

CO1507 Introduction to Networking

Lab 6 - ARP tables and more besides

Task 1 - DHCP

IMPORTANT

If you did not complete it already last week go to last weeks labsheet and undertake **"Task 3: DHCP server configuration"** do this BEFORE proceeding with this weeks tasks.

Task 2 - ARP

Setup a small local area network in packet tracer with 5 hosts:

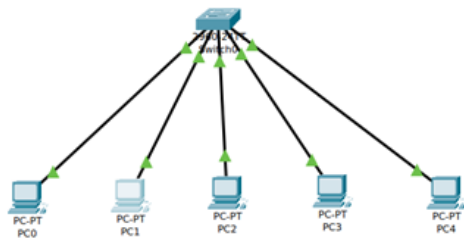


Fig 1. Small LAN with 5 hosts in Packet Tracer

I want you to use the network address 192.168.16.0 255.255.255.0

Record answers to the following in your notes

1. What is the first valid host IP address on this subnet?
2. What is the last valid host IP address on this subnet?
3. What is the maximum number of hosts which this subnet can support?
4. What is the broadcast address on this subnet?

List the IP addresses you have given to the 5 hosts on the network

Host 1 IP address: ...

Host 2 IP address: ...

Host 3 IP address: ...

Host 4 IP address: ...

Host 5 IP address: ...

Using the command `ipconfig /all` in packet tracer in the "Command Prompt" option from the "Desktop" tab (i.e. where you go to ping!) lookup and write down the MAC addresses of the 5 machines you have included in your network

```

Physical  Config  Desktop  Programming  Attributes
Command Prompt X

Packet Tracer PC Command Line 1.0
C:\>ipconfig /all

FastEthernet0 Connection:(default port)

    Connection-specific DNS Suffix.:
    Physical Address.....: 0002.4A87.004C
    Link-local IPv6 Address.....: FE80::202:4AFF:FE87:4C
    IP Address.....: 0.0.0.0
    Subnet Mask.....: 0.0.0.0
    Default Gateway.....: 0.0.0.0
    DNS Servers.....: 0.0.0.0
    DHCP Servers.....: 0.0.0.0
    DHCPv6 Client DUID.....: 00-01-00-01-43-C5-B6-
    D2-00-02-4A-87-00-4C

Bluetooth Connection:

    Connection-specific DNS Suffix.:
    Physical Address.....: 0001.C911.9958
    Link-local IPv6 Address.....: ::
    IP Address.....: 0.0.0.0
    Subnet Mask.....: 0.0.0.0
    Default Gateway.....: 0.0.0.0
    DNS Servers.....: 0.0.0.0
    ..More..

```

Fig 2. Command prompt showing ipconfig output in Packet Tracer

Host 1 MAC address: ...

Host 2 MAC address: ...

Host 3 MAC address: ...

Host 4 MAC address: ...

Host 5 MAC address: ...

On one of the hosts in the command prompt use the command arp -a. What do you see?

Ping another machine on your network, was it successful? If not troubleshoot.

Once you have successfully pinged another machine repeat the arp -a command. What do you see now?

Ping ALL of the machines on the network one by one. If any fail troubleshoot the issue.

Repeat the command arp -a once again. What do you see?

Now use the command arp -d, followed by arp -a again. What do you see? All entries should be removed as arp -d should clear the ARP table.

```

Command Prompt X

Packet Tracer PC Command Line 1.0
C:\>arp -a
No ARP Entries Found
C:\>arp -a
No ARP Entries Found
C:\>ping 192.168.10.18

Pinging 192.168.10.18 with 32 bytes of data:

Reply from 192.168.10.18: bytes=32 time=1ms TTL=128
Reply from 192.168.10.18: bytes=32 time=2ms TTL=128
Reply from 192.168.10.18: bytes=32 time<1ms TTL=128
Reply from 192.168.10.18: bytes=32 time<1ms TTL=128

Ping statistics for 192.168.10.18:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 2ms, Average = 0ms

C:\>arp -a
    Internet Address      Physical Address      Type
    192.168.10.18         0002.4a87.004c       dynamic

C:\>arp -d
C:\>arp -a
No ARP Entries Found
C:\>

```

Fig 3. Command prompt showing arp output in Packet Tracer

Using the information what you have from the ARP tables construct frame diagrams in your notes showing what the ARP request and response would look like for communication between and 2 machines when one pings the other, and no ARP entry previously exists. Refer to the lecture slides for example of ARP frames

ARP request :

Destination IP address:	Source IP address:	Destination MAC address:	Source MAC address:

ARP response :

Destination IP address:	Source IP address:	Destination MAC address:	Source MAC address:

1. Why is it important for ARP tables to be created?
2. Why is it important that periodically ARP tables are discarded by the operating system? (we just manually cleared them but after a time of inactivity this would happen automatically)

Task 3: Adding a second subnet

Add a second subnet; what I mean by this is that you need to construct what is essentially a copy of the network which you constructed at the beginning of the lab sheet.

