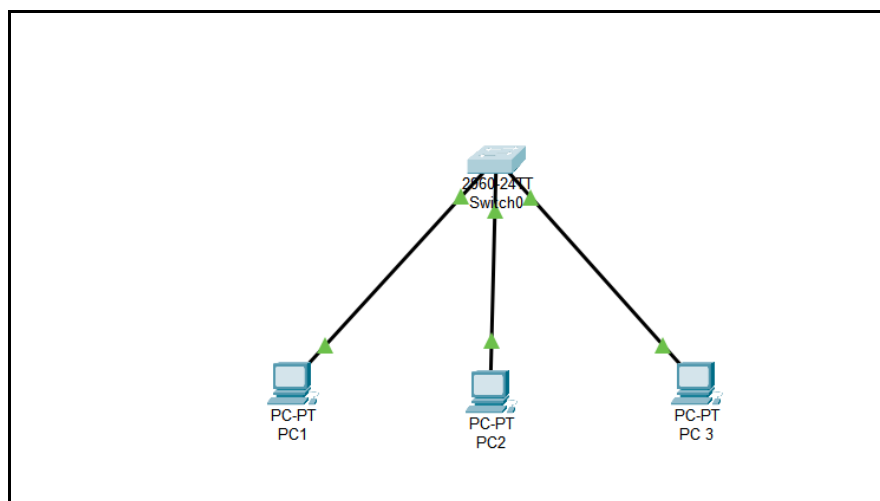
- Build a small LAN with 3 PCs and an 8-port layer-2 switch in Cisco Packet Tracer.
- Configure static IPv4 addresses for the PCs in the same subnet.
- Use Packet Tracer's Simulation mode to capture ARP request and response.
- Verify ARP entries on PCs and the MAC-address table on the switch.
- Produce a .pkt file and a short demo video showing the ARP process.

Required components

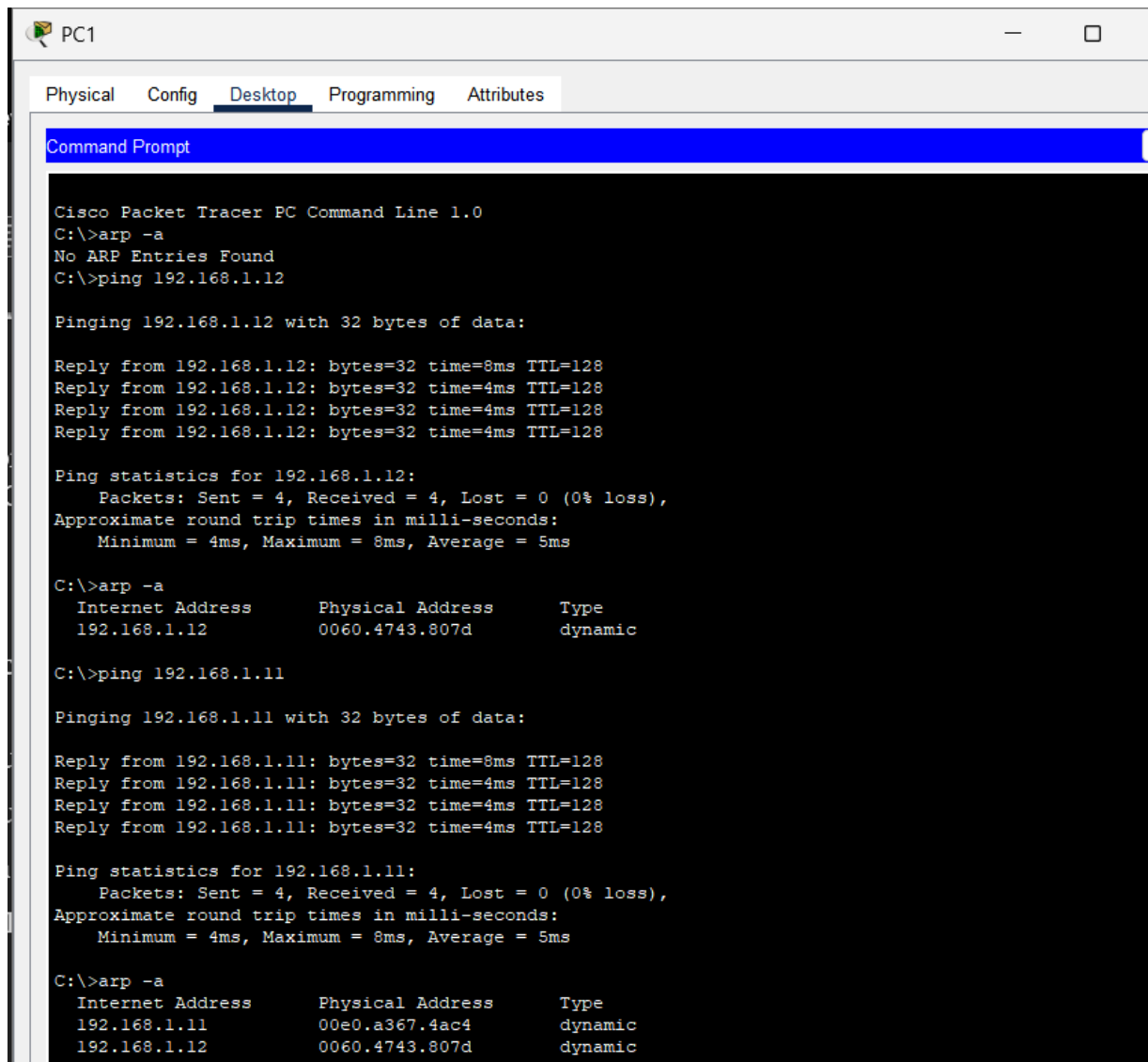
- **Software:** Cisco Packet Tracer
- **Hardware (simulated):** 3 × PC, 1 × 8-port Switch (e.g., 2960), Copper straight-through cables.

