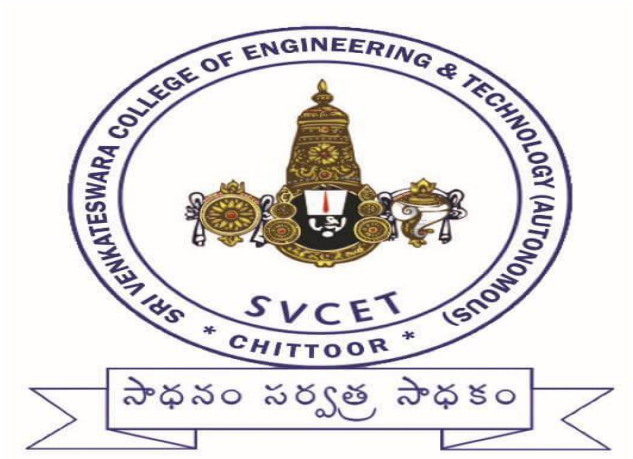

SRI VENKATESWARA COLLEGE OF ENGINEERING& TECHNOLOGY

(AUTONOMOUS)

R.V.S NAGAR, CHITTOOR – 517 127. (A.P)

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By NBA, New Delhi & NAAC, Bengaluru)

(An ISO 9001:2000 Certified Institution)

2023-2024

PROJECT DETAILS: (Mid-Course Project)

CLASS : Third year ECE(second semester)

COURSE NAME: Applied industrial IOT

PROJECT NAME : CONFIGURATION OF ADDRESS RESOLUTION PROTOCOL(ARP).

BATCH: Batch 44(4)

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PROJECT

CONFIGURATION OF ADDRESS RESOLUTION PROTOCOL(ARP)

AIM:To Construct a simple LAN and understand the concept and operation of address resolution protocol (ARP) using Cisco packet tracer.Utilze PCs,8port switch and LAN cable.

PROBLEM STATEMENT: problem has been identified in the Address Resolution Protocol (ARP) functionality. Devices in the simulated network experience intermittent connectivity issues, indicating a failure in ARP resolution. Despite correct network configurations, ARP fails to map IP addresses to corresponding MAC addresses, disrupting communication between devices. The challenge is to investigate and resolve the ARP-related issues within the Cisco Packet Tracer simulation, ensuring consistent and reliable communication across the network. The ARP should be able to resolve the MAC address of a device given its IP address. The ARP should also be able to update its cache when devices move or change their IP addresses.

SCOPE OF THE SOLUTION: The scope of the solution is to design a network that uses ARP to communicate between devices in a Cisco Packet Tracer environment. The solution will address the challenges of ARP by using the following techniques:

- **VLANs**:

VLANs can be used to divide the network into smaller segments. This will reduce the amount of broadcast traffic on the network, as ARP requests will only be sent within the VLAN that the device is in.

- **Static ARP entries:**

Static ARP entries can be used to map IP addresses to MAC addresses. This will prevent the device from sending out ARP requests for devices that it already knows the MAC address of.

- **ARP filtering:**

ARP filtering can be used to prevent ARP requests from being sent to certain devices. This can be used to prevent attackers from launching DoS attacks against the network.

REQUIRED COMPONENTS TO DEVELOP SOLUTIONS:

1. Cisco packet tracer (software)
2. PCs
3. 8 Port Switch
4. LAN cable

Concept:

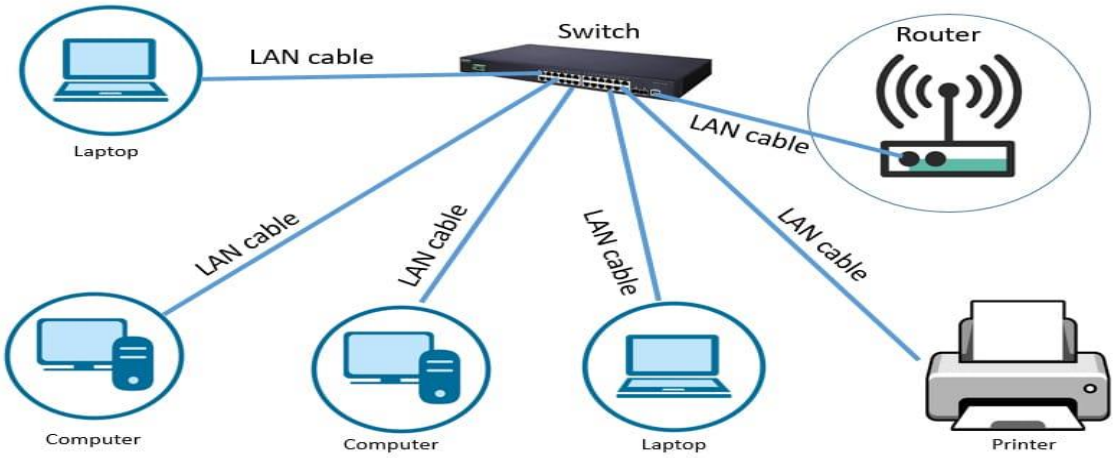
LAN stands for Local Area Network. It's a collection of devices connected together in a single physical location, such as a building, office, or home. LANs can be small or large, ranging

from a home network with one user to an enterprise network with thousands of users and devices in an office or school.

Here are some examples of LANs:

- Networking in home, office
- Networking in school, laboratory, university campus
- Networking between two computers
- Wi-Fi (When we consider wireless LAN)

Ethernet is a common technology used in LANs for wired connections. It specifies the standards for transmitting data over physical cables, such as twisted-pair copper cables or fiber optic cables.



Local Area Network

ARP: The Address Resolution Protocol (ARP) is a network protocol that helps computers on a local area network (LAN) communicate with each other. It performs a key function in IP routing.

Here's how ARP works:

1. When a new computer joins a LAN, the network assigns it a unique IP address.
2. When two computers want to communicate, they create an IP packet with a source and destination IP address.
3. The IP packet is then encapsulated in an Ethernet frame with a source and destination MAC address.

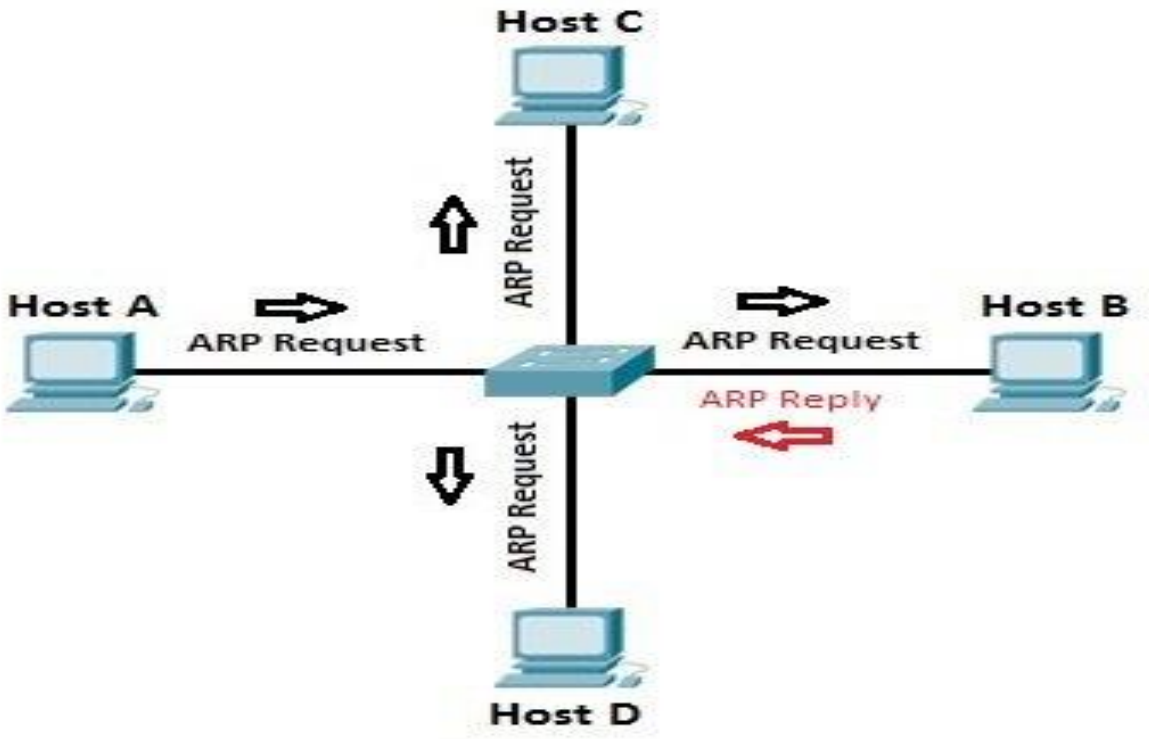
4. The sending computer knows its source MAC address, but it needs to know the destination MAC address.
5. ARP solves this problem by finding the hardware address, also known as Media Access Control (MAC) address, of a host from its known IP address.

