Address Resolution Protocol

Introduction:

The Address Resolution Protocol (ARP) is a fundamental protocol used in computer networks to map IP addresses to physical MAC addresses within a local network segment. Its primary function is to facilitate communication between devices by resolving IP addresses to MAC addresses, which are necessary for data transmission at the link layer of the OSI model.

Aim and Objective:

The aim of ARP is to provide a method for dynamically resolving IP addresses to MAC addresses within a local network, enabling efficient and reliable communication between devices. Its objectives include:

- Address Resolution: ARP aims to resolve the mapping between IP addresses and MAC addresses to facilitate communication between devices on the same network segment.
- Efficiency: ARP aims to operate efficiently by minimizing network traffic and overhead associated with address resolution.
- Dynamic Updates: ARP allows for dynamic updates of the ARP cache, ensuring that changes in network topology or device configurations are reflected accurately.

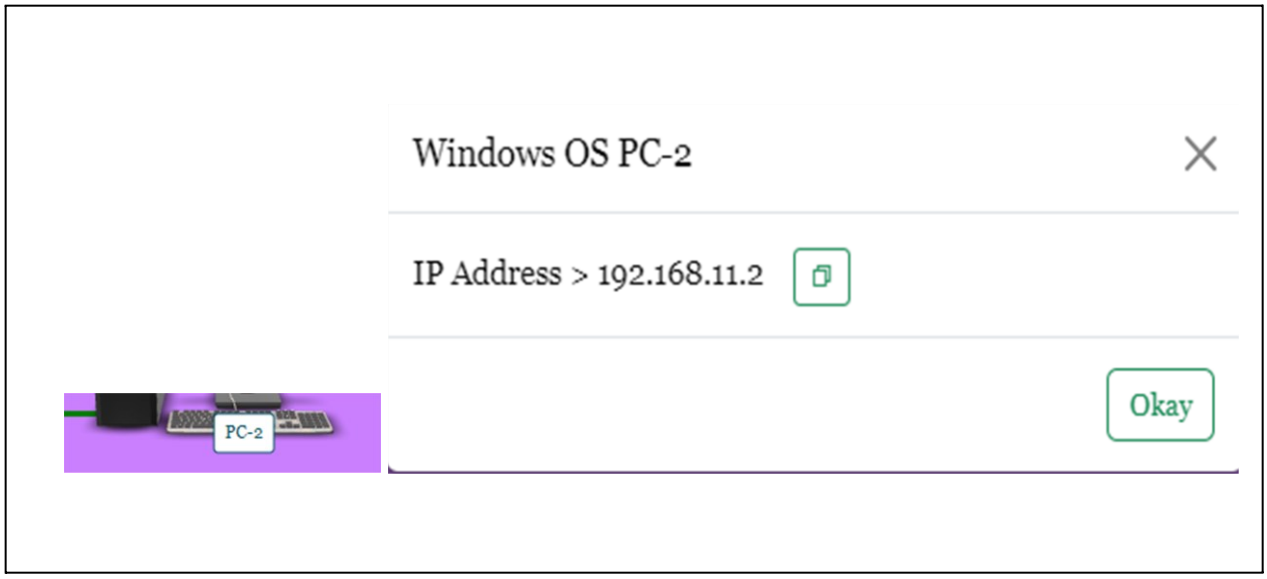
Steps Involved in Address Resolution Protocol:

- ARP Request: When a device needs to communicate with another device on the same network segment and does not have the MAC address of the destination device, it broadcasts an ARP request packet containing the IP address it wishes to resolve.
- ARP Reply: The device with the corresponding IP address specified in the ARP request responds with an ARP reply packet containing its MAC address.
- ARP Caching: Upon receiving the ARP reply, the requesting device stores the IP-to-MAC mapping in its ARP cache to facilitate future communication with the same device. This caching mechanism helps to reduce ARP traffic and improve network efficiency.
- Address Resolution: With the IP-to-MAC mapping stored in its ARP cache, the requesting device can now encapsulate the data packets with the correct destination MAC address, enabling direct communication with the destination device.

