Department of Computer Science and Engineering
Islamic University of Technology (IUT)
A subsidiary organ of OIC

Laboratory Report

CSE 4412 : Data Communication and Networking Lab

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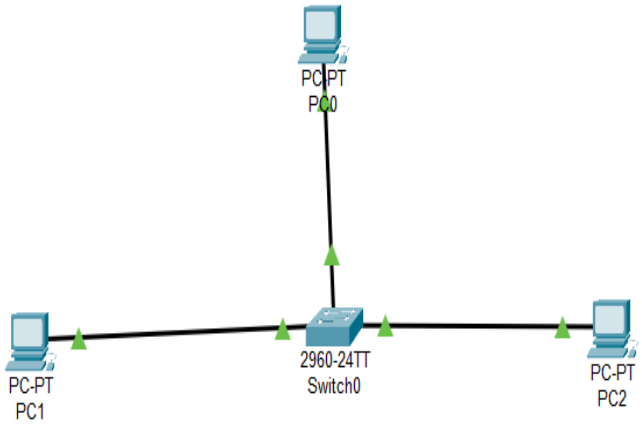
Section	**:1A**
Semester	**:Summer**
Academic Year	**:2021-2022**
Date of Submission	**:30.01.2023**
Lab No	**:04**

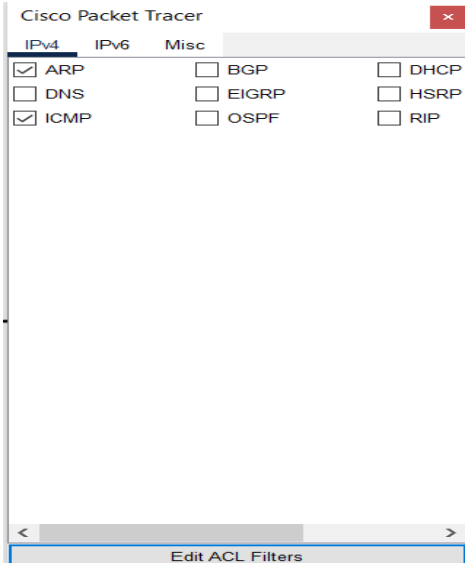
Title: Observation of ARP events and lecture on Logical Addressing.

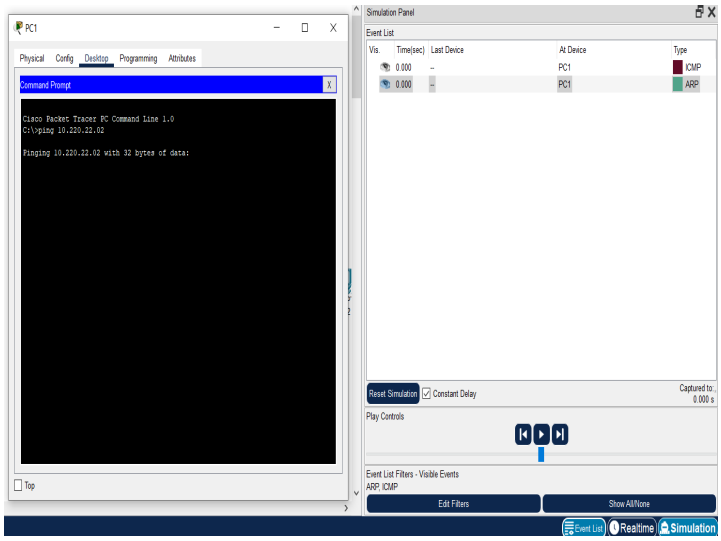
Objective:

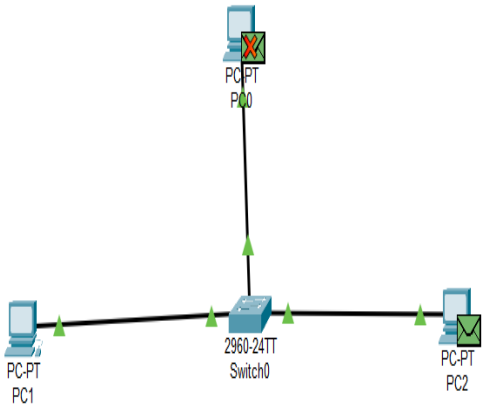
1. Understand how the physical address of a node in the same network is found when the source only knows the logical address.
2. Understand the necessity of hierarchical addressing compared to flat addressing.
3. Understand classful addressing of IPv4 Addressing.
4. Understand the subnet mask.