ARP maintains a cache (table) in which MAC addresses are mapped to IP addresses. The ARP table can be manually entered by the user.

Here's an example of the ARP process:

- Host A wants to communicate with host B.
- Host A knows host B's IP address, but not its MAC address.
- Host A sends an ARP request to find host B's MAC address.

ARP translates 32-bit addresses to 48-bit addresses and vice versa.



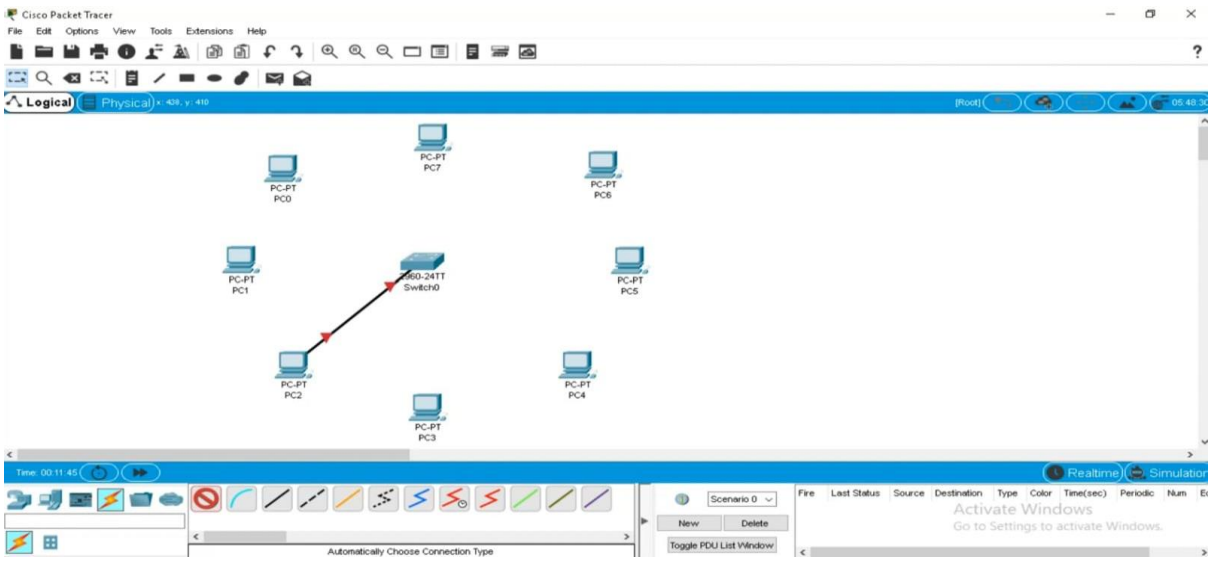
Address Resolution Protocol (ARP) is used for:

1. Mapping IP Addresses to MAC Addresses: ARP resolves and maps IP addresses to corresponding Media Access Control (MAC) addresses on a local network.
2. Local Network Communication: It enables devices on the same network to communicate by discovering and associating IP addresses with the physical hardware addresses.

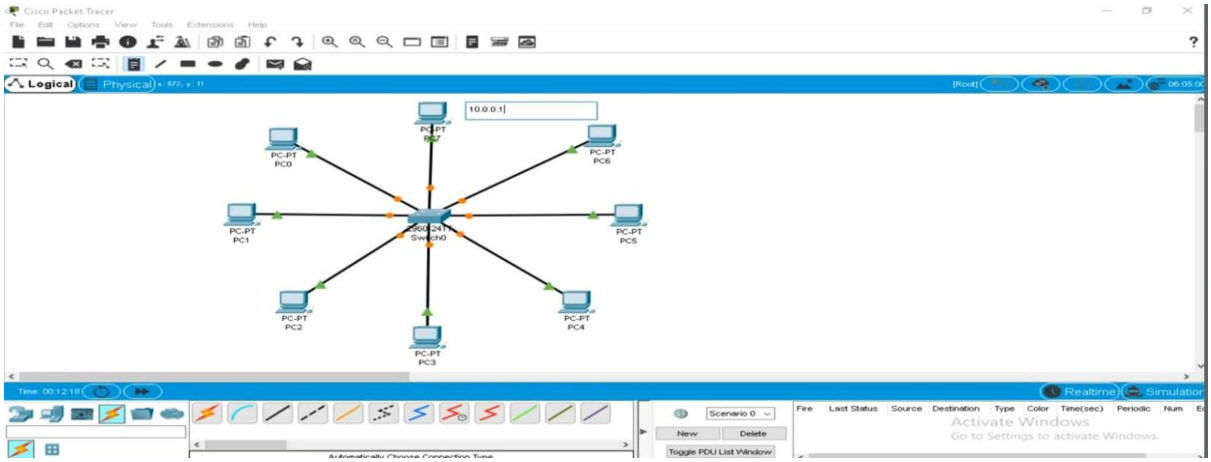
3. Building ARP Tables: Devices maintain ARP tables that store mappings between IP addresses and MAC addresses, helping optimize data transmission within a network.
4. Broadcasting ARP Requests: When a device needs to find the MAC address associated with a specific IP address, it sends an ARP request as a broadcast message to the entire network.
5. Dynamic Host Configuration Protocol (DHCP): ARP is involved in the DHCP process, allowing hosts to dynamically obtain IP addresses and related configuration information.
6. Proxy ARP: In certain network configurations, ARP can be used for proxy ARP, where a device responds to ARP requests on behalf of another device.
7. Security and Network Monitoring: ARP activity can be monitored for security purposes, detecting and preventing ARP spoofing or other malicious activities.
8. Troubleshooting: ARP information is valuable for diagnosing network issues, such as connectivity problems or incorrect IP-MAC mappings.

SIMULATED CIRCUIT(Cisco Packet Tracer):

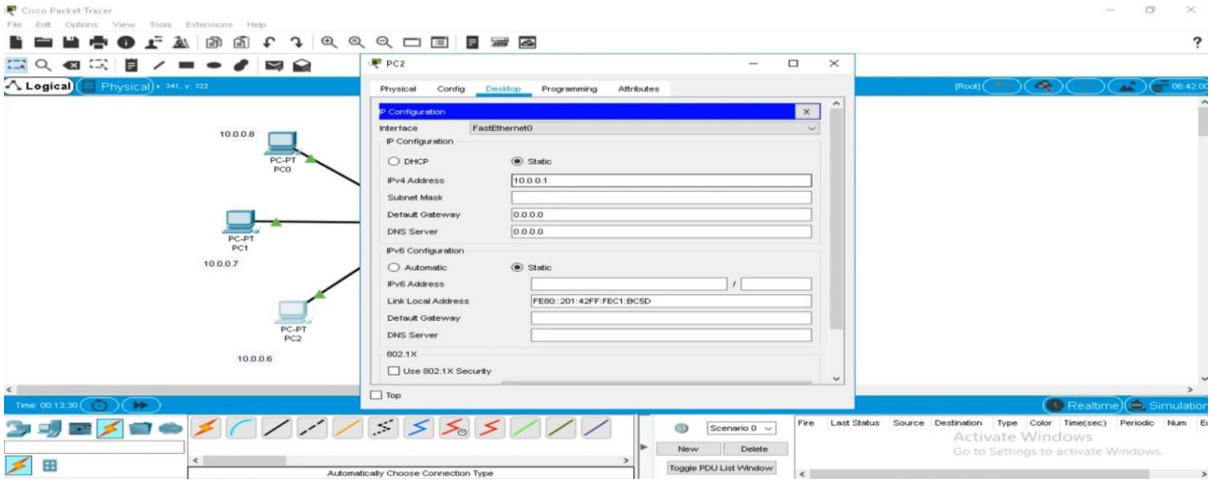
1. Construct a LAN.



