SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS) CHITTOOR

PROJECT NAME : ADDRESS RESOLUTION PROTOCOL

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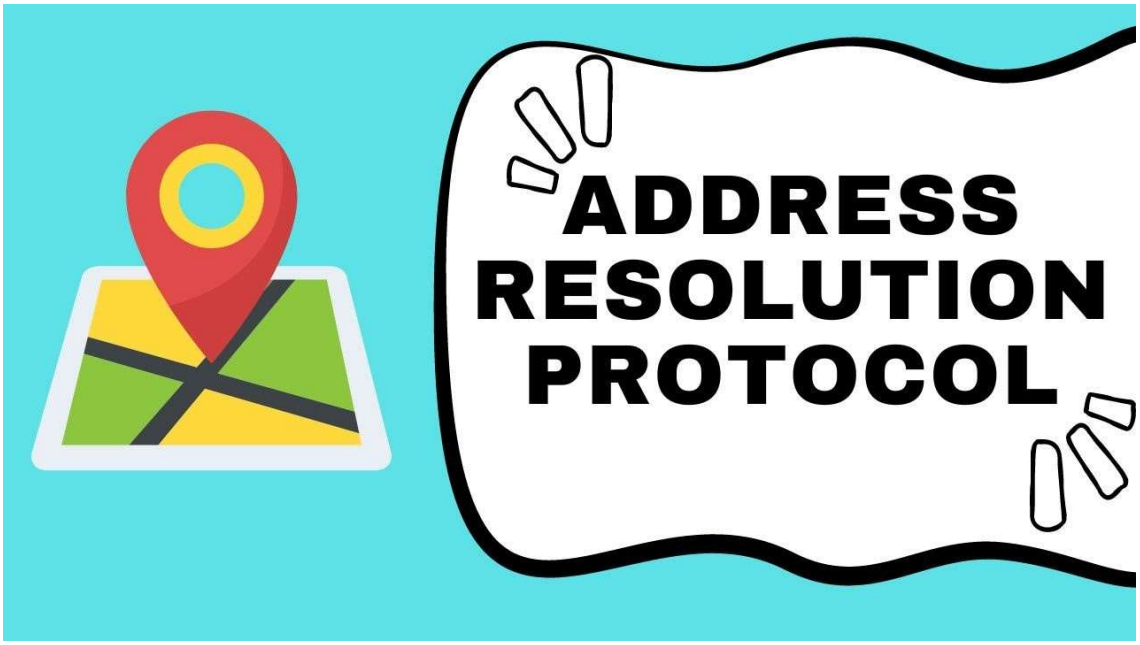
ADDRESS RESOLUTION PROTOCOL

AIM:

To construct a simple Local Area Network (LAN) using Cisco Packet Tracer and understand the concept and operation of Address-Resolution Protocol (ARP).

PROBLEM STATEMENT:

Design and configure a basic LAN setup comprising PCs, an 8-port switch, LAN cables, and routers. Understand how ARP works within this network setup.



SCOPE OF THE SOLUTION:

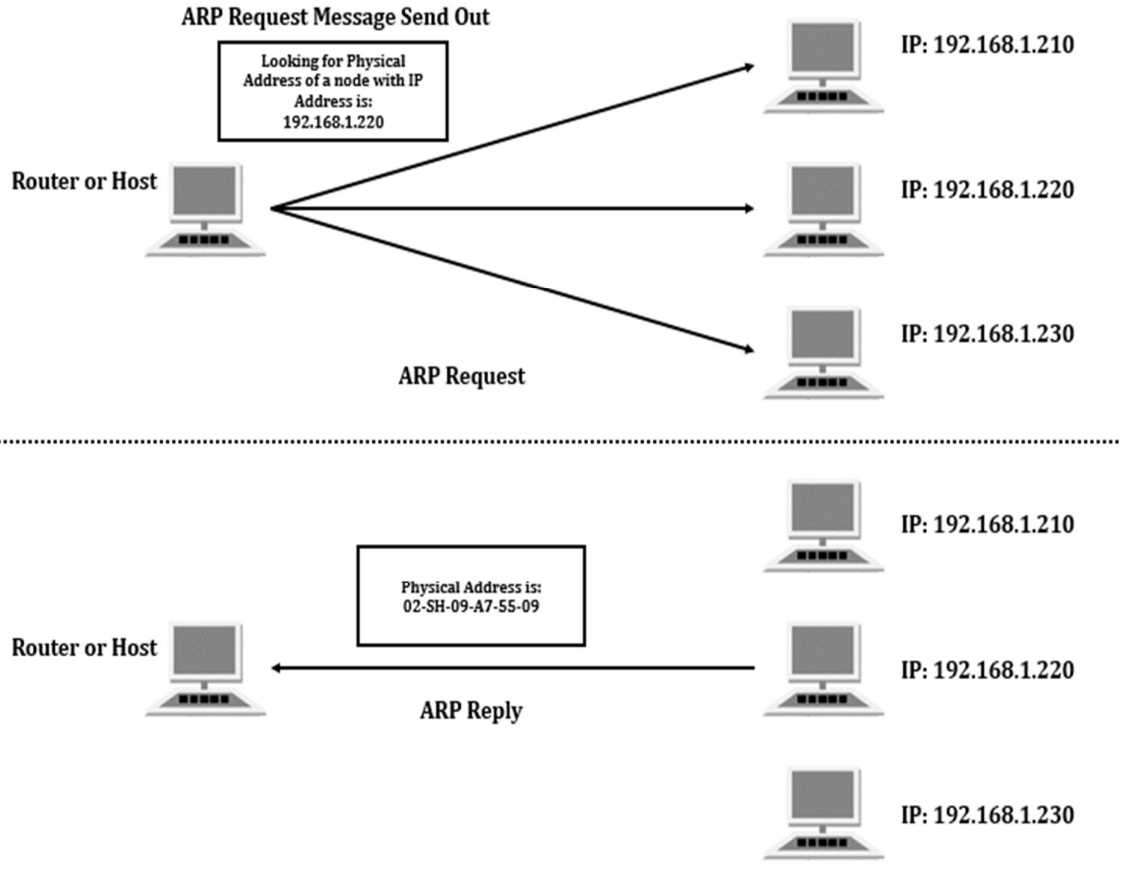
The solution involves creating a LAN with PCs connected to an 8-port switch using LAN cables. Configure the IP addresses for each PC and the switch. Utilize Cisco Packet Tracer

