CSE-331 Computer Networks

Lab No. 03

CLO1,3

Objective

1. Study of Switch Algorithm and Switch MAC Address Tables

Looking at the Switch Algorithm and Switch MAC Address Tables

Step 1

Open the UsingSwitch.pkt file. Do not save the changes to the current network. Notice the similarity to the previous topology. The layer 1 hub has been replaced with a layer 2 switch (if not present, create the topology).

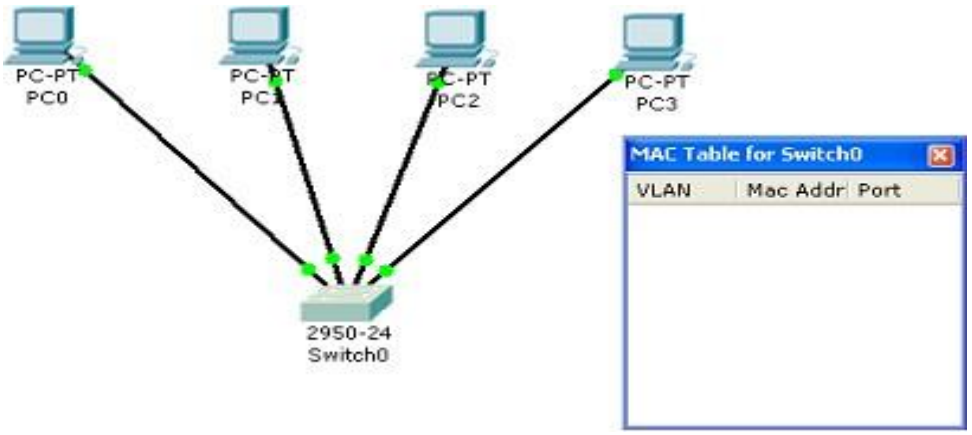
Click on the Simulation icon to switch to simulation mode.

Step 2 Viewing the Switch MAC Address Table

Use the Select tool to view IP address and MAC address information for the various hosts.

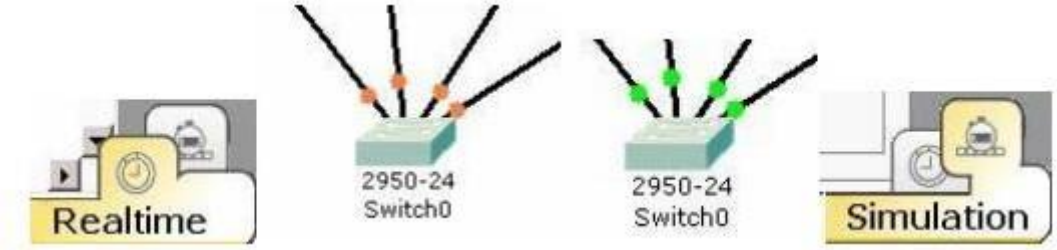
 Use the Inspect tool to view the MAC Address Table of the switch. 

The MAC Address Table is empty as it has not learned any Source Ethernet MAC Addresses. Notice that there is also a VLAN column in this table. This will be discussed in future courses.



Waiting for STP

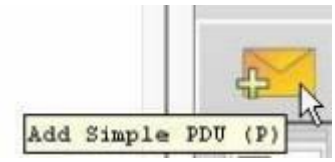
Note: Because of how Packet Tracer deals with the Spanning Tree Protocol, at times the switch may show amber lights on its interfaces. To correct this, click the Real-time mode icon, wait for the lights to turn green, and then click the Simulation mode icon, returning to where you left off.



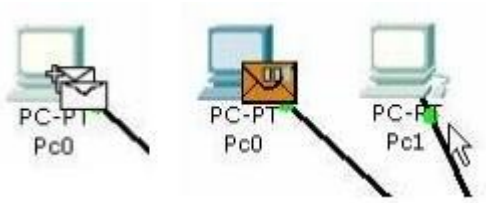
Step 3: Issuing a Ping and Viewing the MAC Address Table

ARP is used to learn the MAC address to use to encapsulate the IP packet in an Ethernet frame. The ARP packet will precede the ICMP packet.

Using the Add Simple PDU perform a ping from PC0 to PC1.
Choose the Add Simple PDU tool from the toolbox:

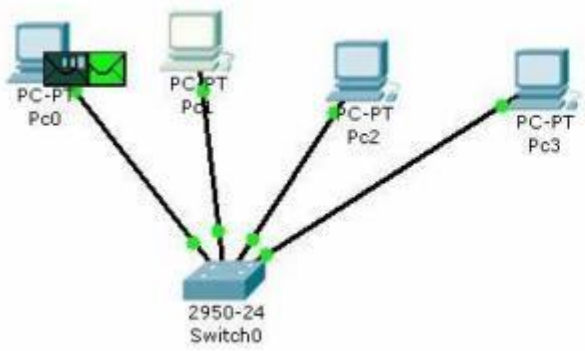


Click once on PC0, the device issuing the ping (ICMP Echo Request) and then click once on PC1 (the destination of the ICMP Echo Request).

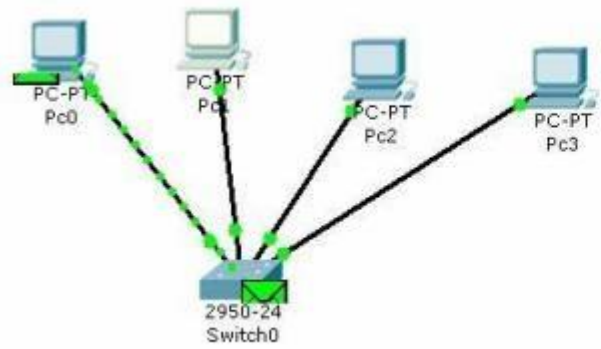


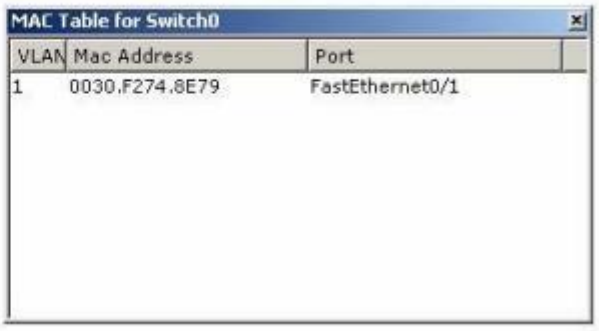
Run the simulation using the Play button.

PC0 forwards the frame containing the ARP request to Switch0:

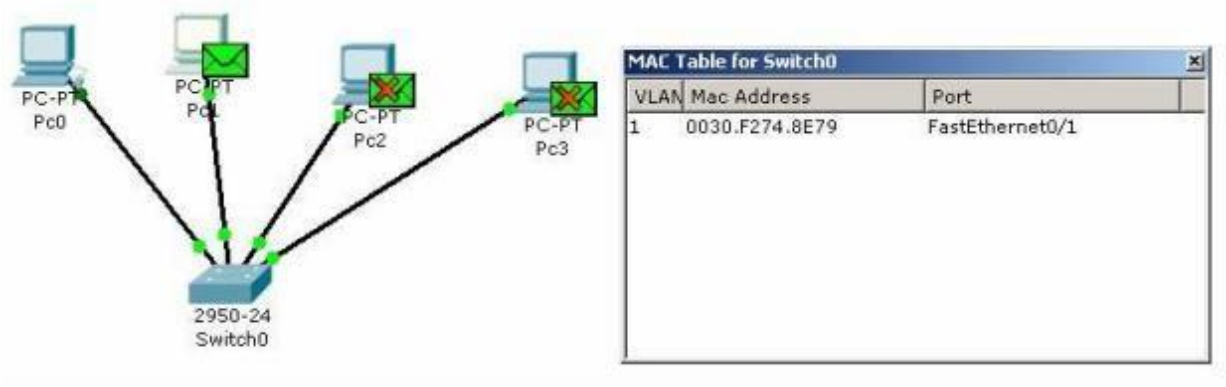


Notice how the Switch learns the Source MAC Address of the frame:

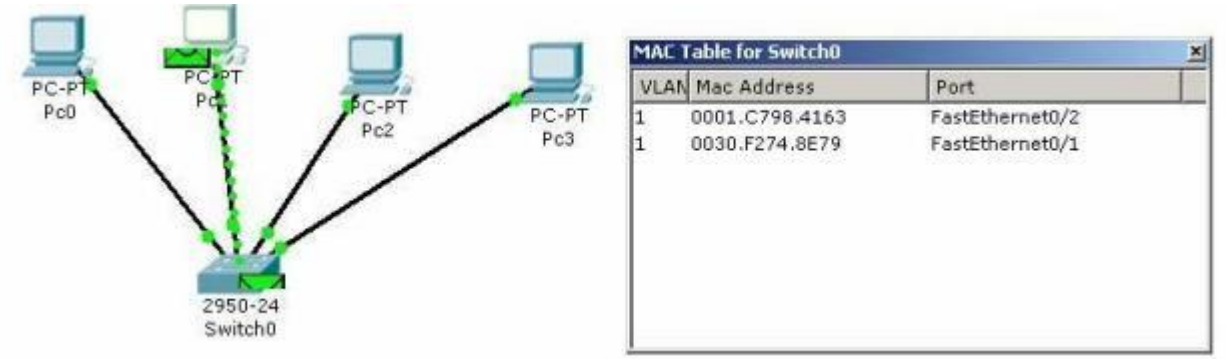




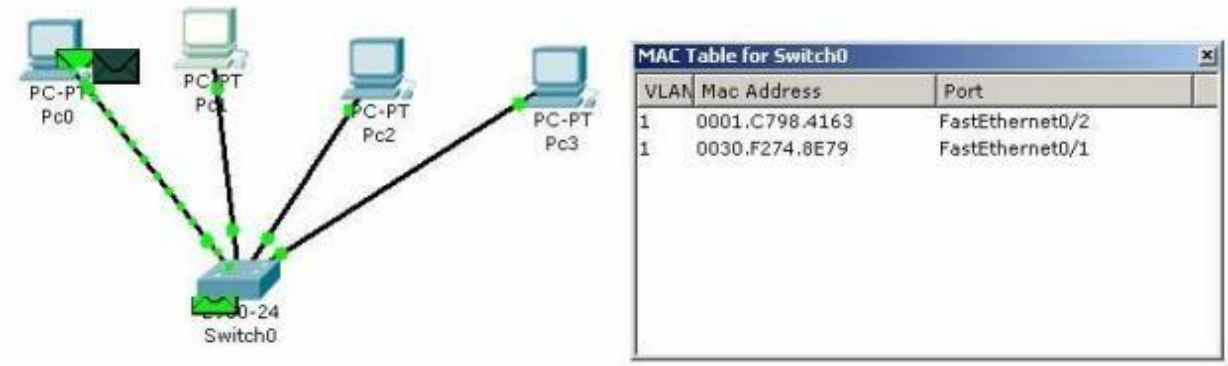
The packet is flooded out all ports because the Switch's MAC Address Table does not contain the Destination Address of the Ethernet frame. PC2 and PC3 disregard the frame:



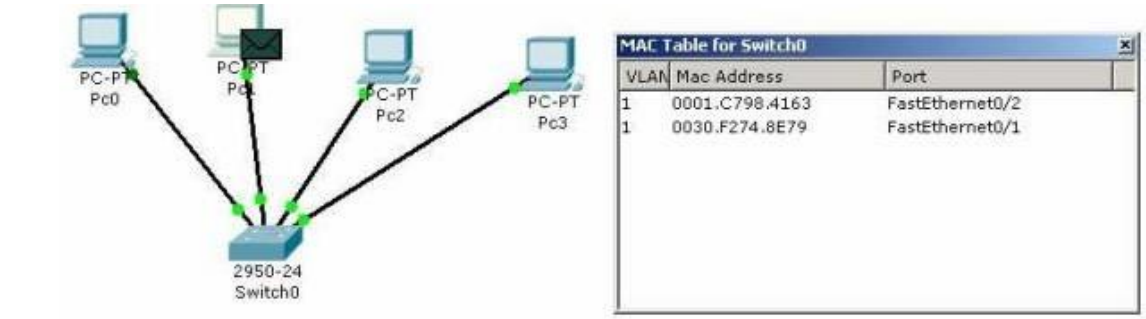
PC1 return the ARP reply. Switch0 learns the Source MAC Address of PC1:



Because the Source MAC Address of PC0 was learned previously, when examining the Destination MAC Address of the frame, Switch0 filters the frame by only sending it out FastEthernet port 0/1



The rest of the pings, frames with IP packets containing ICMP Echo Requests from PC0 destined for PC1 and frames with IP packets containing ICMP Echo Replies from PC1 destined for PC0, are filtered by the switch an only sent out the appropriate interface (port).



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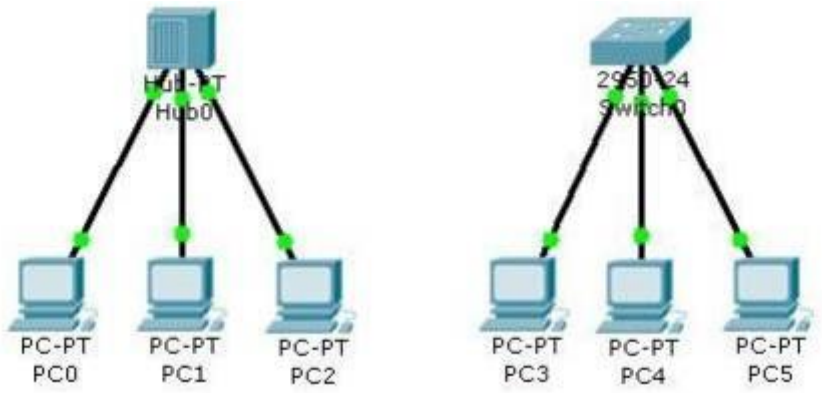
ACTIVITY 3

Build the following network on the same window in packet tracer.



Assign the IP's as:

PC	IP Address	Subnet Mask
PC0	192.168.1.1	255.255.255.0
PC1	192.168.1.2	255.255.255.0
PC2	192.168.1.3	255.255.255.0
PC3	192.168.2.1	255.255.255.0
PC4	192.168.2.2	255.255.255.0
PC5	192.168.2.3	255.255.255.0

If all connections and addressing are correct, the link lights should be green. If not, troubleshoot the cabling type, connections, and addressing.

Now do the following:

1) Go to Simulation mode. In the Event List filters, enable only ICMP and ARP. Using the "Simple PDU", issue a ping from PC0 to PC1. Play the simulation. Pay close attention to how the hub processes the ICMP and ARP packets. After that, once again, use "Add Simple PDU" to issue a ping from PC1 to PC0. Play the simulation again. How has the behavior of the hub changed from the first and second ping attempts, if at all?

2) Still in Simulation mode, in the Event List Filters, enable only ICMP and ARP. Using "Add Simple PDU", issue a ping from PC3 to PC4. Play the simulation. Pay close attention to how the switch processes the ICMP and ARP packets. After that, once again, use "Add Simple PDU" to issue a ping from PC4 to PC3. Play the simulation again. How has the behavior of the switch changed from the first and second ping attempts, if at all? In what ways did the switch process the packets similarly or differently from the hub between the first and second ping attempts?
By this time, you should be clear about how switch and hub differ from each other.

Course Instructor: Mr. Amjad Majeed

CSE-331 Computer Networks

Lab No. 04

CLO2,1

Aim:

Study of basic network command and Network configuration commands

Apparatus (Software): Command Prompt and Packet Tracer.

Procedure: To do this experiment- follows these steps:

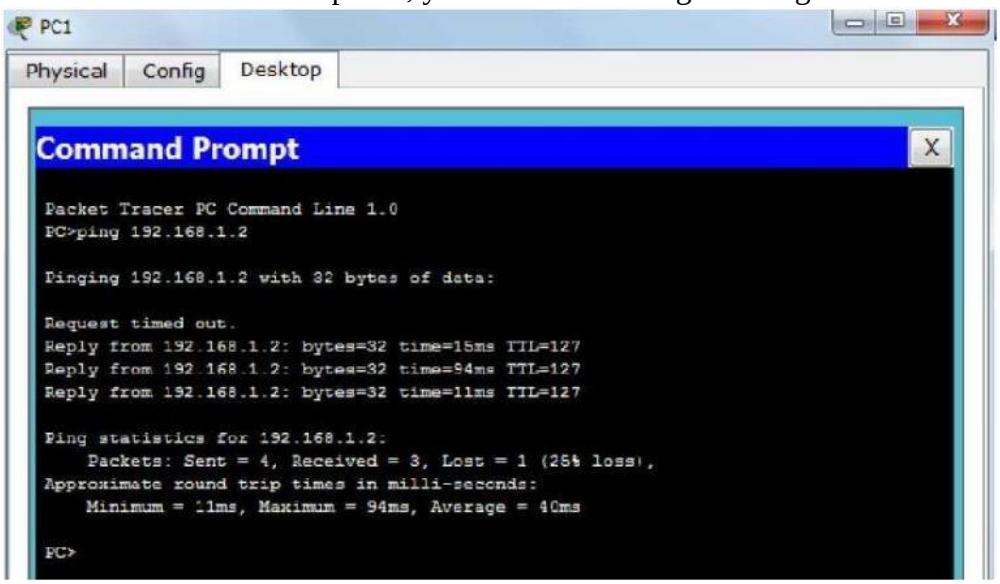
In this experiment- students have to understand basic networking commands e.g ping, tracert etc.

All commands related to Network configuration which includes how to switch to privilege mode and normal mode and how to configure router interface and how to save this configuration to flash memory or permanent memory.
These commands include:

- Configuring the Router commands
- General Commands to configure network
- Privileged Mode commands of a router
- Router Processes & Statistics
- IP Commands
- Other IP Commands e.g. show ip route etc.