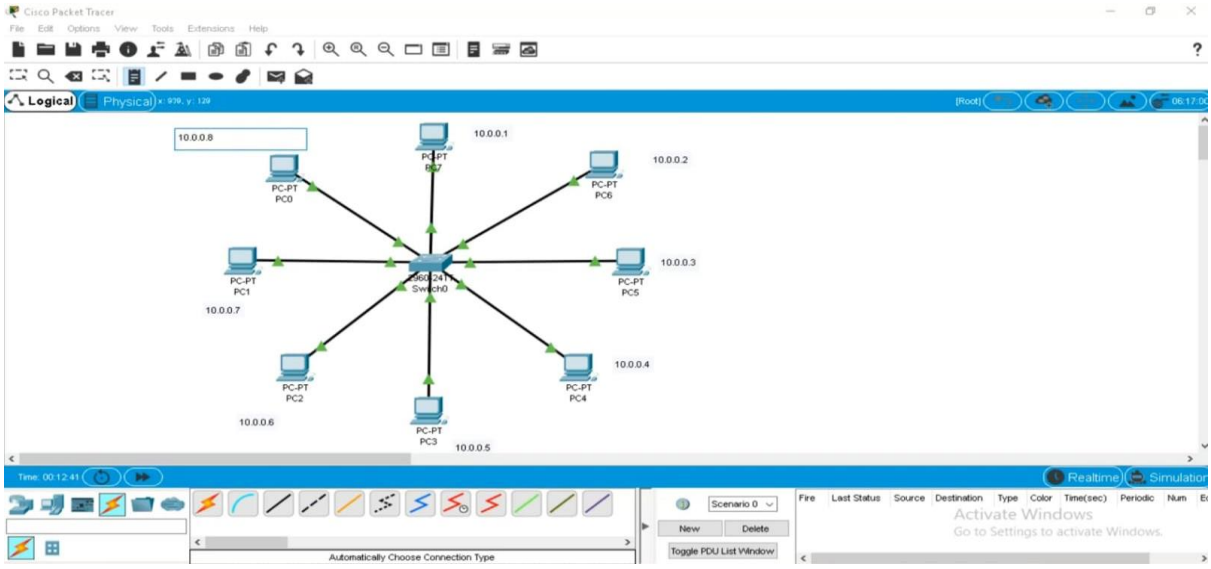
2. Define the IP address of each device.



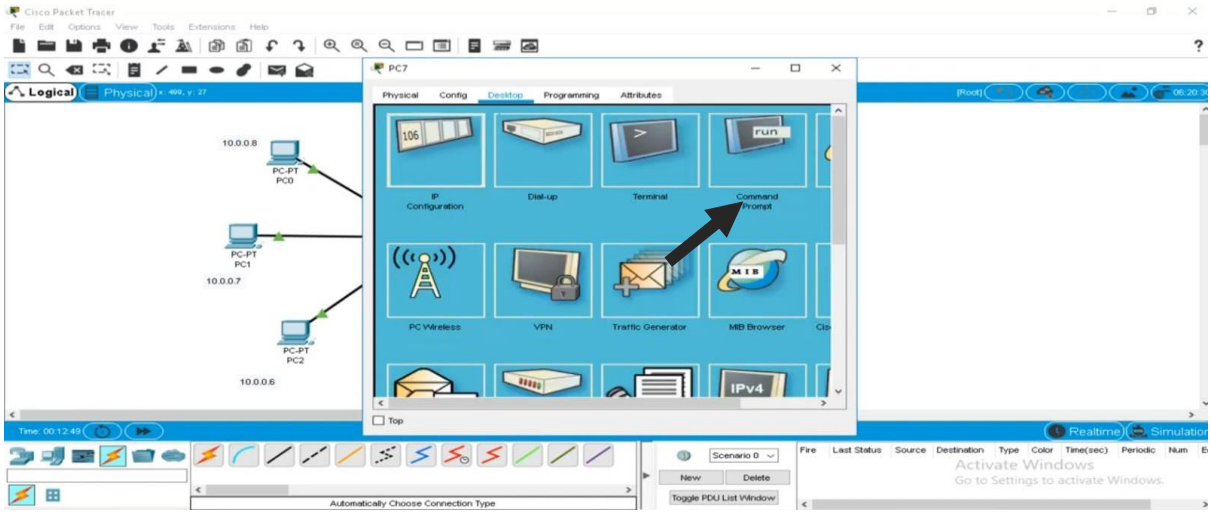
3. IP address displayed on desktop.



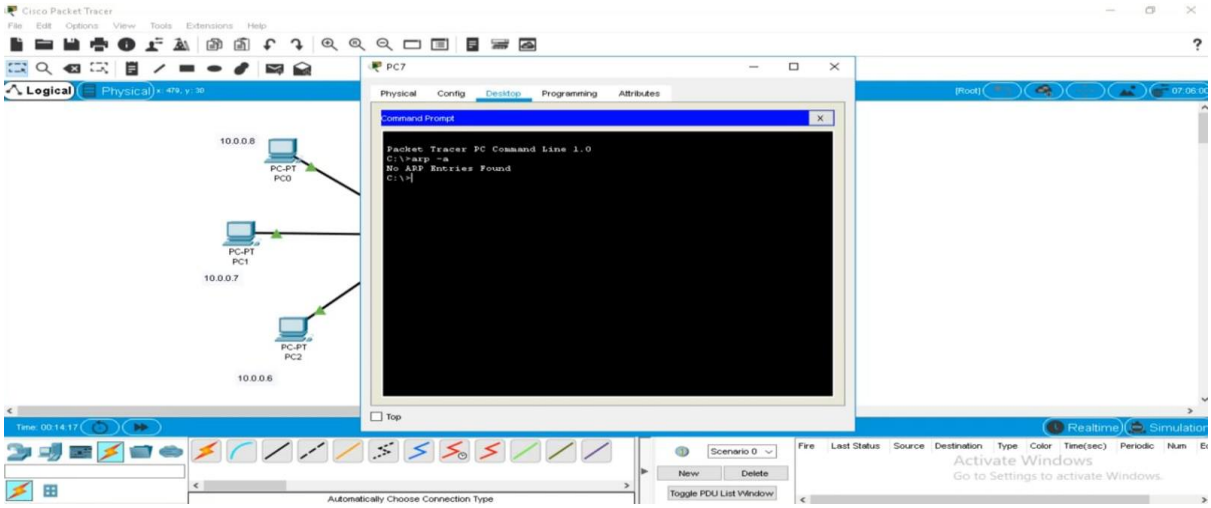
4. Give it in order.



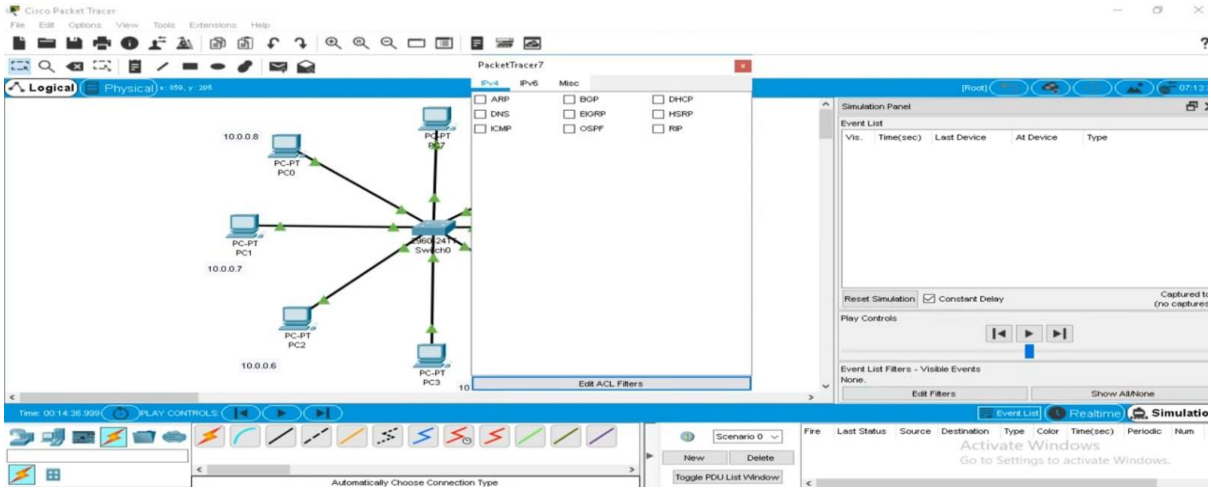
5. Next go to command prompt.