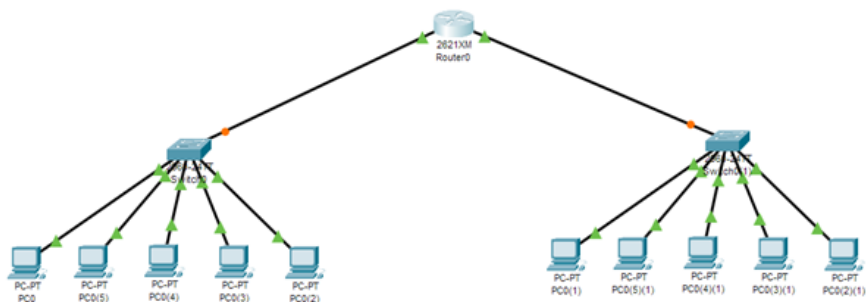


Fig 4. Second subnet added and joined to previous with a router in Packet Tracer

You need to configure this subnet on ANOTHER network address. Use 172.16.0.0 255.255.0.0

Record the IP addresses on the 5 hosts in your new network.

Host 1 IP address: ...

Host 2 IP address: ...

Host 3 IP address: ...

Host 4 IP address: ...

Host 5 IP address: ...

Connect the 2 networks together using a router. Use the router 2621XM. Obviously ONE of the fast ethernet ports of the router should be connected to the first subnet and given an IP address ON that subnet. The second should be connected to the second subnet and given an IP address ON that subnet.

You can configure the routers addresses in Packet Tracer by clicking on the router, going to the “Config” tab, and locating the correct interface down the left hand side:

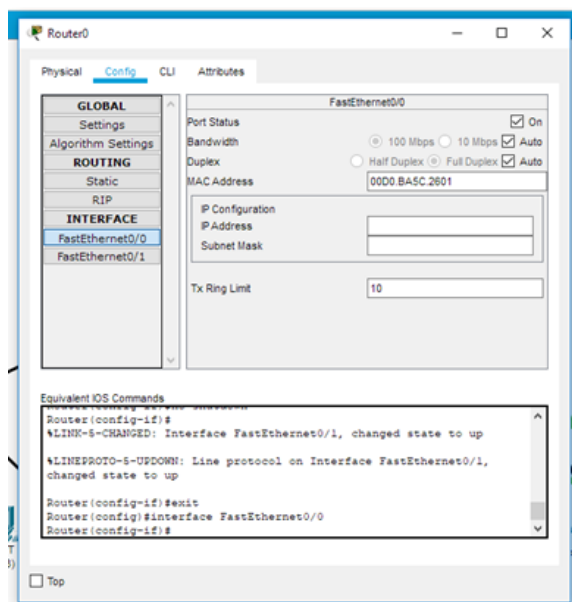


Fig 4. Router config panel in Packet Tracer

Record the 2 IP addresses of your router in your notes:

Router f0/0 IP address: ...

Router f0/1 IP address: ...

From and PC host on the new subnet ping 172.16.255.255. What do you notice?

How many hosts did you get a reply from? and why?

Issue the command arp -a to look at the ARP table again, what do you see?

Record the IP and MAC addresses of the hosts in the network

Host 1 IP address: ... Host 1 MAC address: ...

Host 2 IP address: ... Host 2 MAC address: ...

Host 3 IP address: ... Host 3 MAC address: ...

Host 4 IP address: ... Host 4 MAC address: ...

Host 5 IP address: ... Host 5 MAC address: ...

Router f0/1 IP address: ... Router f0/1 MAC address: ...

Pinging a broadcast address as we just did is actually a pretty dumb thing to do (depending on circumstances - this is Packet Tracer where we can sandbox things without consequences) in fact a network admin may well block users from doing this

Can you think of why it is undesirable to do this?

