L&T PROJECT REPORT

**1. Aim**

To construct and simulate a simple Local Area Network (LAN) using Cisco Packet Tracer and demonstrate the operation of the Address Resolution Protocol (ARP) in this environment.

**2. Problem Statement**

In industrial and embedded systems, efficient device-to-device communication is critical. This project involves creating a basic LAN with two PCs and an 8-port switch, simulating how ARP enables devices to map IP addresses to MAC addresses. Using Cisco Packet Tracer, the steps to visualize and validate ARP operation within a small LAN are demonstrated.

**3. Components Used**

| **Category** | **Component** |
| --- | --- |
| Simulation IDE | Cisco Packet Tracer |
| Devices | PC0, PC1 |
| Network | 8-port Switch (e.g., 2960) |
| Cabling | Ethernet (straight-through) cables |
| Media Tools | Screen capture/recording software |
| PC/Laptop | Host machine |

**4. Circuit/Simulation Diagram**

**Insert a diagram or screenshot showing:**

* **Two PCs (PC0 & PC1) connected to the switch**
* **LAN cables linking each PC to separate switch ports**

***Example (add actual image as “Fig.1: LAN Topology in Cisco Packet Tracer”):***

**![LAN Topology](Images/LAN\_Top5. Step-by-Step Implementation Procedure\*\***

1. **Start Cisco Packet Tracer**
   * **Launch the software and open a new workspace.**
2. **Place Devices**
   * **Drag two PCs (PC0, PC1) onto the canvas.**
   * **Drag one 8-port switch into the workspace.**
3. **Connect Devices**
   * **Use straight-through Ethernet cables to connect:**
     + **PC0 → Switch port Fa0/1**
     + **PC1 → Switch port Fa0/2**
4. **Configure IP Addresses**
   * **Click on each PC, then Desktop → IP Configuration:**
     + **PC0: IP: 192.168.1.10, Subnet Mask: 255.255.255.0**
     + **PC1: IP: 192.168.1.20, Subnet Mask: 255.255.255.0**
5. **Check ARP Table (Before Communication)**
   * **On PC0, go to Desktop → Command Prompt:**

* **arp -a**

6**. Initiate Communication**

* **From PC0, open Command Prompt and ping PC1:**
* **ping 192.168.1.20**
* **Observe the first ping; ARP is used to resolve the MAC address.**

7.**Check ARP Table (After Communication)**

* **Again, on PC0:**
* **arp -a**
* **The ARP table now shows a mapping for PC1's IP to its MAC.**

8 **Take Screenshots**

* **Capture images of the topology, ARP command output before/after ping, and ping results.**

**6. Explanation of ARP Process and Results**

**Address Resolution Protocol (ARP):**

* ARP is a network protocol used to find the hardware (MAC) address of a device on a LAN from its IP address.
* When PC0 wants to communicate with PC1, it must know PC1's MAC address.
* If unknown, PC0 broadcasts an ARP request: “Who has 192.168.1.20?”
* PC1 receives the request, matches the IP, and replies with its MAC address.
* PC0 stores this IP-MAC mapping in its ARP table and can now communicate directly.

**Result Analysis**

* Before the first ping, PC0’s ARP table does **not** include PC1’s IP.
* After the ping, an entry appears, showing successful ARP resolution.
* The ARP operation was validated visually and through commands, confirming network connectivity.