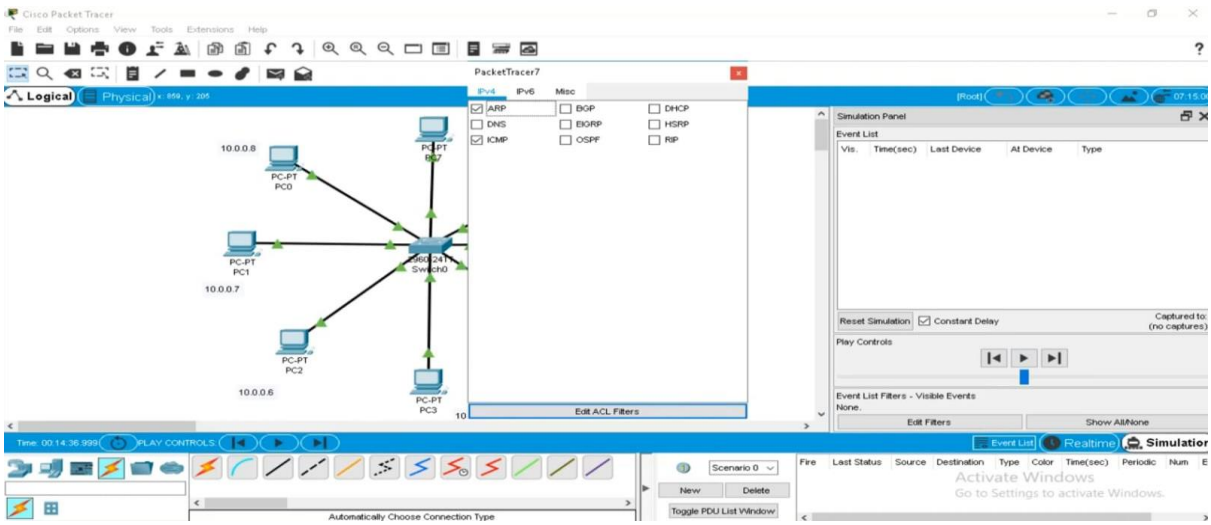
6. It shows the entries.



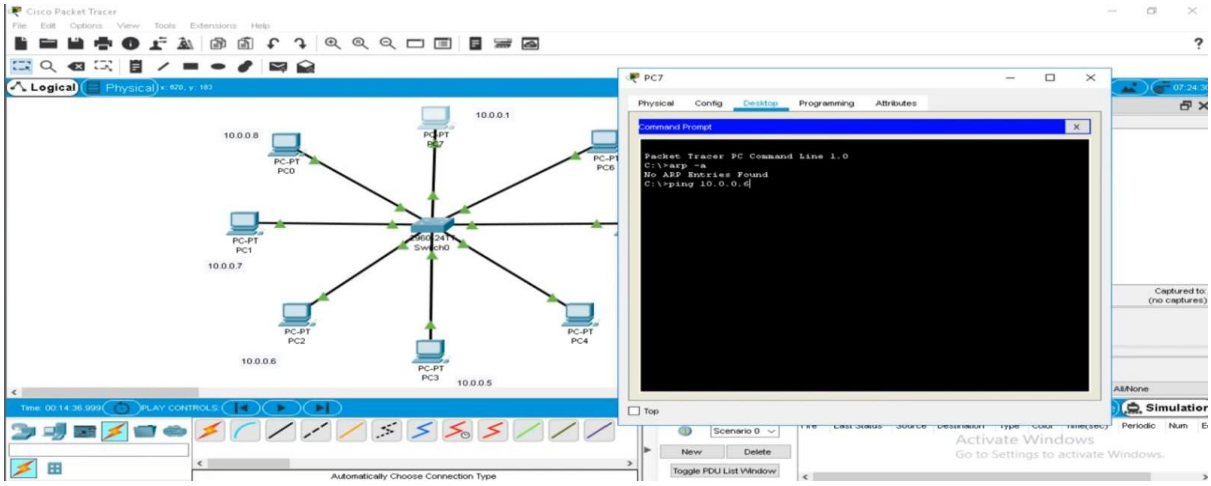
7. Go to simulation.



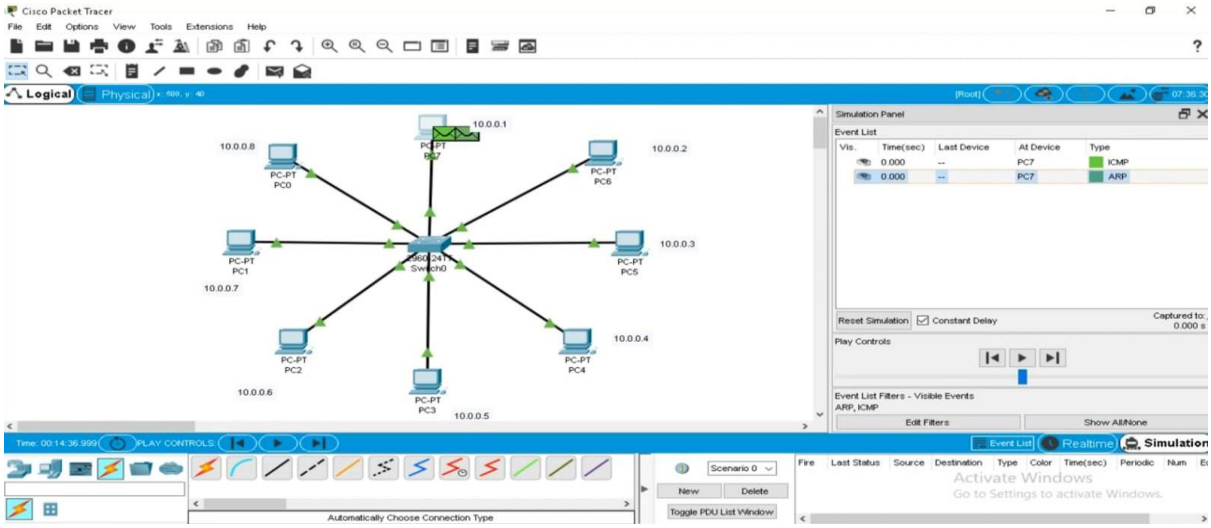
8. Select only specific protocols.



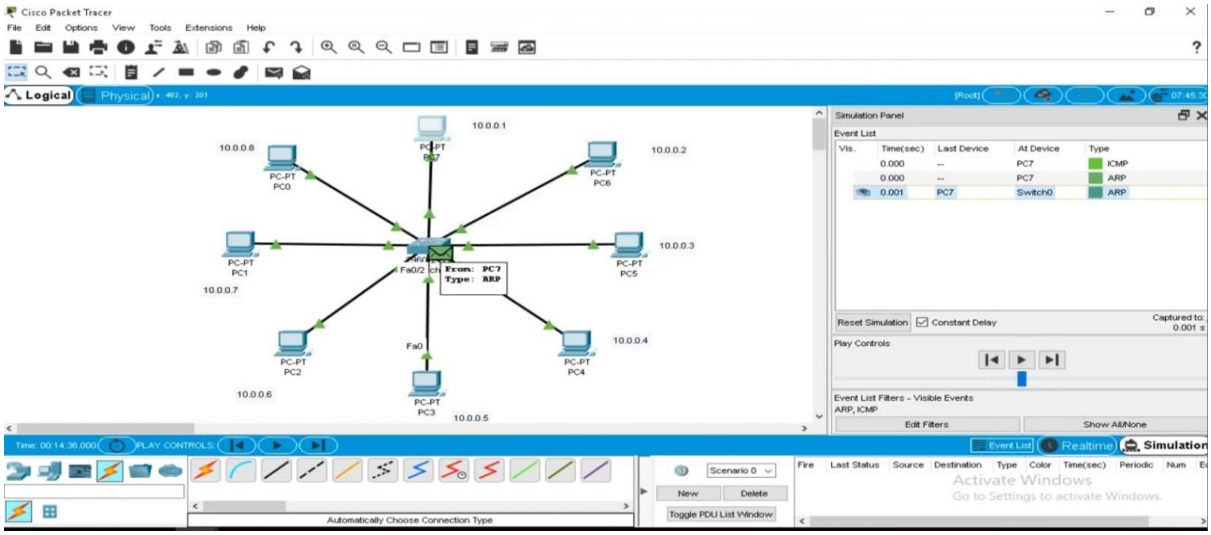
9. Select any one device.