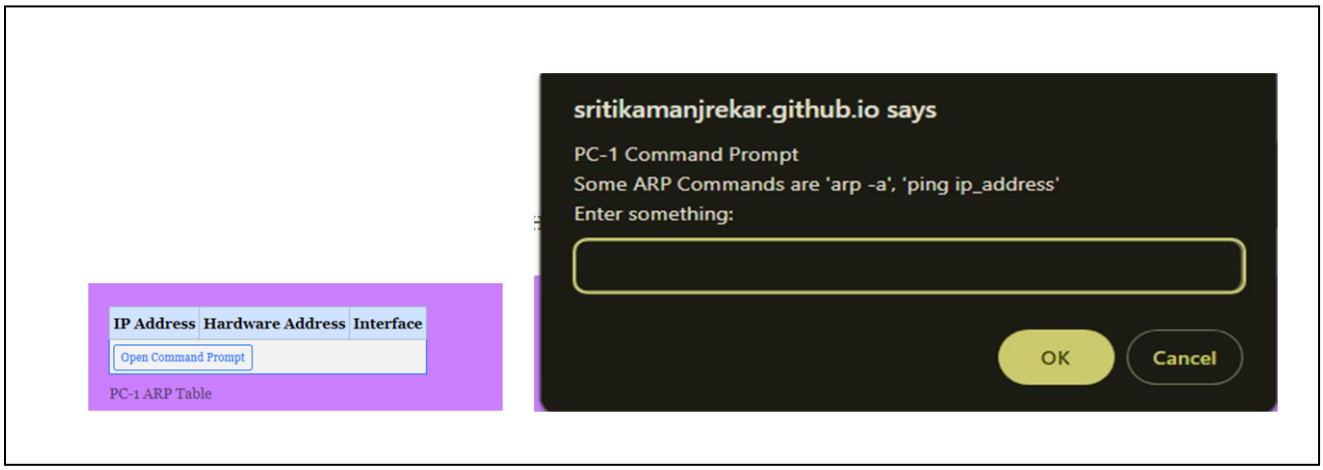
Conclusion:

In conclusion, the Address Resolution Protocol (ARP) plays a crucial role in enabling communication between devices on the same network segment by dynamically resolving IP addresses to MAC addresses. By facilitating efficient address resolution and maintaining an ARP cache, ARP helps optimize network performance and reliability. It serves as a fundamental component of modern networking protocols, ensuring seamless connectivity within local networks.

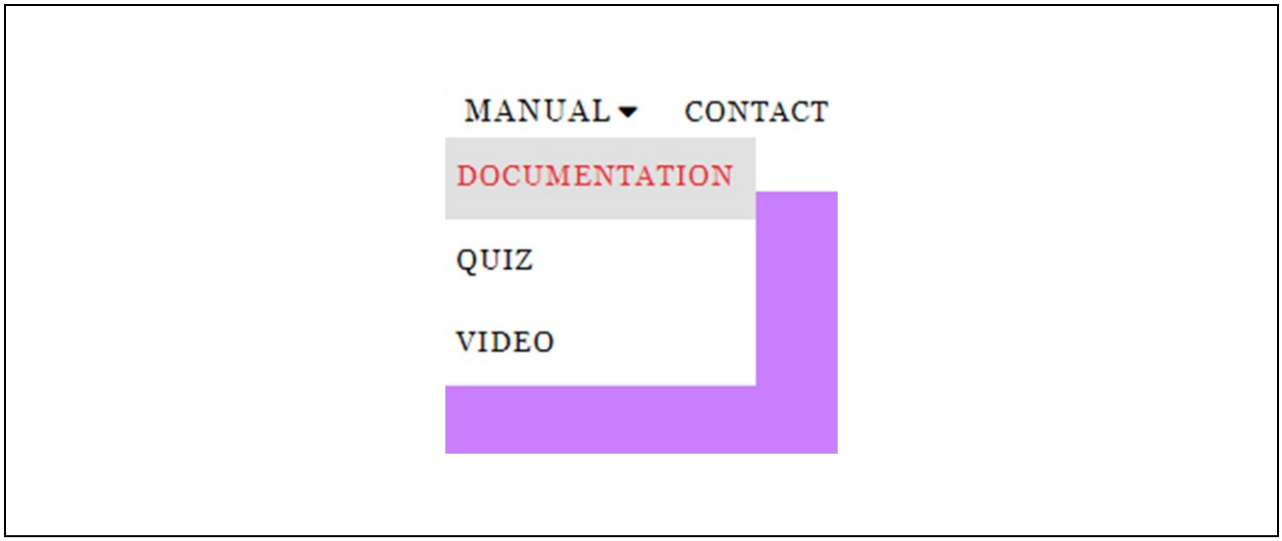
1. If you want know IP & MAC Address of any PC you can click on blue square as shown below:



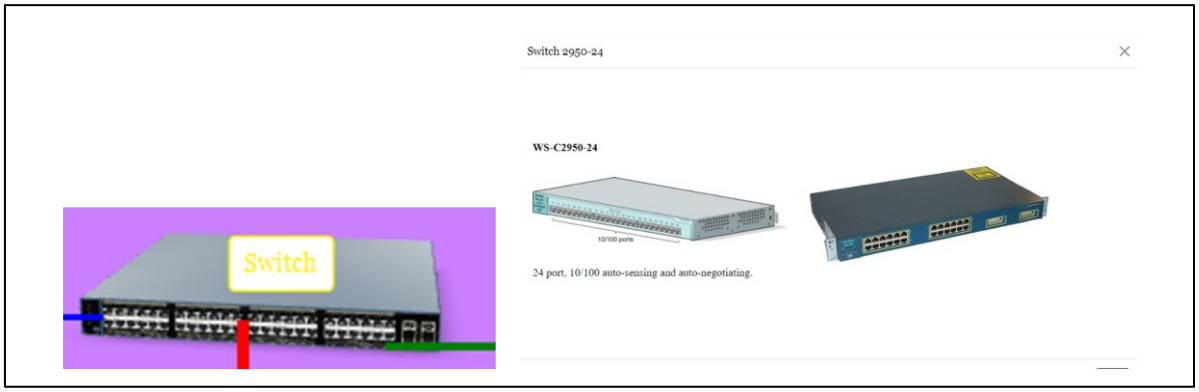
2. Let's start performing ARP in AR World!!! Click on "Open Command Prompt" button of any PC:



3. Click on “Explore ARP Magic” to view Presentation on ARP :

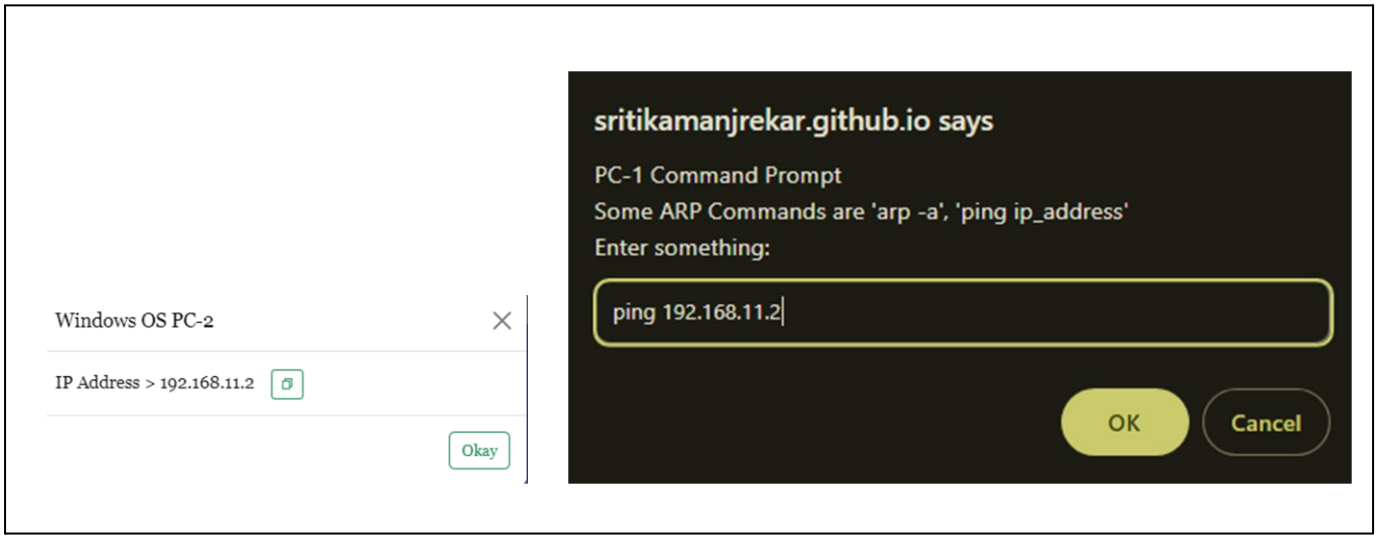


4. Click on “Switch” to view Switch Details:



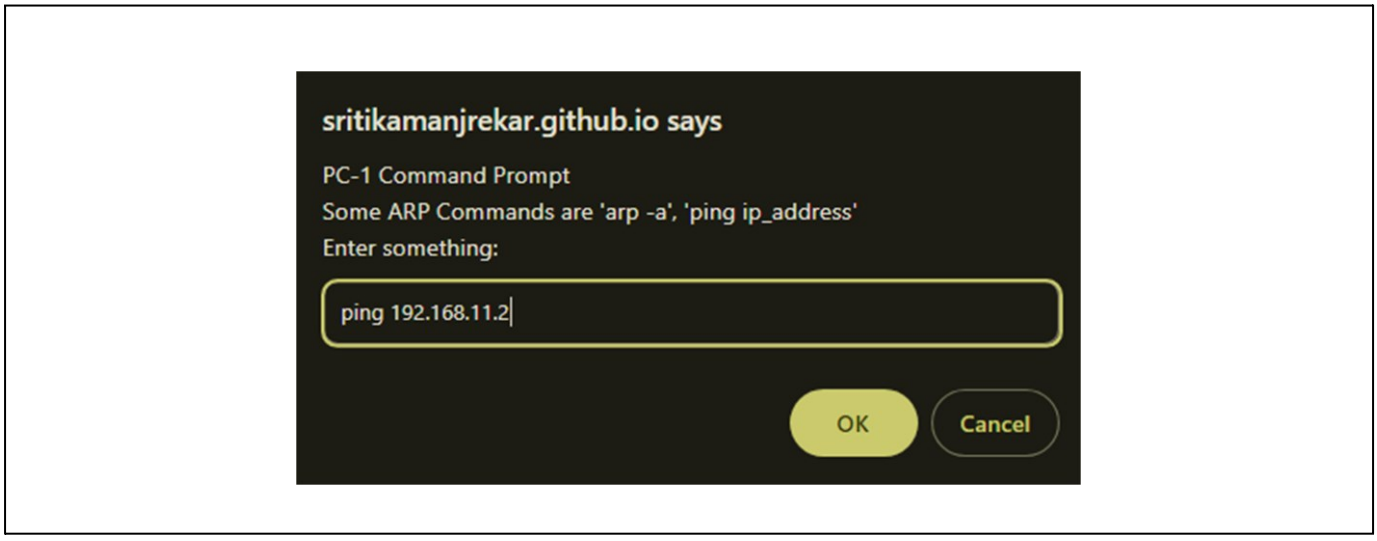
5. Click on wire colors “Red”/”Blue”/”Green” to view wire details:

6. Enter “ping IP_Address” of PC of which you want to know MAC Address

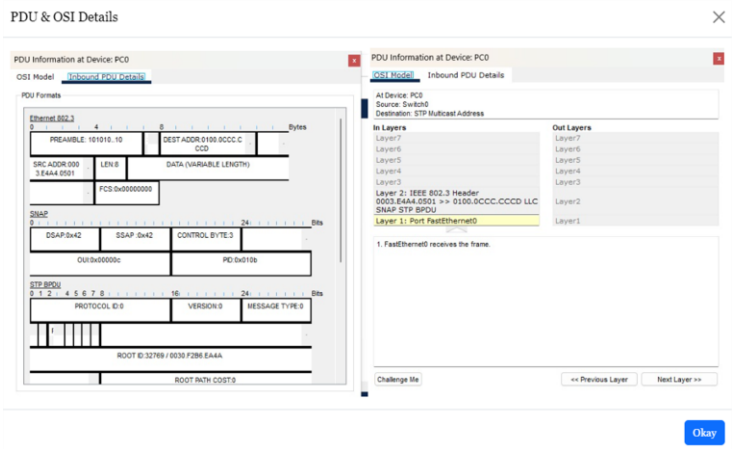


For now let’s enter IP Address of PC-2 which is 192.168.11.2

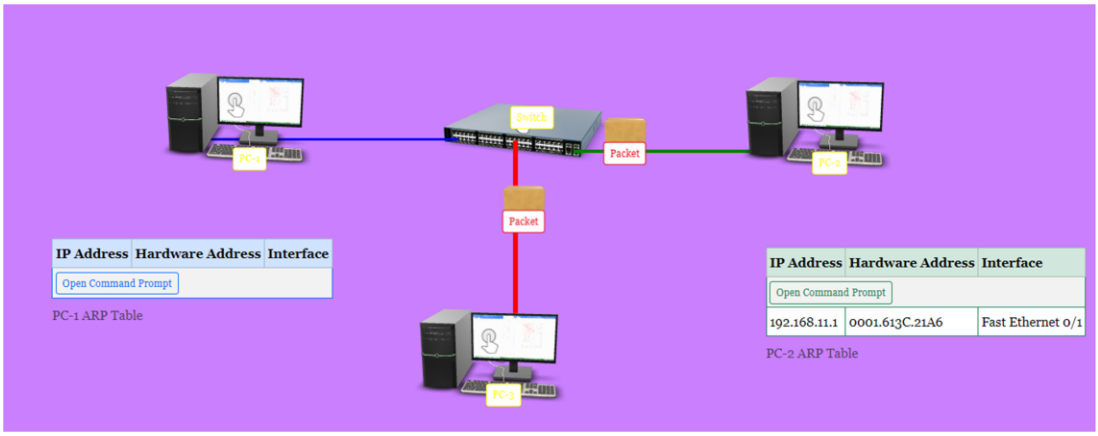
7. Now Click on OK then the magic AR World will begin the packet will start simulating