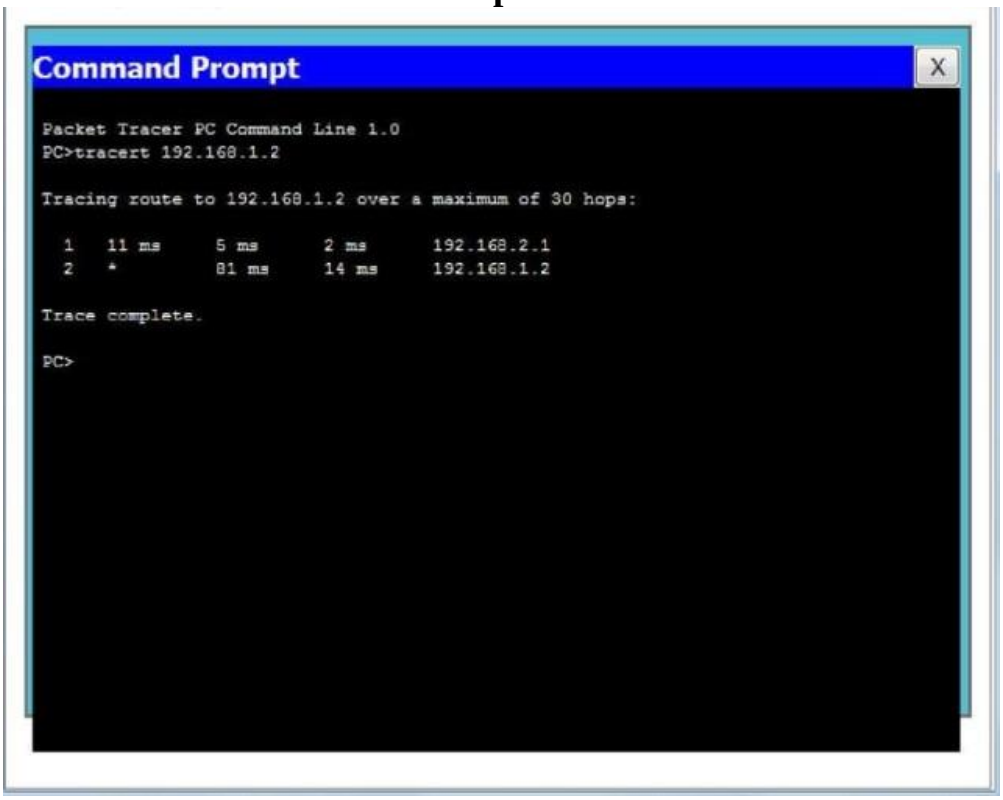
ping:

ping(8) sends an ICMP ECHO_REQUEST packet to the specified host. If the host responds, you get an ICMP packet back. Sound strange? Well, you can "ping" an IP address to see if a machine is alive. If there is no response, you know something is wrong.



Traceroute:

Tracert is a command which can show you the path a packet of information taken from your computer to one you specify. It will list all the routers it passes through until it reaches its destination or fails to and is discarded. In addition to this, it will tell you how long each 'hop' from router to router takes.



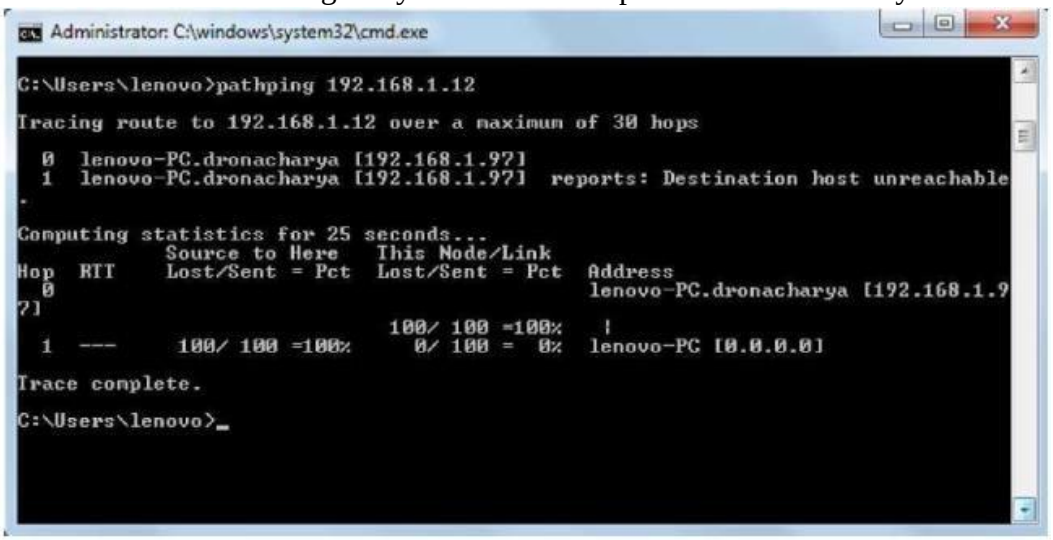
nslookup:

Displays information from Domain Name System (DNS) name servers.

NOTE: If you write the command as above it shows as default your pc's server name firstly.

pathping:

A better version of tracert that gives you statics about packet lost and latency.



Getting Help

In any command mode, you can get a list of available commands by entering a question mark(?).

Router>**?**

To obtain a list of commands that begin with a particular character sequence, type in those characters followed immediately by the question mark (?).

Router#**co?**

configure connect copy

To list keywords or arguments, enter a question mark in place of a keyword or argument. Include a space before the question mark.

Router#**configure ?**

memory Configure from NV memory network Configure from a TFTP network host terminal Configure from the terminal

You can also abbreviate commands and keywords by entering just enough characters to make the command unique from other commands. For example, you can abbreviate the **show** command to **sh**.

Configuration Files

Any time you make changes to the router configuration, you must save the changes to memory because if you don't, they will be lost if there is a system reload or power outage. There are two types of configuration files: the running (current operating) configuration and the startup configuration.

Use the following privileged mode commands to work with configuration files.

CSE-331 Computer Networks
Lab No. 05

CLO3,4

Task	1	2	3	4	5
Set time and date of a router having your ID as hostname	Student select a router	Student set the hostname of router as their respective registration ID	Student set the time and date of the system as current	Student enables user-mode password with their name	Student enables privileged-mode password with their name
Router configuration	Student designs the network as said	Student configure the router	Student assign Class B IP address to the PCs	Student ping the default gateway	Student save the current configuration

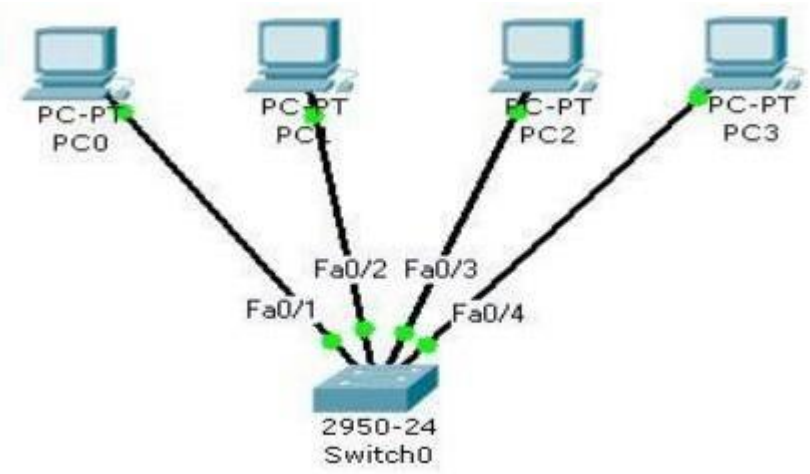
Aim:

Router Configuration using CLI

Design a network having one router, a switch and two PC's as shown in the figure. Configure the router and also assign the **Class B** IP addresses to the PC's and ping the default gateway. Also save the current configuration of the router.

ACTIVITY 1

SWITCHED NETWORK



Step 1 Open the PT activity file then add a Switch and four generic PC's. Arrange them as shown in the above figure.

Step 2 Connect the devices using the appropriate connection type for each link**.**

Step 3 Using the Config tab, configure the IP address and subnet mask for each PC as

shown in the following table:

PC	IP Address	Subnet Mask
PC0	172.16.128.1	255.255.192.0
PC1	172.16.128.2	255.255.192.0
PC2	172.16.128.3	255.255.192.0
PC3	172.16.128.4	255.255.192.0

Step 4 Verify that the connections are correct. At this point, all link lights should be green.

Step 5 Change the bandwidth on PC0 to 10 Mbps and set the duplex setting to full instead of Auto

Notice that the connection–immediately goes down. T bring it back up again, change the bandwidth and the duplex settings of the switch's Ethernet port to match current settings of PC0

ACTIVITY 2

Router:

Functions:

1- IP addressing.
2- Routing.

Components:

1- Hardware:
   - Interfaces.
   - DRAM: running configuration.
   - NVRAM: start up configuration.
   - CPU.
   - PCMCIA (flash memory).