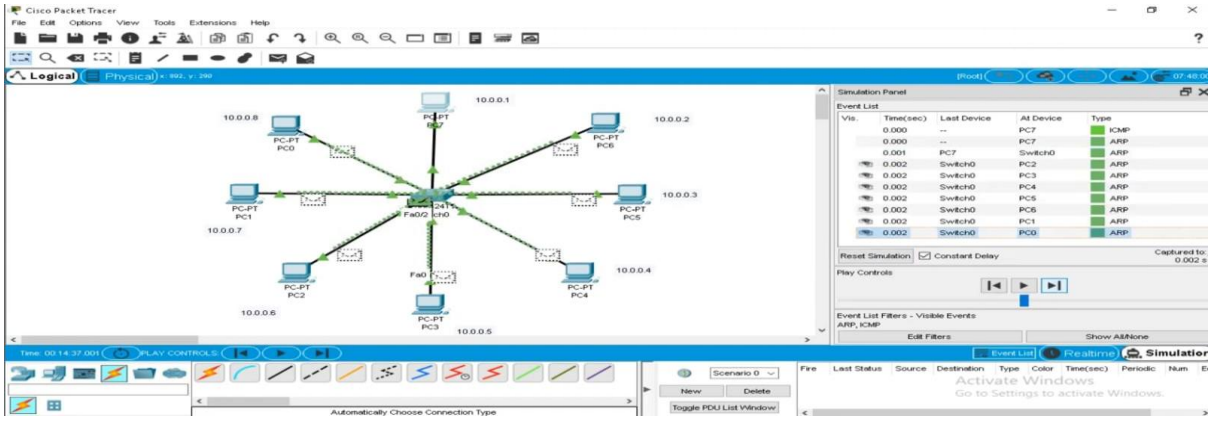
10. Two packets will be generated.



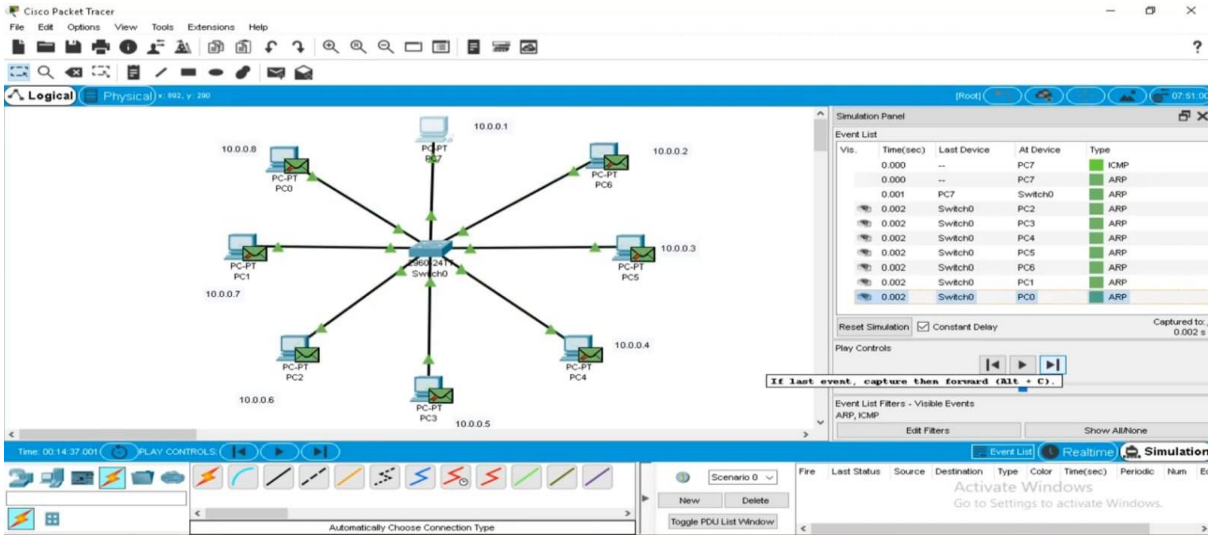
11. ARP packet is going to be transmitted.



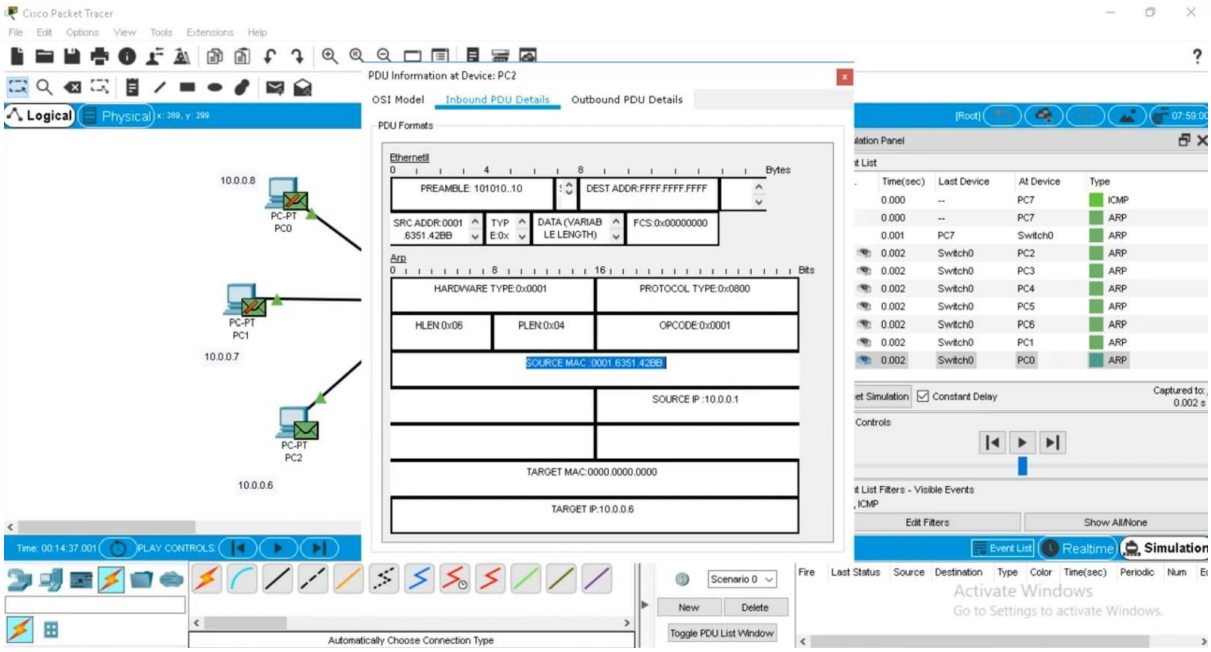
12. You can see the Working of ARP.



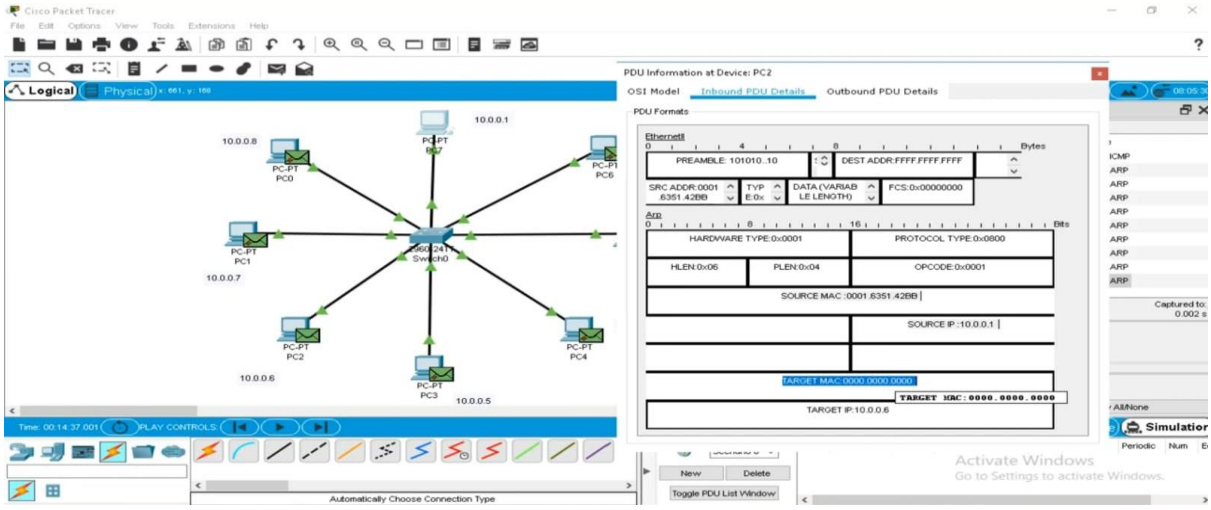
13. Open packet and you can see the details.