Task 4: Diagnosis of fault

Given the network addresses 192.168.1.0 255.255.255.0 for LAN 1 and 172.16.0.0 255.255.0.0 for LAN 2 as shown in the figure below, there are **FIVE** TCP/IP address configuration mistakes.

Identify all mistakes and correct them to enable all hosts to communicate together. [You need to record the mistake and the correction needed to make it work in your notes]

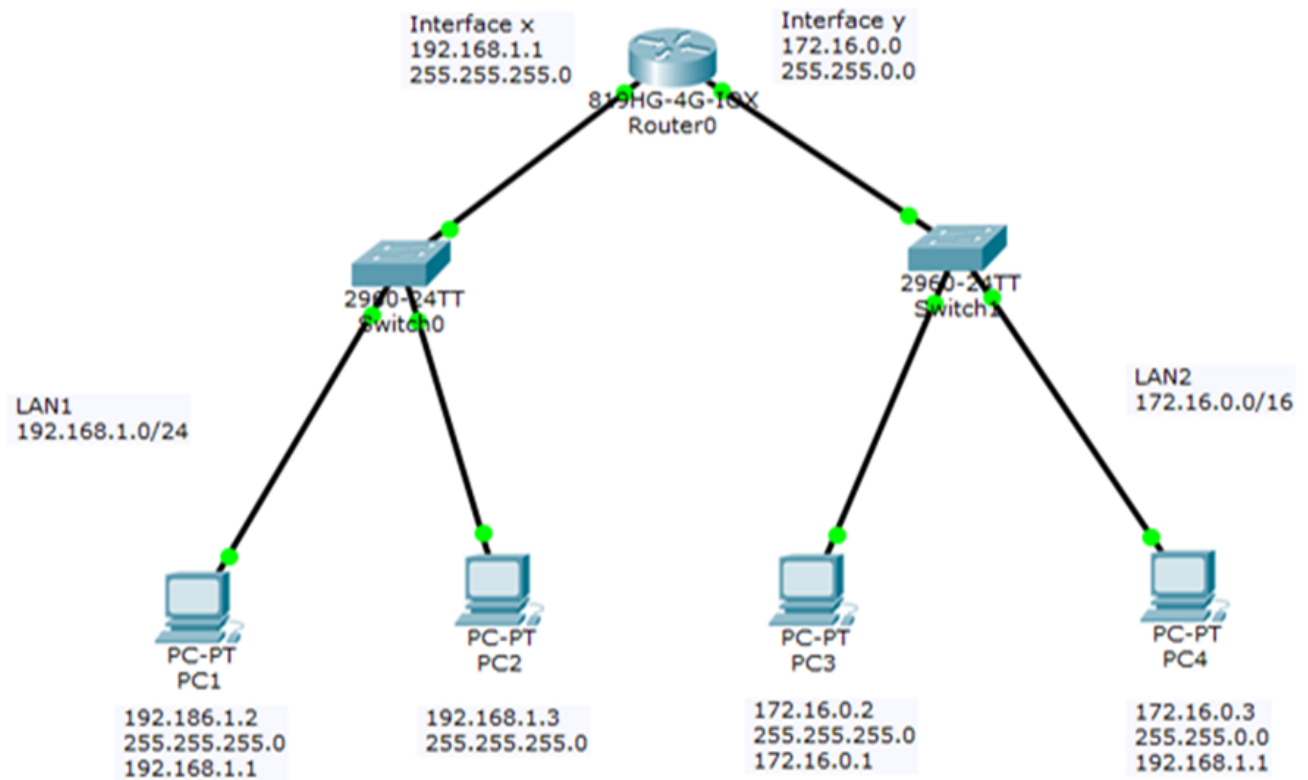


Fig 5. Network topology and config containing 5 mistakes

Mistake 1: ...

Correction: ...

Mistake 2: ...

Correction: ...

Mistake 3: ...

Correction: ...

Mistake 4: ...

Correction: ...

Mistake 5: ...

Correction: ...

Task 5: Complete the quiz linked below.

The following quiz is designed to recap subjects that we have learned so far up to this point. We will be moving onto a different subject next week and by now I want all students to have a good grasp on:

Your score doesn't go anywhere or count for or against you, however it should help you identify any gaps in your own knowledge

- Binary and Hex
- Network devices and topology
- Network IP addressing
- The OSI model, including relevant concerns of the lower 3 layers
- ARP protocol

[Quiz Link](#)