2- Software (IOS).

Router configuration modes:

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1- User mode (router>).
2- Privilage mode (router #).
3- Global configuration mode (router (config)#).

User	enable disable	Privilage	conf t exit	Global

User EXEC Mode:

When you are connected to the router, you are started in user EXEC mode. The user EXEC commands are a subset of the privileged EXEC commands.

Privileged EXEC Mode:

Privileged commands include the following:
• Configure – Changes the software configuration.
• Debug – Display process and hardware event messages.
• Setup – Enter configuration information at the prompts.

Enter the command disable to exit from the privileged EXEC mode and return to user EXEC mode.

Configuration Mode:

Configuration mode has a set of submodes that you use for modifying interface settings, routing protocol settings, line settings, and so forth. Use caution with configuration mode because all changes you enter take effect immediately.

To enter configuration mode, enter the command configure terminal and exit by pressing Ctrl-Z.

Getting Help:

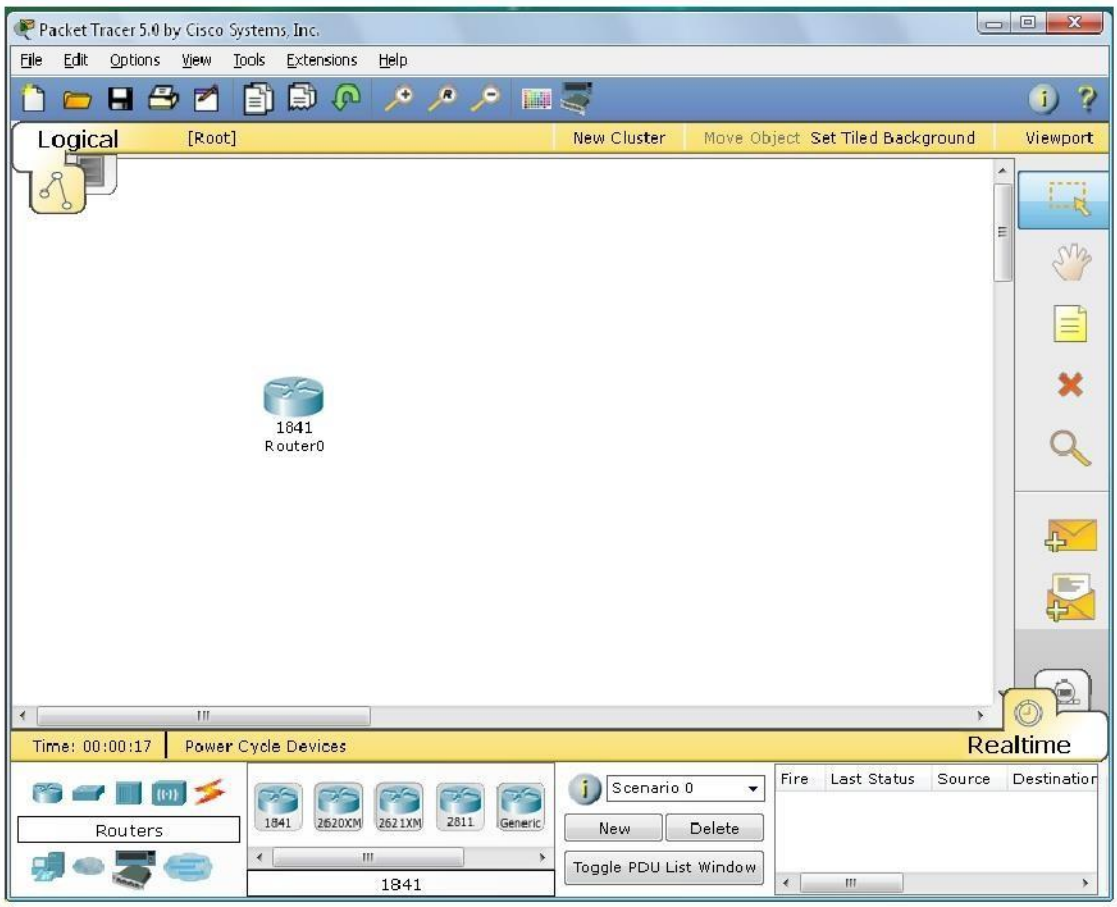
In any command mode, you can get a list of available commands by entering a question mark (?).

Router>?

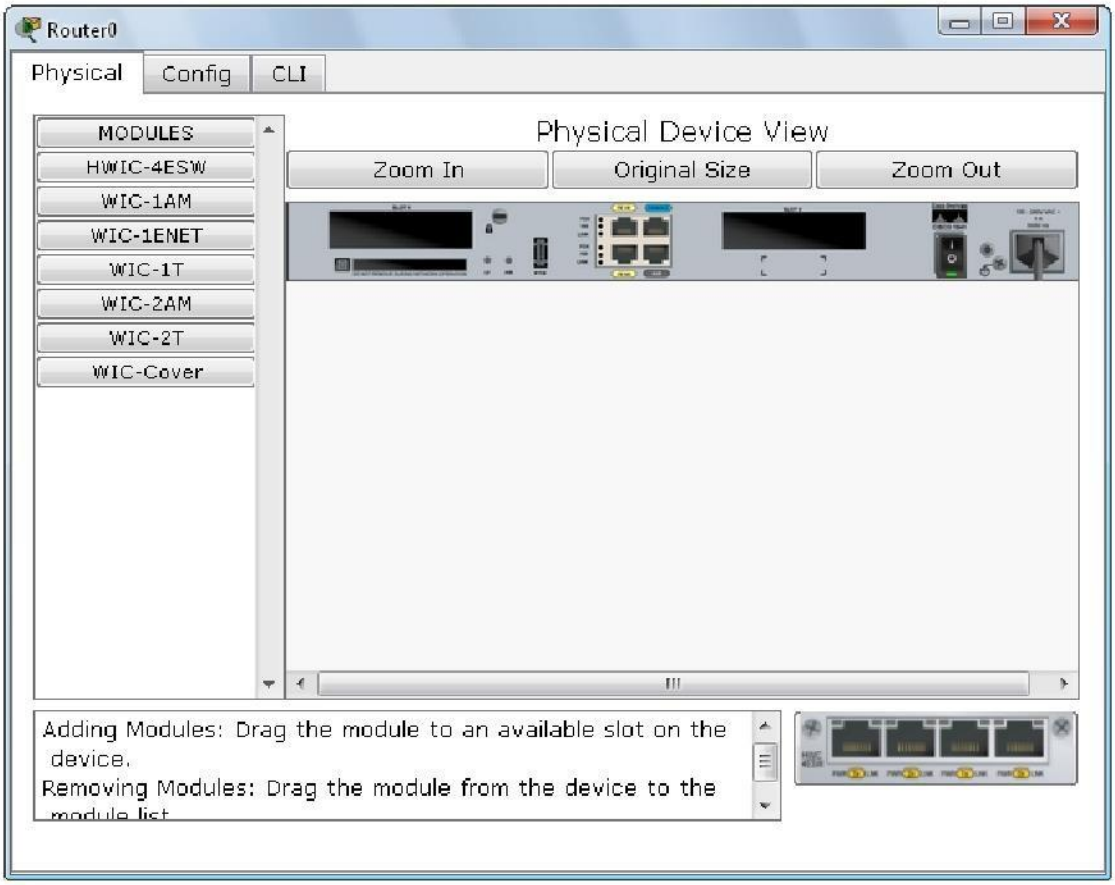
To obtain a list of command that begin with a particular character sequence, type in those characters followed immediately by the question mark (?).

We use packet tracer program for router configuration in the previous 3 modes.