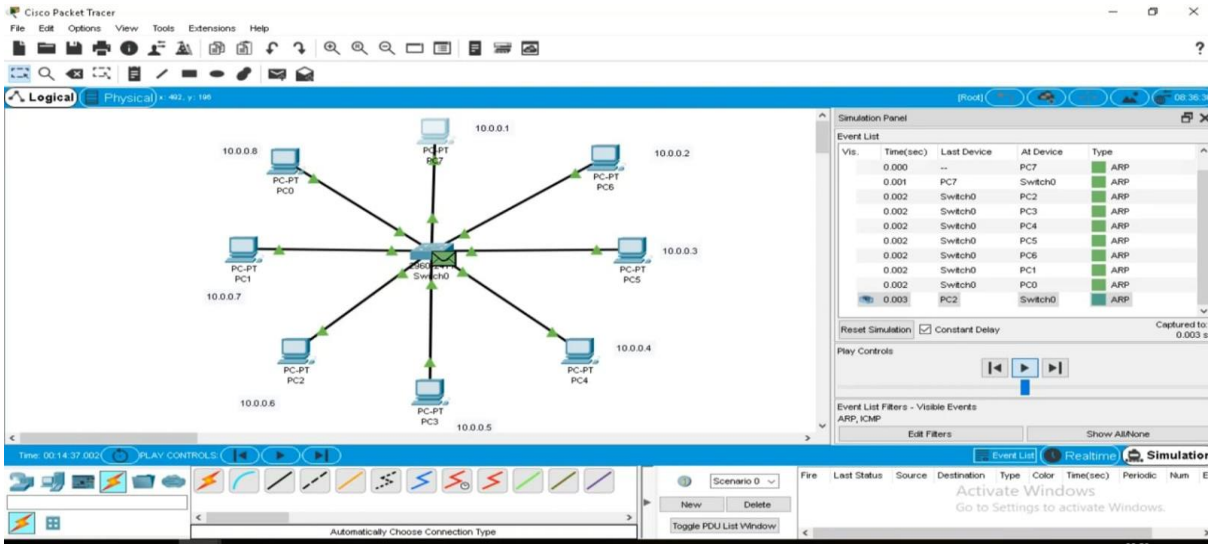
14.MAC address is displayed.



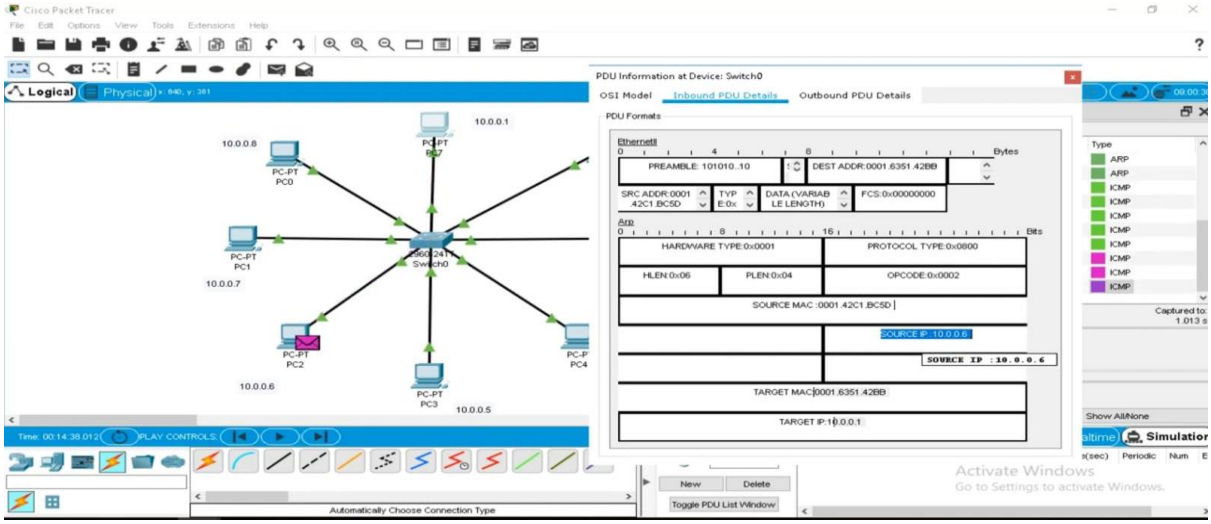
15.TARGET is also displayed(target is our wish).



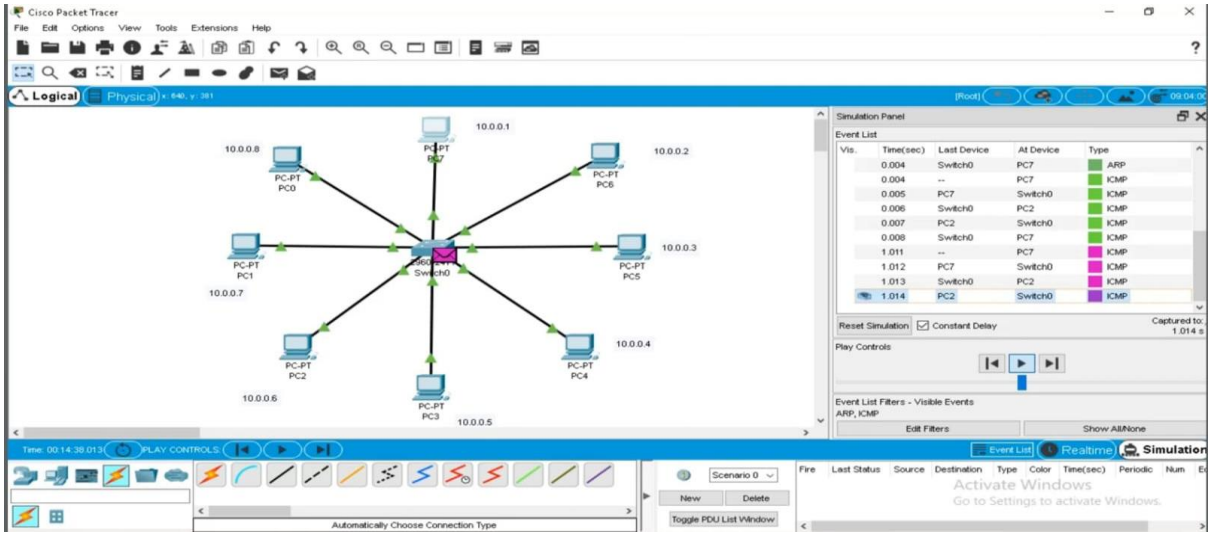
16.Message is at switch.