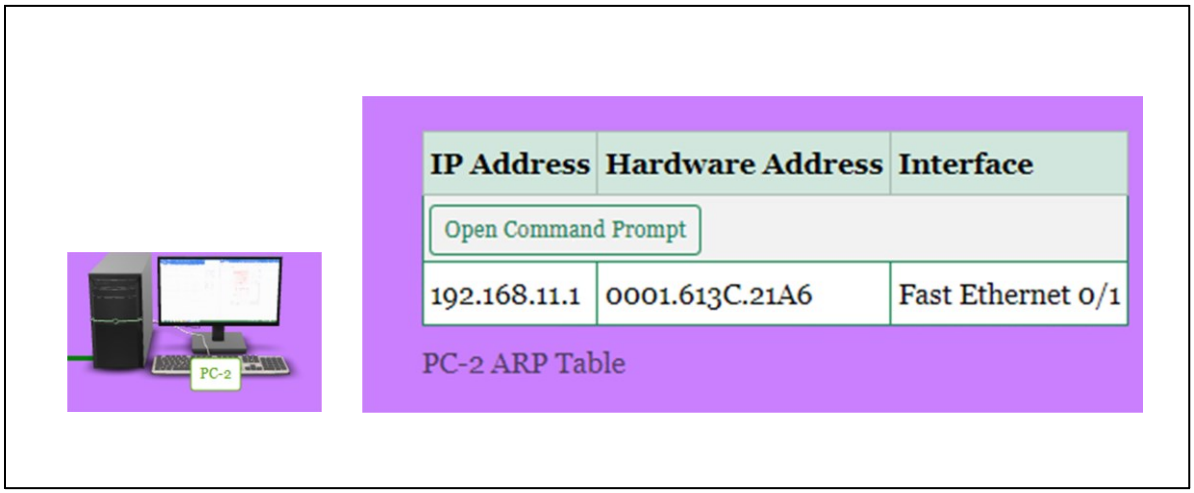
8. When you click on Packet Label you will get details of what is there inside the Packet when it goes from PC-1 to PC-2, PC-3 to search for that IP Address



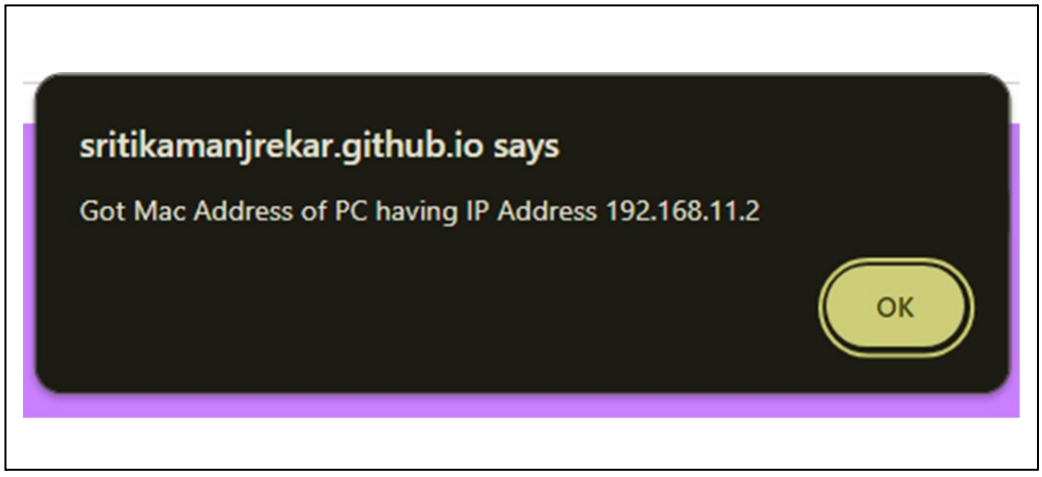
9. PC-1 sends a ping to all PC's whichever PC matches that ping IP Address sends Acknowledgement and also stores PC-1 IP Address and MAC Address in their ARP table.



10. PC-2 stores IP Address, MAC Address, Interface in their ARP Table of PC-1.



11. You will get an alert message like this: “Got MAC Address” means communication between PC-1 to respective PC with IP Address 192.168.11.2 is completed.



12. You will observe that after clicking on OK the PC-1 ARP table shows IP Address, MAC Address, Interface of PC-2.

IP Address	Hardware Address	Interface
Open Command Prompt		
192.168.11.2	0030.A333.03CB	Fast Ethernet 0/1

PC-1 ARP Table

This way you can get the MAC Address of any PC when you know only one thing that is an IP Address and this is how it works in Real World also.

Bonus!!!

You can also zoom in network devices with mouse to look around to take a look