Department of Computer Science and Engineering

Islamic University of Technology (IUT)

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Laboratory Report

CSE 4412 : Data Communication and Networking Lab

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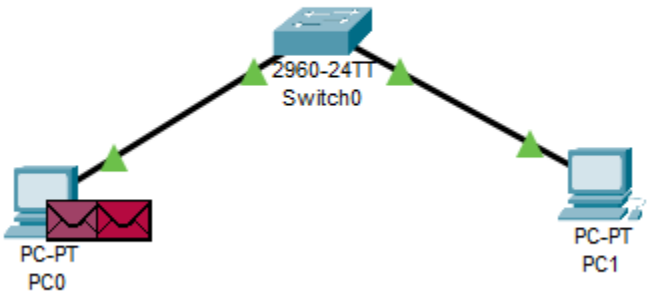
Title: Observation of ARP events and lecture on Logical Addressing.

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:




```
Cisco Packet Tracer PC Command Line 1.0
C:\>arp -d
C:\>
```

Event List

Vis.	Time(sec)	Last Device	At Device	Type
	0.000	--	PC0	ICMP
	0.000	--	PC0	ARP
	0.001	PC0	Switch0	ARP
	0.002	Switch0	PC1	ARP
	0.003	PC1	Switch0	ARP
	0.004	Switch0	PC0	ARP
	0.004	--	PC0	ICMP
	0.005	PC0	Switch0	ICMP

```
C:\>arp -a
  Internet Address      Physical Address      Type
  192.168.0.2           0002.4a3b.a62d        dynamic
```

Experiment Set Up Description:

1. Set two end devices and one switch in cisco packet tracer and connect them
2. Set Ip address for PC0 to 192.168.0.1 and for PC1 to 192.168.0.2.
3. Click on edit filters in simulation window and deselect everything except ARP and ICMP.
4. Write arp - d on command prompt of PC0 to clear the ARP table.
5. Send message from PC0 to PC1 using ping command from command prompt.
6. Type arp -a on command prompt to check for ARP entries and view physical address.

Observation:

ARP packets only get sent when MAC address of destination device is not known by PC0. To explain this lets say PC0 is sending a packet to PC1 as described in the experiment set up. At first, PC0 is not aware of the MAC address of PC1. So, an ARP request is sent by PC0. The request is then acknowledged by PC1 and the request is then sent back to PC0. Now, PC0 is aware of the IP address of PC1 so no more ARP requests are sent. However, if we clear the ARP table of PC0 then a new ARP request will be sent to PC1 as it will no longer be aware of the MAC address of PC1.

Challenges:

ARP table needs to be cleared otherwise it will only show the ARP request for the very first message being sent.

Answer the Following Questions

1. What is flat addressing and hierarchical addressing? Why is IPv4 address a hierarchical addressing?

Flat addressing is a simple IP addressing scheme where IP addresses are assigned using an IP address range without any structure or level.
Hierarchical addressing is an IP addressing scheme where IP addresses follow a hierarchical structure. The IP address space is divided into smaller subgroups which identifies each end device from a lower lever. The different subgroups include network, subnet, host which allows efficient usage of IP addresses.

The IPv4 addressing is hierarchical because it follows a class-based addressing system. IPv4 address is divided into two parts namely: a network address and host address. The first two octaves identify the network while the last two octaves identify the end devices of that network.

2. What are the ranges of ip addresses in class A, B, C.

   Class A IP addresses range from 1.0.0.0 to 126.0.0.0.
   Class B IP addresses range from 128.0.0.0 to 191.255.0.0.
   Class C IP addresses range from 192.0.0.0 to 223.255.255.0.

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 are the default subnet mask of a class A, B, C network.

   Subnet mask is a 32 bit mask used to divide IP addresses into subnets and determine network address, subnet address, host address of an IP address.

   To determine the network address and broadcast address from an IP address the following steps are to be taken.
   - Binary representation of IP address is performed a bitwise AND operation to obtain network address.
   - To obtain broadcast address, at first subnet mask is inversed using a bitwise NOT operation. Then a bitwise OR operation is performed with the inversed subnet mask and the broadcast address is obtained.

   Default mask of a class A address is 255.0.0.0
   Default mask of a class B address is 255.255.0.0
   Default mask of a class C address is 255.255.255.0