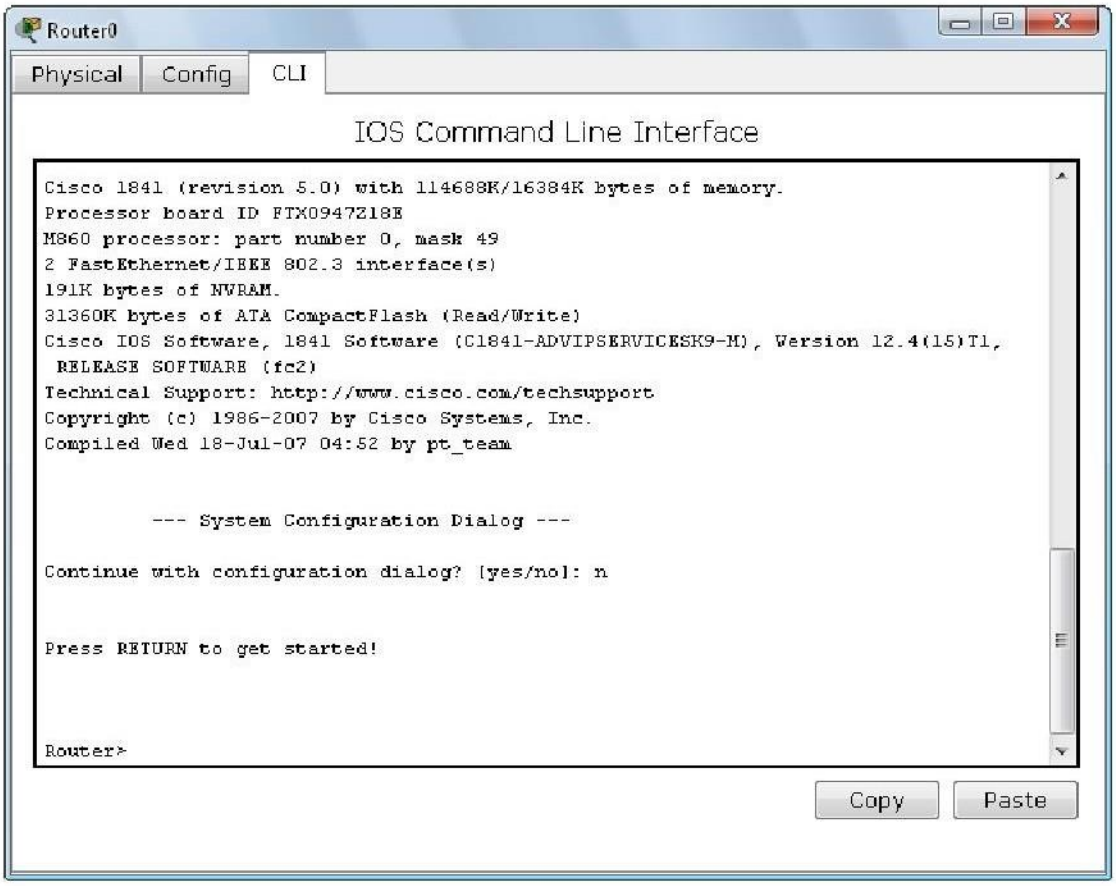
We choose a router:



Double click on the router chosen:

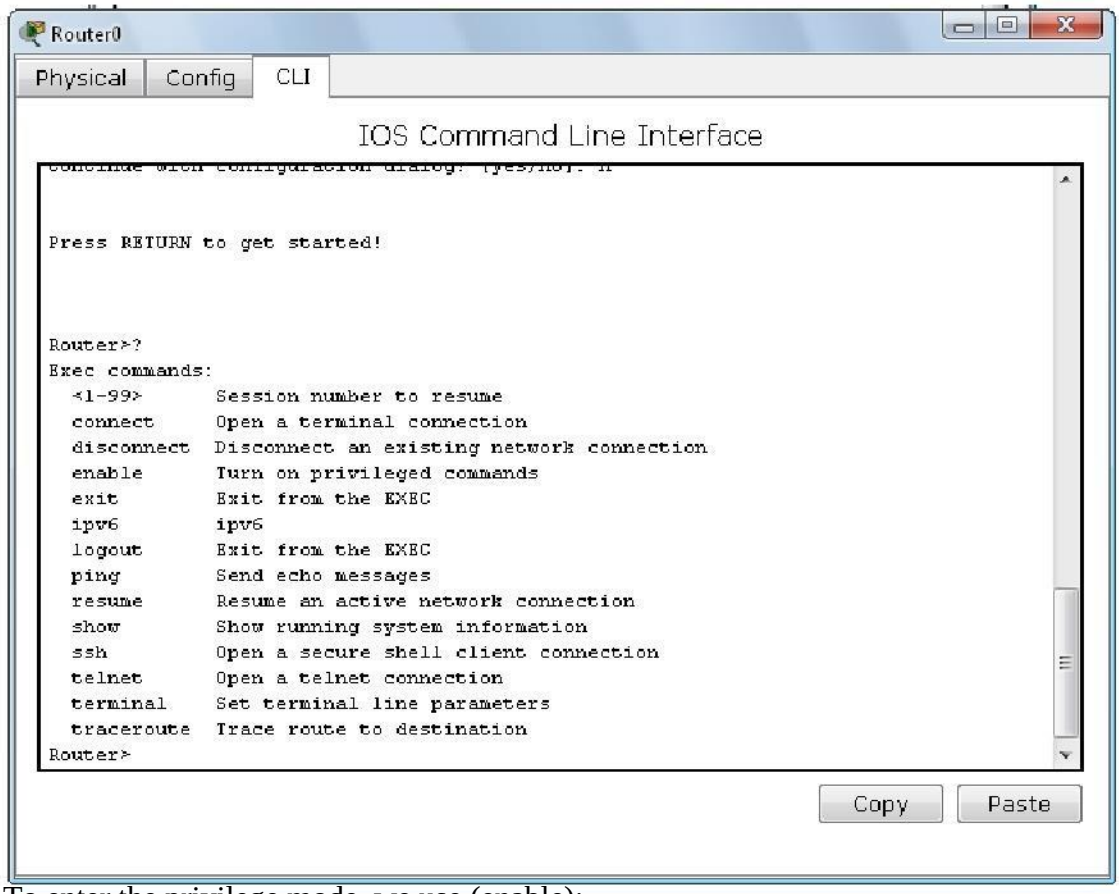


We enter CLI for router configuration:

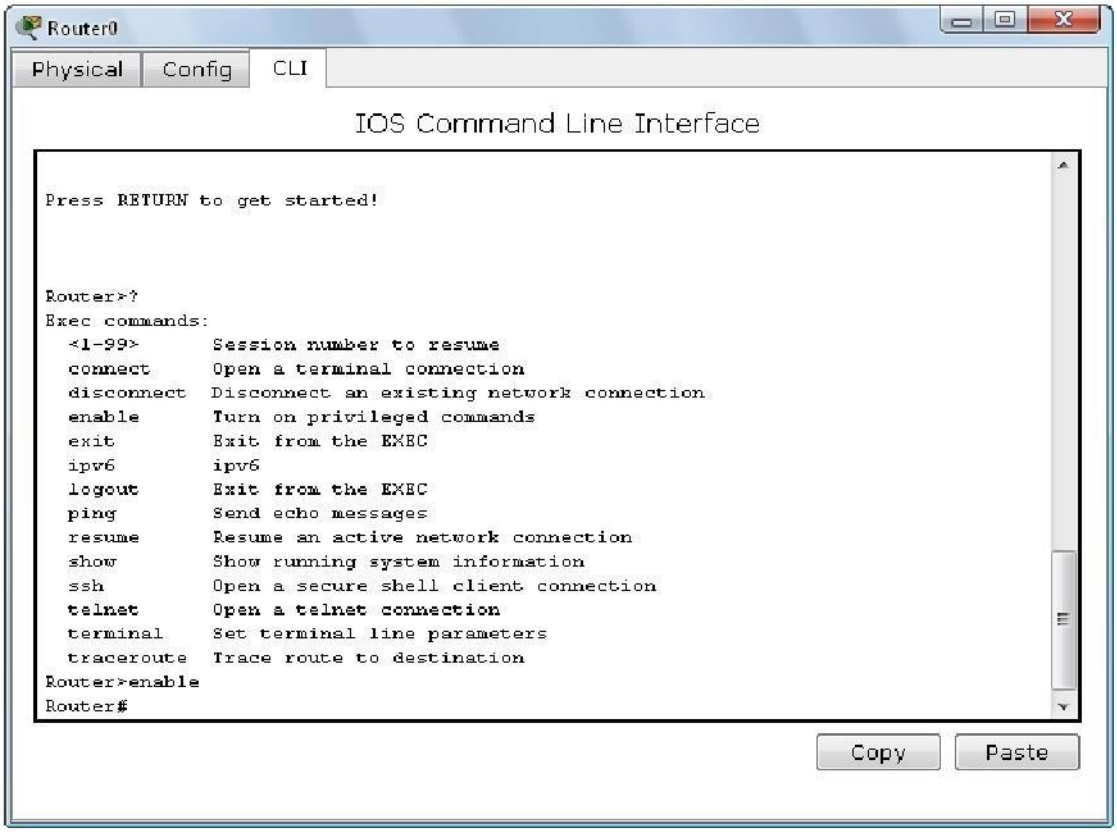


Now we are in the user mode:

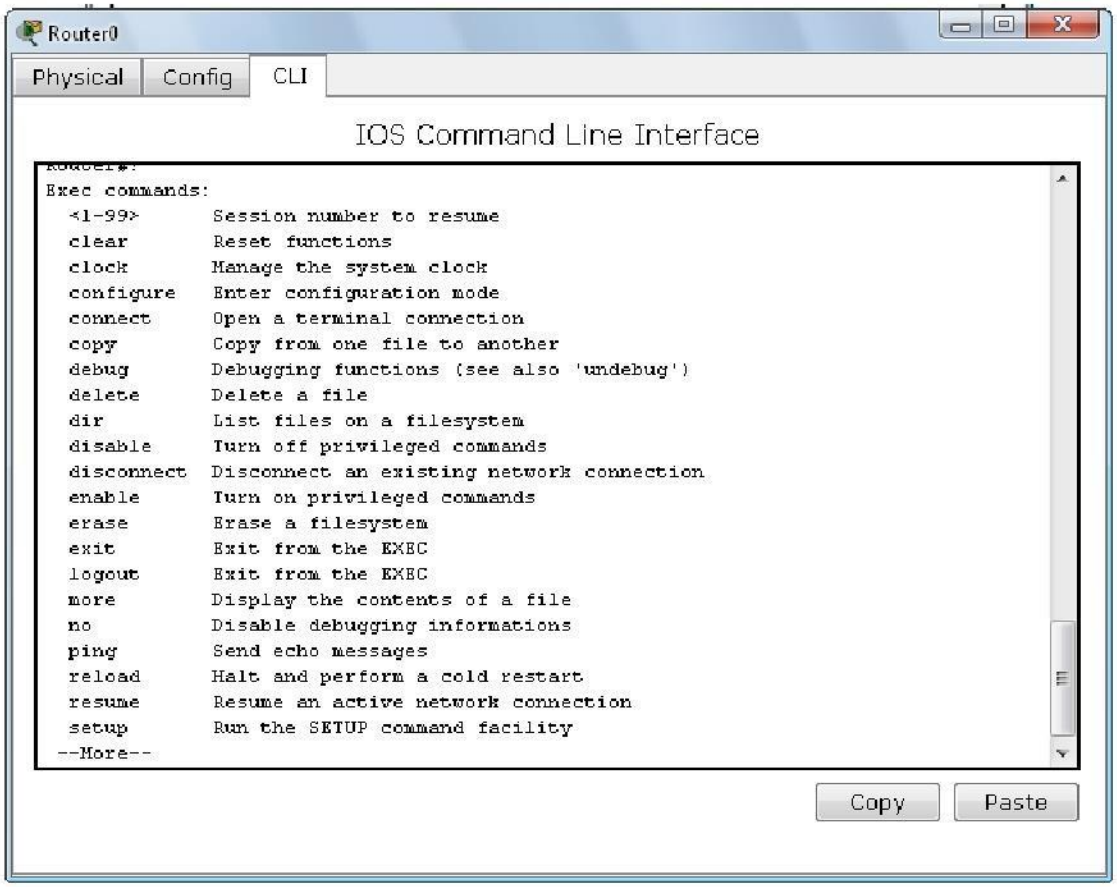
To know the commands in user mode we use (?) :



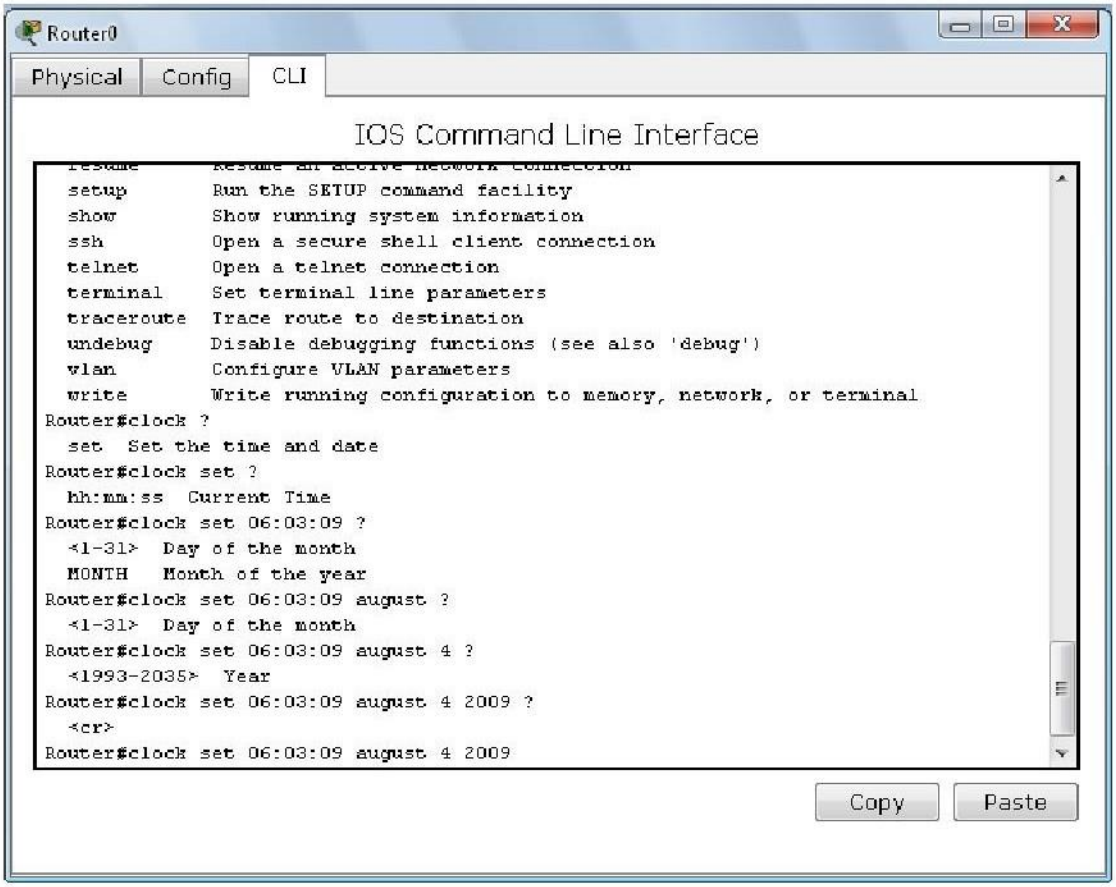
To enter the privilege mode, we use (enable):



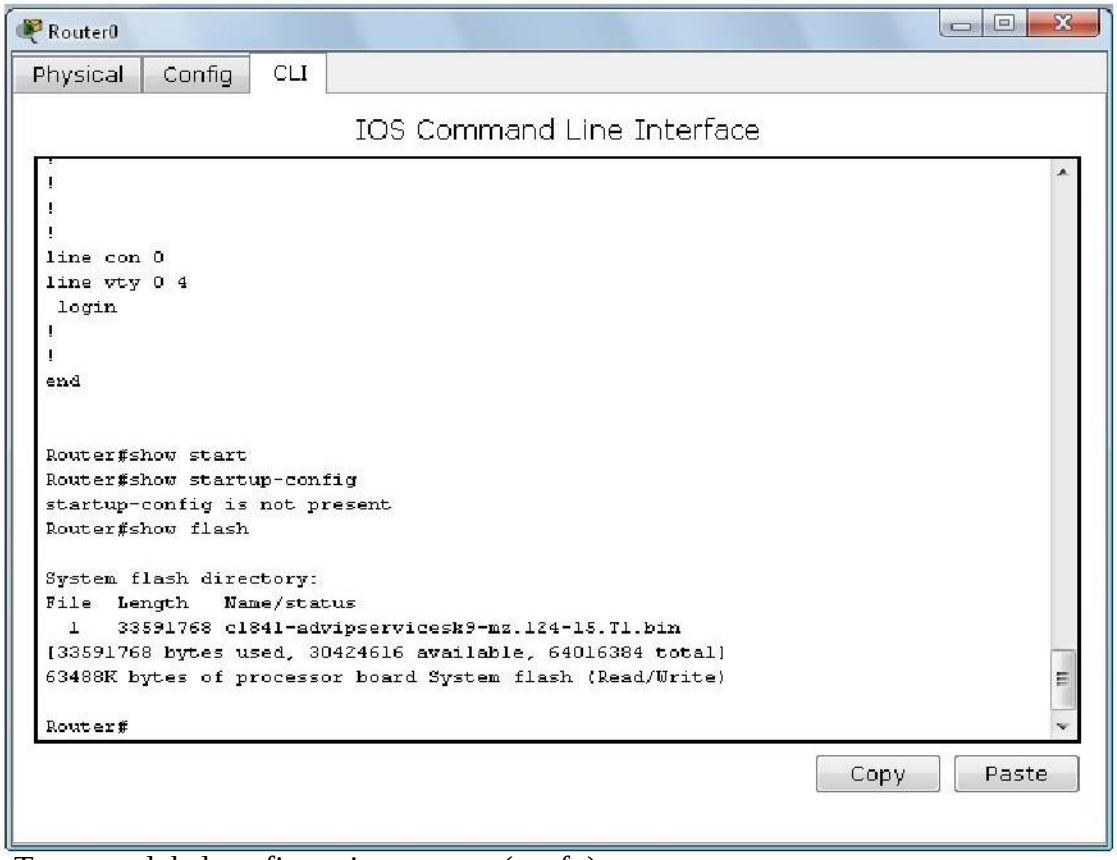
To see the commands in privileged mode we use (?):



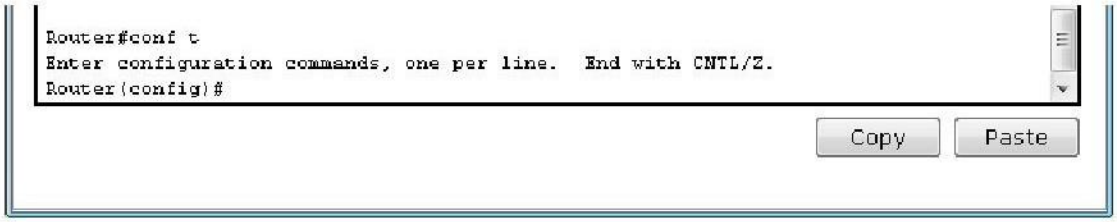
To manage the system clock, we use (clock):