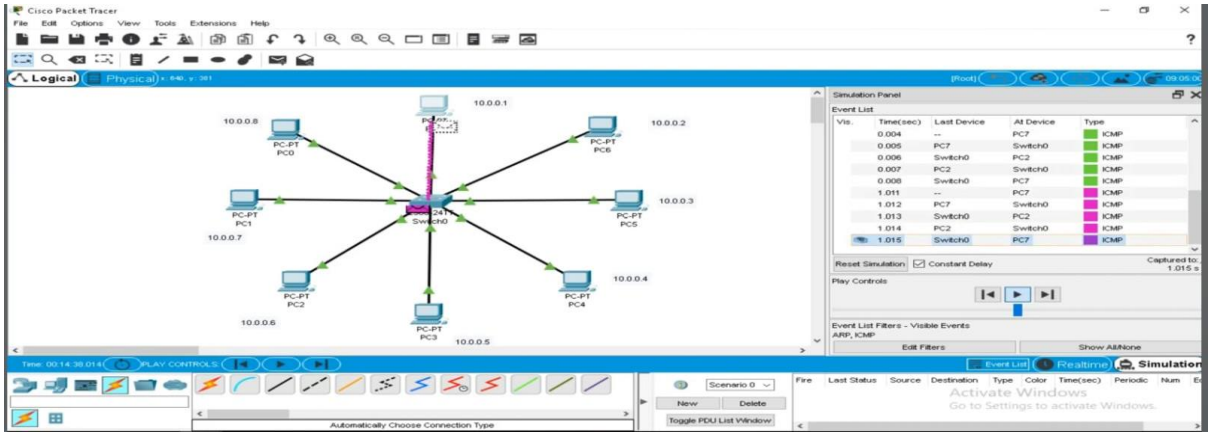
17.Message gone to selected IP address.



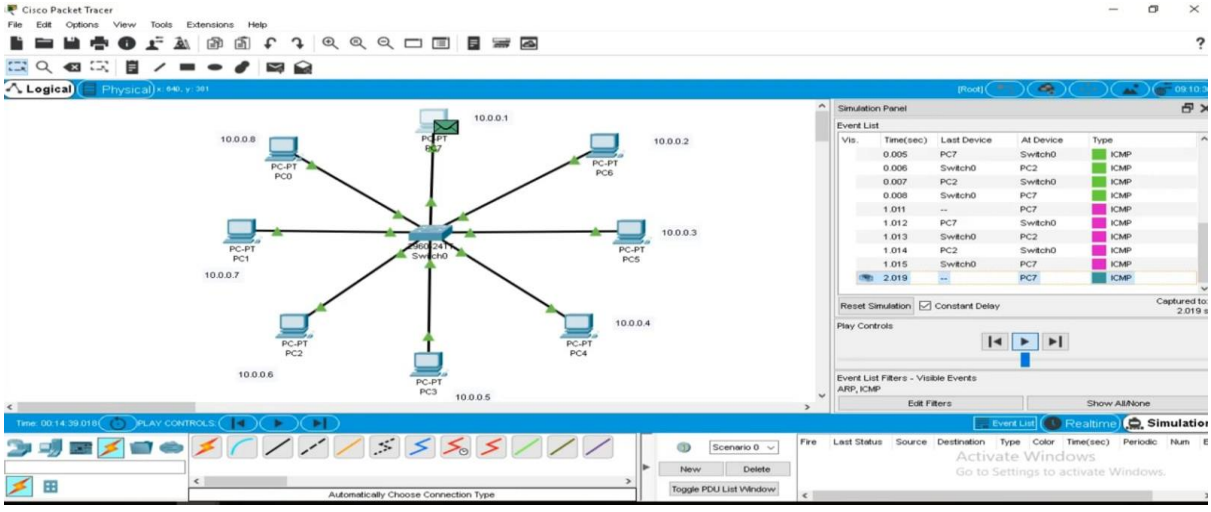
18.Message is going to destination.



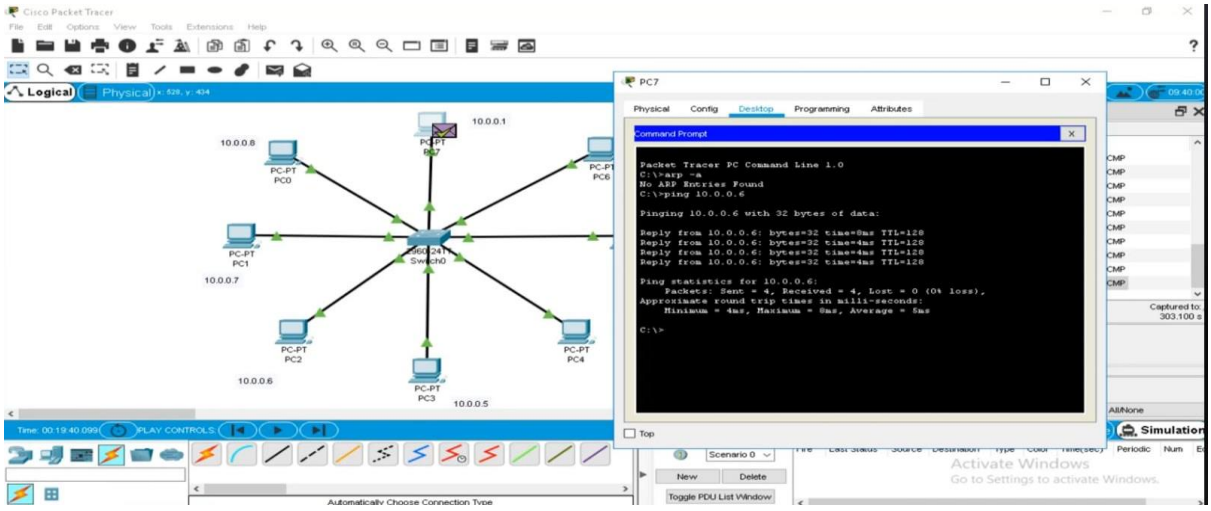
19.You can see at target IP address.



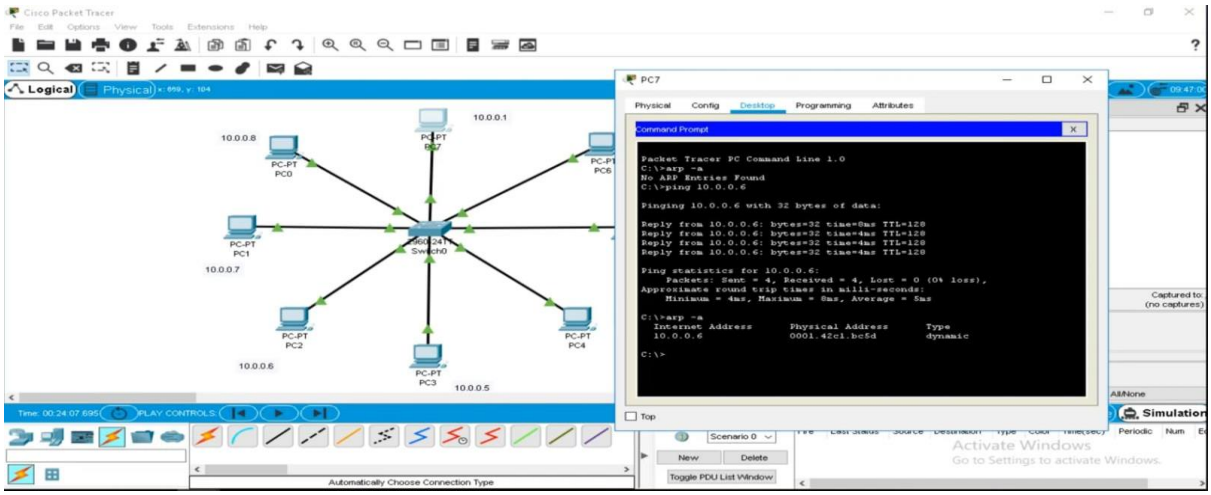
20.Observe the event list.