software to simulate the network. Understand ARP's role in resolving IP addresses to MAC addresses within the LAN.

REQUIRED COMPONENTS TO DEVELOP SOLUTION:

1. Cisco Packet Tracer (software)
2. PCs (devices)
3. 8-port Switch (device)
4. LAN cables (physical connections)
5. Router (optional, for internet connectivity)

SIMULATED CIRCUIT:



Setup Hardware Components:

Place PCs: Drag and drop PCs from the "End Devices" section onto the workspace.

Place a Switch: Drag and drop an 8-port switch from the "Switches" section onto the workspace.

Connect Devices: Use LAN cables to connect each PC to the switch ports.

Configure Ip Addresses: Assign IP addresses to each PC in the same subnet.

For example: PC1: IP Address - 192.168.1.1PC2: IP Address - 192.168.1.2PCs 3-8: Continue in the same subnet range.

Set Subnet Mask: Use a subnet mask like 255.255.255.0 for a simple setup.

Configure ARP Settings: ARP operates at the Data Link Layer (Layer 2) of the OSI model. It resolves IP addresses to MAC addresses. By default, ARP is enabled on most devices. There are usually no specific configurations needed in Packet Tracer for ARP. Verify

Connectivity:

Ping Test: Use the command prompt on each PC to ping the other PCs in the LAN using their IP addresses.

Example: On PC1, open the command prompt and type ping 192.168.1.2 to ping PC2.

View ARP Table:

Each PC maintains an ARP table that maps IP addresses to MAC addresses. Use the command arp -a on the command prompt of a PC to view its ARP table. This table shows the mappings between IP addresses and MAC addresses.

Observe ARP Operation: When a PC wants to communicate with another device on the LAN, it first checks its ARP table to see if it already has the MAC address of the destination IP. If not found, the PC sends an ARP broadcast message asking "Who has IP x.x.x.x?" to the entire LAN. The device with the corresponding IP address responds with its MAC address. The requesting PC updates its ARP table with the new MAC address and proceeds with communication.

Monitor Packet Flow: Use Packet Tracer's simulation mode to observe ARP packets and their interactions between devices.

PROGRAM:

```
#include <stdio. h>

#include <stdlib. h>

#include <string. h>


// Define structure for ARP table entry

Struct  arp _ entry {

   char IP _ address[16];  // Assuming IPv4 addresses

   char mac_address[18]; // Assuming MAC addresses in the format "XX:XX:XX:XX:XX:XX"

};


// Function to simulate ARP request/response

void arp_request_response(struct arp_entry arp_table[], int table_size, char dest_ip[]) {

   int i;
```

```
    int found = 0;

    // Search ARP table for matching IP address
    for (i = 0; i < table_size; i++) {
        if (strcmp(arp_table[i].ip_address, dest_ip) == 0) {
            found = 1;
            printf("ARP request: Who has IP %s?\n", dest_ip);
            printf("ARP response: IP %s is at MAC %s\n", dest_ip,
arp_table[i].mac_address);
            break;
        }
    }

    if (!found) {
        printf("ARP request: Who has IP %s? (No response)\n", dest_ip);
    }
}
int main() {
    // Initialize ARP table with some entries
    struct arp_entry arp_table[] = {
        {"192.168.1.1", "00:11:22:33:44:55"},
```

```
    {"192.168.1.2", "AA:BB:CC:DD:EE:FF"},
    {"192.168.1.3", "11:22:33:44:55:66"}
  };
  int table_size = sizeof(arp_table) / sizeof(arp_table[0]);

  // Simulate ARP request/response for a given IP
  char dest_ip[16];
  printf("Enter destination IP address: ");
  scanf("%s", dest_ip);

  arp_request_response(arp_table, table_size, dest_ip);

  return 0;
}
```

CONCLUSION:

This LAN setup facilitates communication between PCs through the switch and allows internet access via the router. ARP ensures efficient communication by mapping IP addresses to MAC addresses within the LAN, enabling devices to locate each other on the network.