

Applied Industrial Internet of Things

Configuration of Address Resolution Protocol (ARP)

Aim

To construct a simple LAN and simulate the working of Address Resolution Protocol (ARP) using Cisco Packet Tracer, demonstrating how IP addresses are mapped to MAC addresses for successful communication in a network.

Problem Statement

In computer networks, devices communicate using IP addresses, but actual data transmission occurs through hardware (MAC) addresses. To bridge this gap, the Address Resolution Protocol (ARP) is used. Without ARP, devices in a LAN cannot correctly resolve the MAC address corresponding to an IP, leading to communication failure. Hence, simulating ARP in a LAN setup using Cisco Packet Tracer helps in understanding this crucial networking concept.

Scope of the Solution

- Demonstrates the working principle of ARP in a Local Area Network (LAN).
- Provides hands-on experience with Cisco Packet Tracer to simulate real-world networking.
- Helps students visualize how devices resolve IP to MAC before communication.
- Can be extended to study ARP spoofing, ARP cache, and troubleshooting network connectivity issues.

Required Components

Software & IDE:

- Cisco Packet Tracer (v7.x or above)

Hardware (Simulated in Packet Tracer):

- 4 PCs (minimum)
- 8-Port Switch
- LAN Cables (Copper Straight-through)

Simulated Circuit

- Connect 4 PCs to an 8-port switch using LAN cables.
- Assign IP addresses to each PC (e.g., 192.168.1.1 – 192.168.1.4).
- Use the ping command between PCs to generate ARP requests and replies.

- Observe ARP tables using the arp -a command in the simulated PCs.

Result:

The simple LAN was successfully constructed and simulated in Cisco Packet Tracer. The Address Resolution Protocol (ARP) operation was observed as devices communicated within the LAN. When one PC attempted to ping another, an ARP request was broadcast, and the corresponding ARP reply provided the MAC address. The ARP table on each PC was correctly populated, confirming the mapping between IP and MAC addresses. This demonstrated the essential role of ARP in enabling communication across a LAN.

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