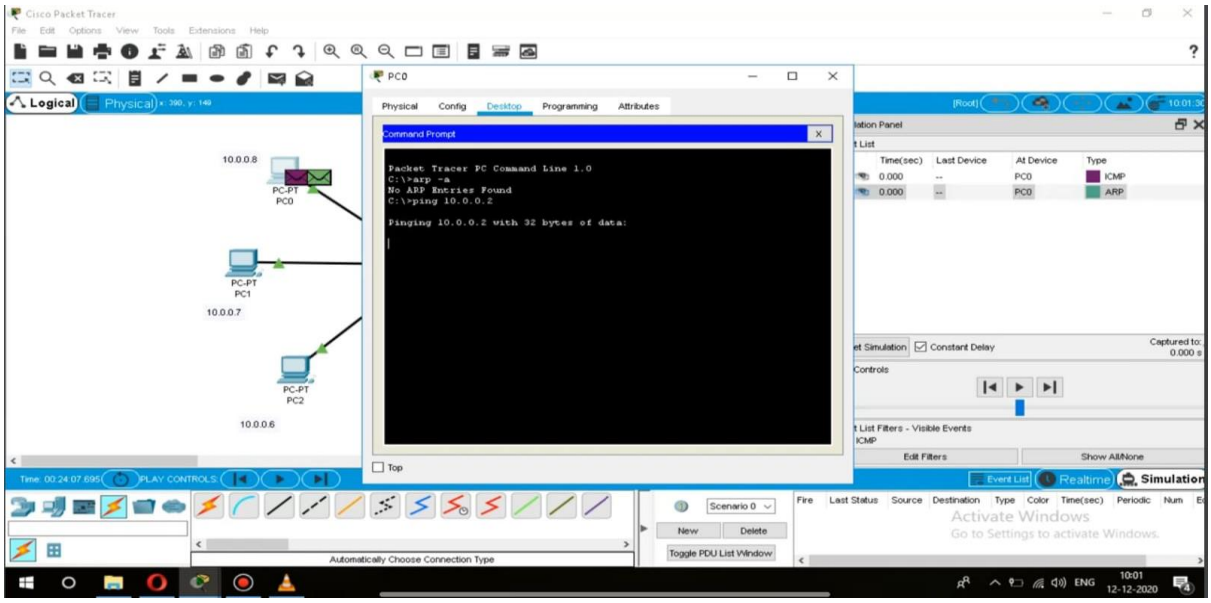
21.Lets go for another device.



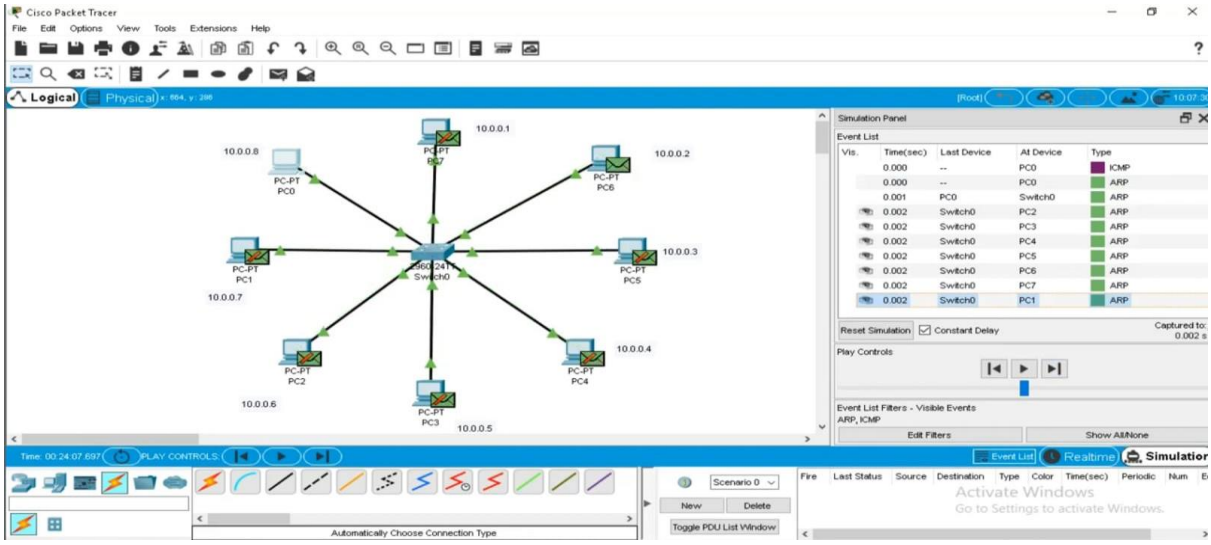
22.ARP is generated.



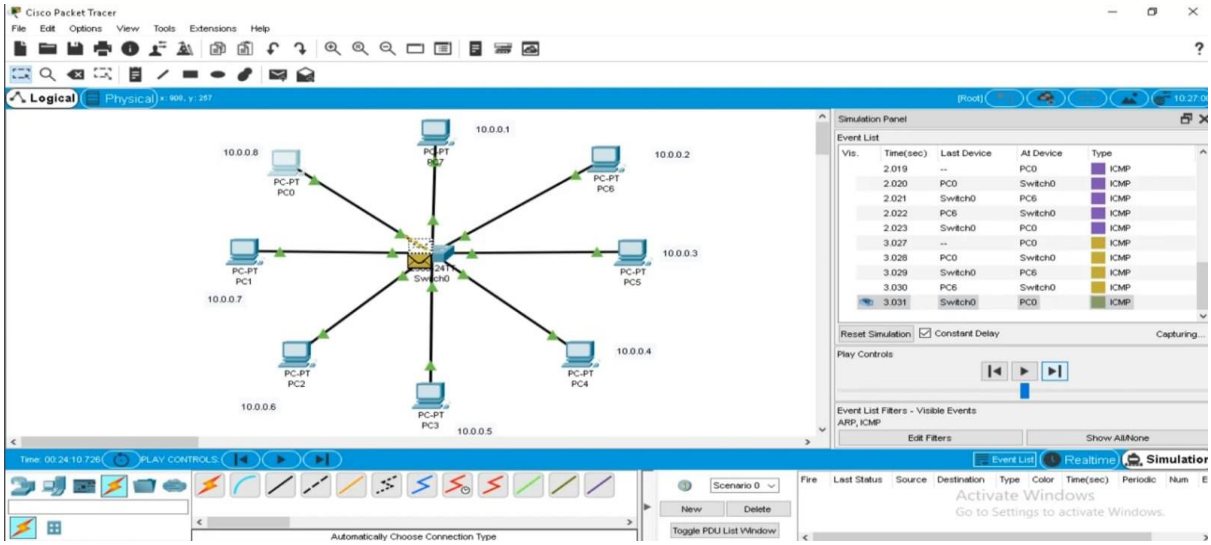
23.Repeat the same process.



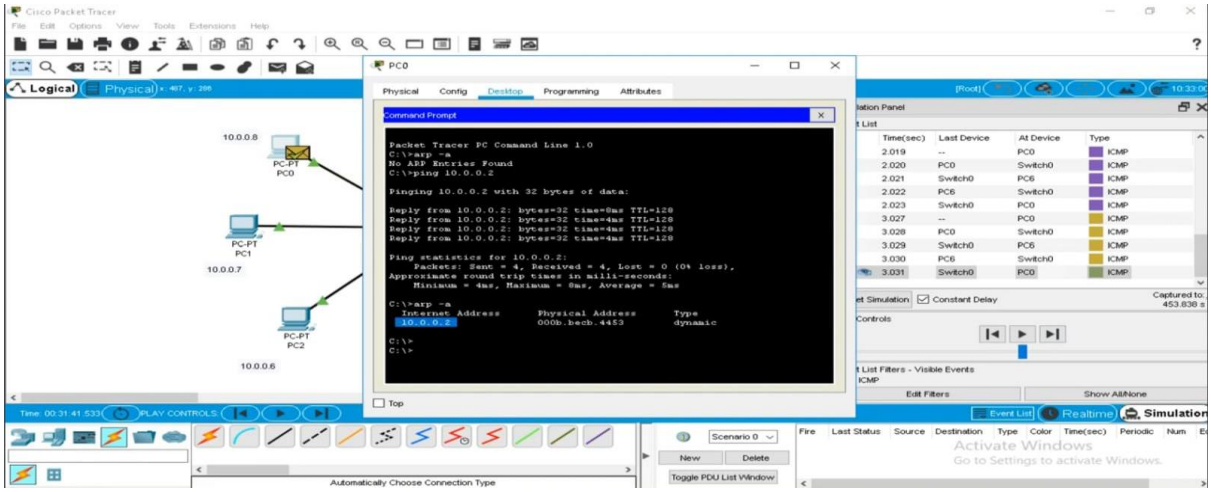
24.Messages going to their destinations.



25.This is the working of ARP.



26.You can check any device like this.



Conclusion:

Through this simulation, we gained practical insights into the functioning of the Address Resolution Protocol (ARP) within a Local Area Network. We observed how ARP plays a crucial role in mapping IP addresses to MAC addresses, facilitating communication between devices. The troubleshooting exercises allowed us to identify and resolve potential ARP-related issues, enhancing our understanding of network protocols and their impact on connectivity. This hands-on experience with Cisco Packet Tracer provided valuable insights into network design and problem-solving, contributing to a more comprehensive grasp of networking concepts.