Simulated Network

Topology:



Command Prompt on PC1:



The screenshot shows the Command Prompt window for PC1 in Cisco Packet Tracer. The window has tabs for Physical, Config, Desktop, Programming, and Attributes, with Desktop selected. The Command Prompt displays the following commands and their outputs:

```
Cisco Packet Tracer PC Command Line 1.0
C:\>arp -a
No ARP Entries Found
C:\>ping 192.168.1.12

Pinging 192.168.1.12 with 32 bytes of data:

Reply from 192.168.1.12: bytes=32 time=8ms TTL=128
Reply from 192.168.1.12: bytes=32 time=4ms TTL=128
Reply from 192.168.1.12: bytes=32 time=4ms TTL=128
Reply from 192.168.1.12: bytes=32 time=4ms TTL=128

Ping statistics for 192.168.1.12:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 4ms, Maximum = 8ms, Average = 5ms

C:\>arp -a
    Internet Address      Physical Address      Type
    192.168.1.12          0060.4743.807d        dynamic

C:\>ping 192.168.1.11

Pinging 192.168.1.11 with 32 bytes of data:

Reply from 192.168.1.11: bytes=32 time=8ms TTL=128
Reply from 192.168.1.11: bytes=32 time=4ms TTL=128
Reply from 192.168.1.11: bytes=32 time=4ms TTL=128
Reply from 192.168.1.11: bytes=32 time=4ms TTL=128

Ping statistics for 192.168.1.11:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 4ms, Maximum = 8ms, Average = 5ms

C:\>arp -a
    Internet Address      Physical Address      Type
    192.168.1.11          00e0.a367.4ac4        dynamic
    192.168.1.12          0060.4743.807d        dynamic
```

Verification of ARP entries on PCs and the MAC-address table on the switch:

```
Switch#show mac address-table
Mac Address Table
-----
```

Vlan	Mac Address	Type	Ports
1	0060.4743.807d	DYNAMIC	Fa0/3
1	0090.21e2.95c4	DYNAMIC	Fa0/1
1	00e0.a367.4ac4	DYNAMIC	Fa0/2

Result

A LAN was successfully in Cisco Packet Tracer, the simulation showed ARP Requests and ARP Replies being exchanged, followed by successful ICMP Echo Request and Echo Reply packets. This confirms that ARP correctly resolved the IP address of PC3 into its MAC address, enabling smooth communication within the LAN.

GITHUB LINK:

https://github.com/joshua-joseph-creator/L-T_IIoT_Project/tree/main/ECE_BATCH_6