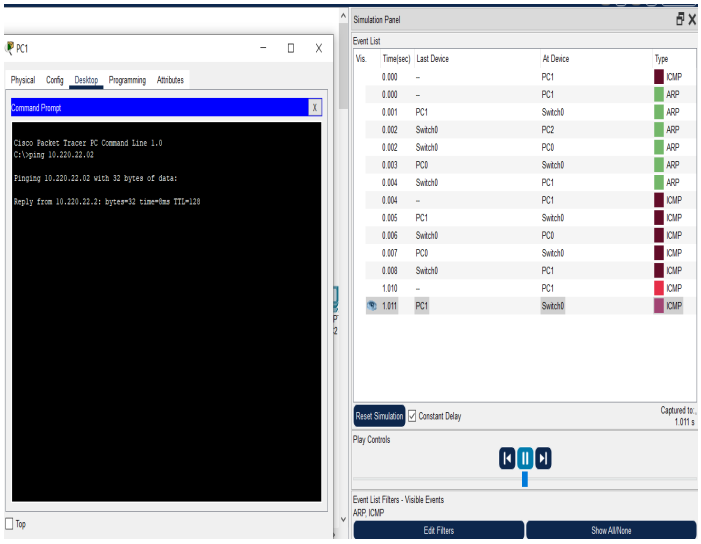
Diagram of the experiment:






PC1
Physical
Config
Desktop
Programming
Attributes
Command Prompt
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 10.220.22.02
Pinging 10.220.22.02 with 32 bytes of data:
Top
Simulation Panel
Event List
Vis.
Time(sec)
Last Device
At Device
Type
0.000
PC1
ICMP
0.000
PC1
ARP
Reset Simulation
Constant Delay
Captured to:
0.000 s
Play Controls
Event List Filters - Visible Events
ARP ICMP
Edit Filters
Show All/None
Event List
Realtime
Simulation


PC-PT
PC0
2960-24TT
Switch0
PC-PT
PC1
PC-PT
PC2


PC1
Physical
Config
Desktop
Programming
Attributes
Command Prompt
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 10.220.22.02
Pinging 10.220.22.02 with 32 bytes of data:
Reply from 10.220.22.2: bytes=32 time=0ms TTL=128
Top
Simulation Panel
Event List
Vis.
Time(sec)
Last Device
At Device
Type
0.000
PC1
ICMP
0.000
PC1
ARP
0.001
PC1
Switch0
ARP
0.002
Switch0
PC2
ARP
0.002
Switch0
PC0
ARP
0.003
PC0
Switch0
ARP
0.004
Switch0
PC1
ARP
0.004
PC1
ICMP
0.005
PC1
Switch0
ICMP
0.006
Switch0
PC0
ICMP
0.007
PC0
Switch0
ICMP
0.008
Switch0
PC1
ICMP
1.010
PC1
ICMP
1.011
PC1
Switch0
ICMP
Reset Simulation
Constant Delay
Captured to:
1.011 s
Play Controls
Event List Filters - Visible Events
ARP ICMP
Edit Filters
Show All/None

Experiment Set Up Description:

The setup was done by connecting 3 computers with a switch using straight-through wire. To simulate, I filtered out the event list selecting only the ARP and ICMP events.

Observation:

Address Resolution Protocol (ARP) is a procedure for mapping a dynamic IP address to a permanent physical machine address in a local area network. The physical machine address is also known as a media access control (MAC) address.

Every time a host device requests for a MAC address to send a packet to another host in the LAN, it checks its ARP table to see if the IP to MAC address translation already exists. If the translation does not exist, then the request for network addresses is sent and ARP is performed. Otherwise use the existing translation.

When a request is made, ARP broadcasts a request packet to all the devices on the LAN and asks if any of the devices are using that particular IP address. When a device recognizes the IP address as its own, it sends a reply so ARP can update the table for future reference and proceed with the communication. If no device recognizes the IP address as its own, then the device will drop the packet.

Now the device whose IP address has matched with the destination IP address in the packet will reply and send the ARP a reply message. The ARP reply message is unicast and it is not broadcasted because the source which is sending the ARP reply to the destination knows the MAC address of the source device.

When the source receives the ARP reply it comes to know about the destination MAC address and it also updates its ARP table. Now the packets can be sent as the source knows the destination MAC address.

Challenges:

As ARP was a new topic for me, I struggled a bit to understand it completely.

Answer the Following Questions

1. **What is flat addressing and hierarchical addressing? Why is IPv4 address a hierarchical addressing?**
   Flat addressing assigns unique addresses to all devices on a network without any structure or hierarchy which makes it difficult to manage large networks. In hierarchical addressing addresses are assigned in a hierarchical structure, where different levels of the hierarchy represent different levels of the network.
   IPv4 addresses are an example of hierarchical addressing because it is divided into four octets where the first octet indicates the network and the remaining three octets indicate the host.

2. **What are the ranges of ip addresses in class A, B, C.**
   In class A IP address, the first bit of the first octet will start with 0. This range allows up to 2^24 hosts. In class B IP address, the first 2 bits will be 10. This range allows up to 2^16 hosts. In class C IP address, the first 3 bits will be 110. This range allows up to 2^8 hosts.

3. **What is a subnet mask? How to determine the network address and broadcast address of a network from an IP address and subnet mask? What is the default subnet mask of a class A, B, C network.**
   A subnet mask is a 32-bit binary IP address that is divided into two parts: the network address and the host address.

The subnet mask is used to determine which portion of the IP address belongs to the network and which portion belongs to the host.
By performing logical AND operation between the IP address and the subnet mask, the network and host part of the address are separated. The first 24 bits are identified as the network address. The last 8 bits are identified as the host address.

The default subnet mask of class A network is 255.0.0.0. The default subnet mask of class B network is 255.255.0.0.The default subnet mask of class C network is 255.255.255.0.