To see the time, we use (show clock):

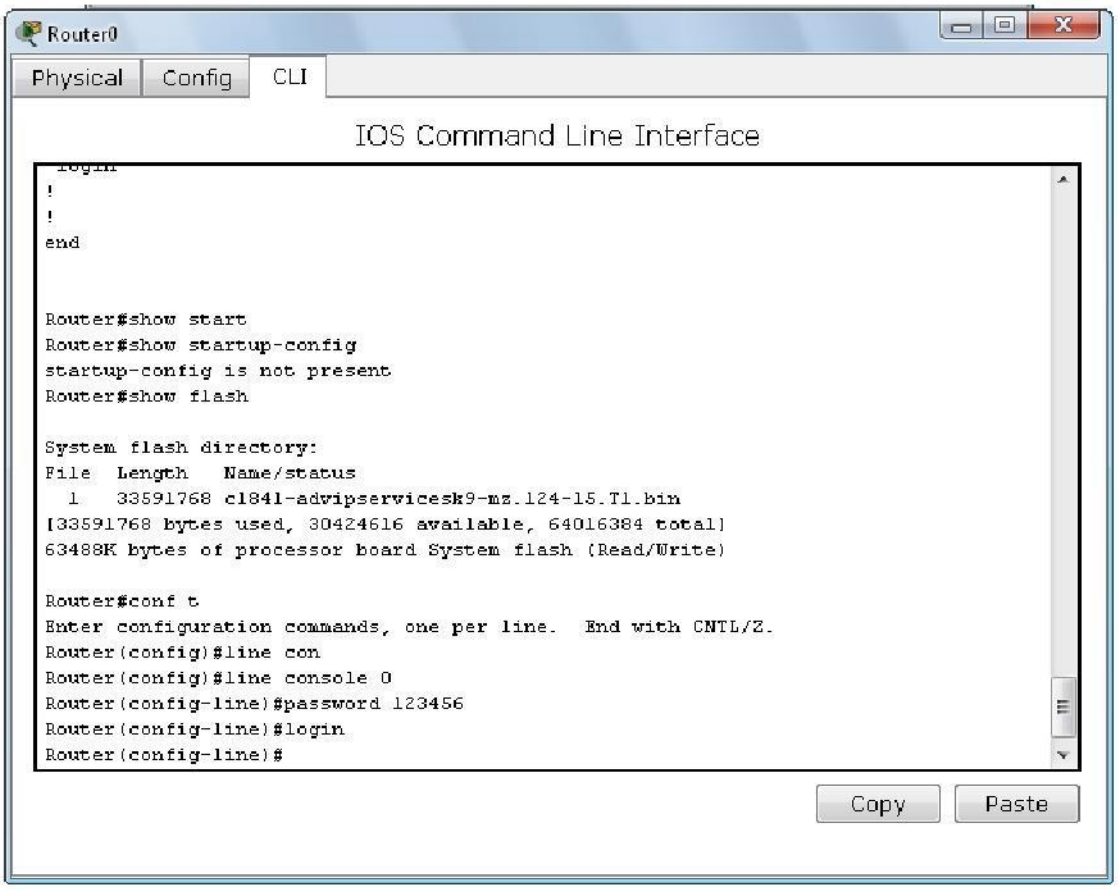


To go to global configuration, we use (conf t):

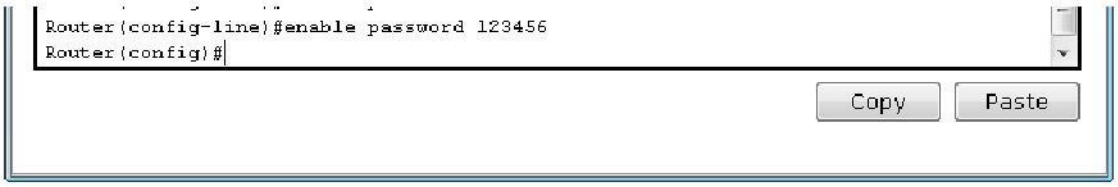


Passwords:

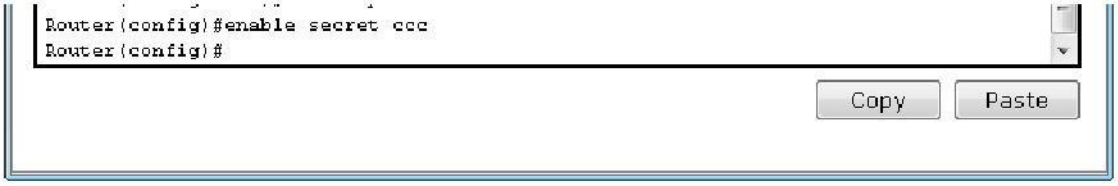
1- Line console password to protect the user mode:



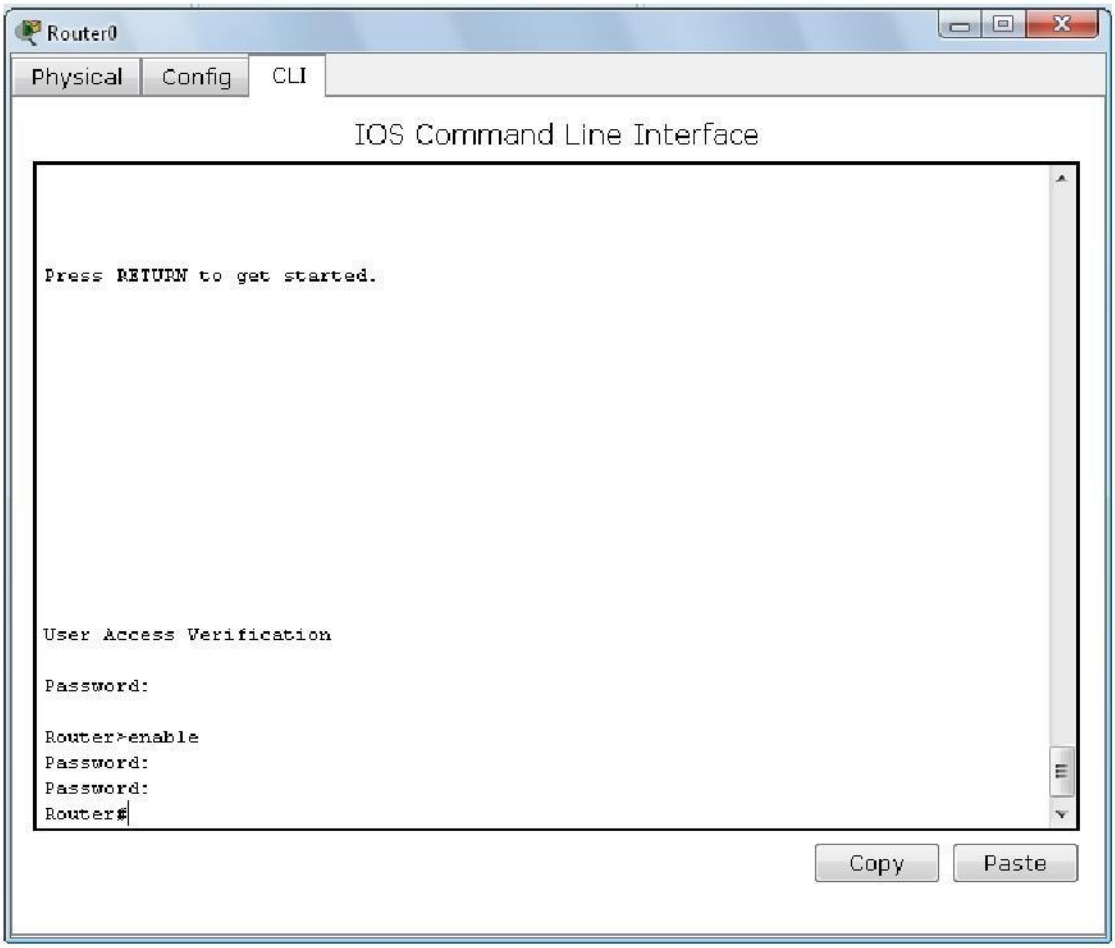
2- Enable password to protect the privilege mode:



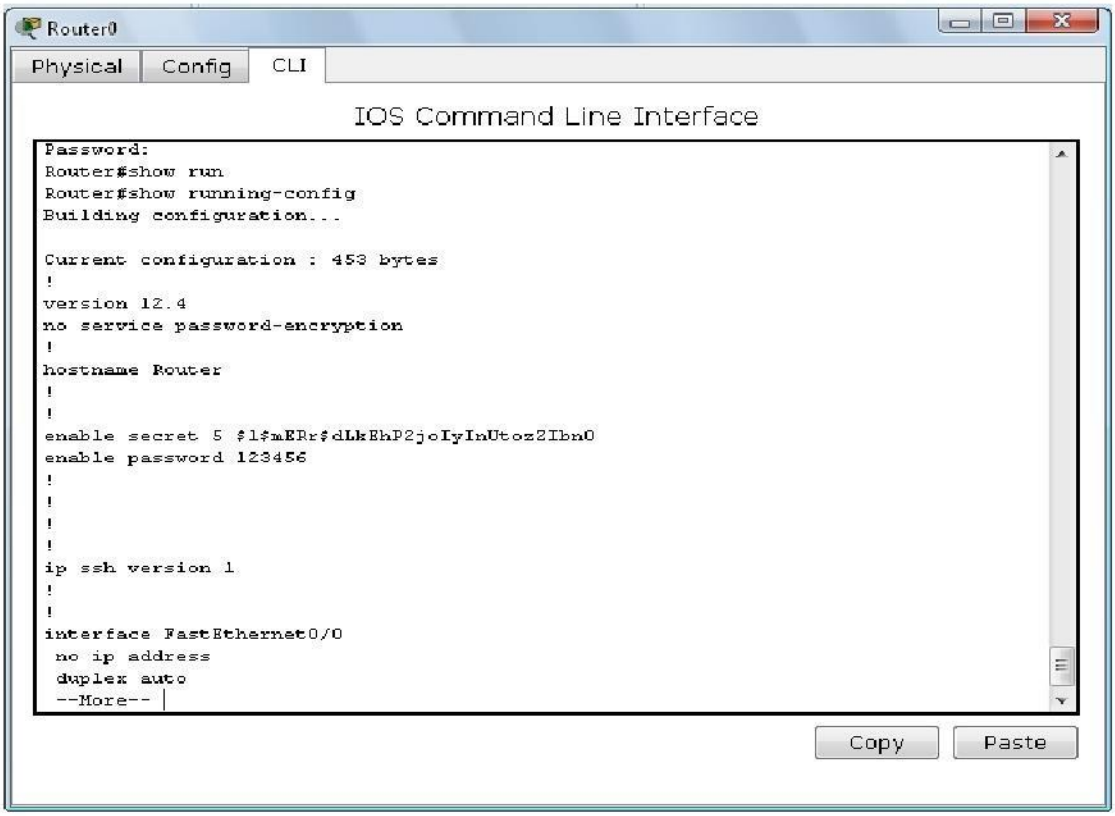
3- Secret password for more protection of privilege mode (more priority than enable pass and its encrypted pass.



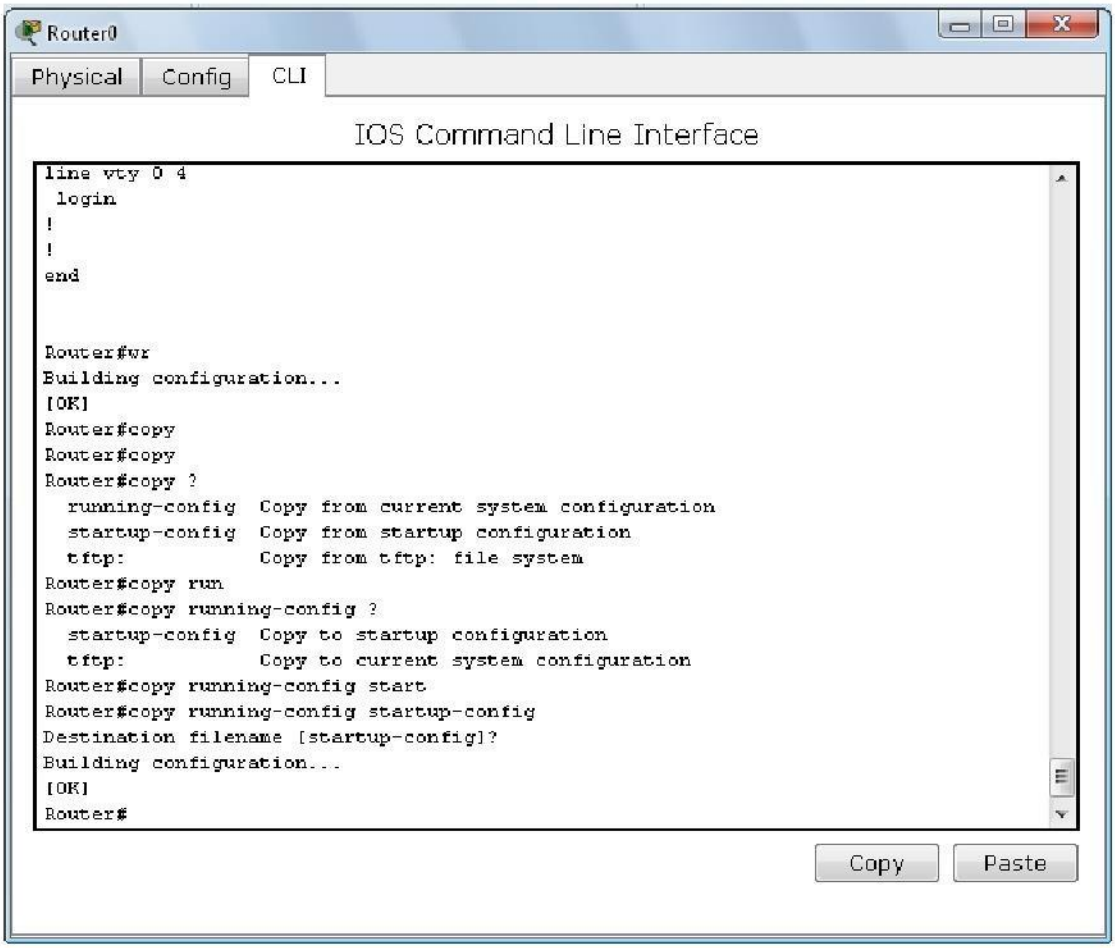
Now we try the passwords set:



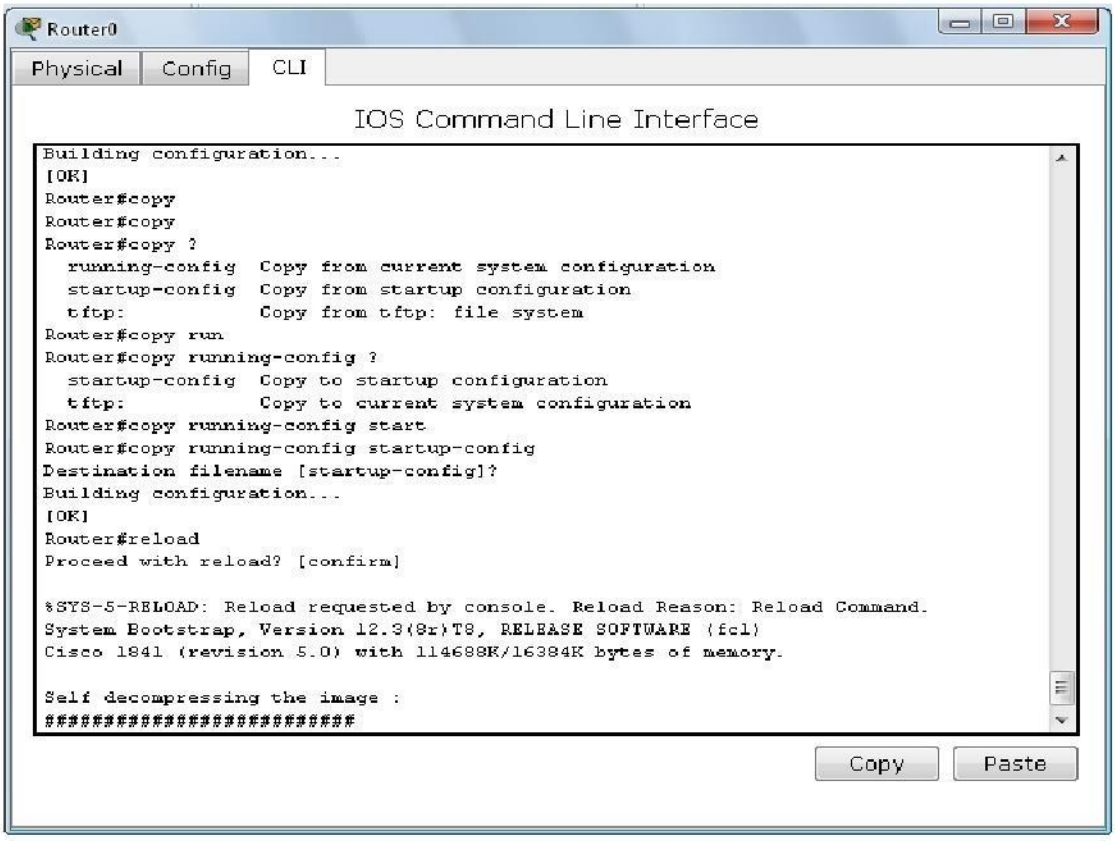
We notice that only secret pass is encrypted:

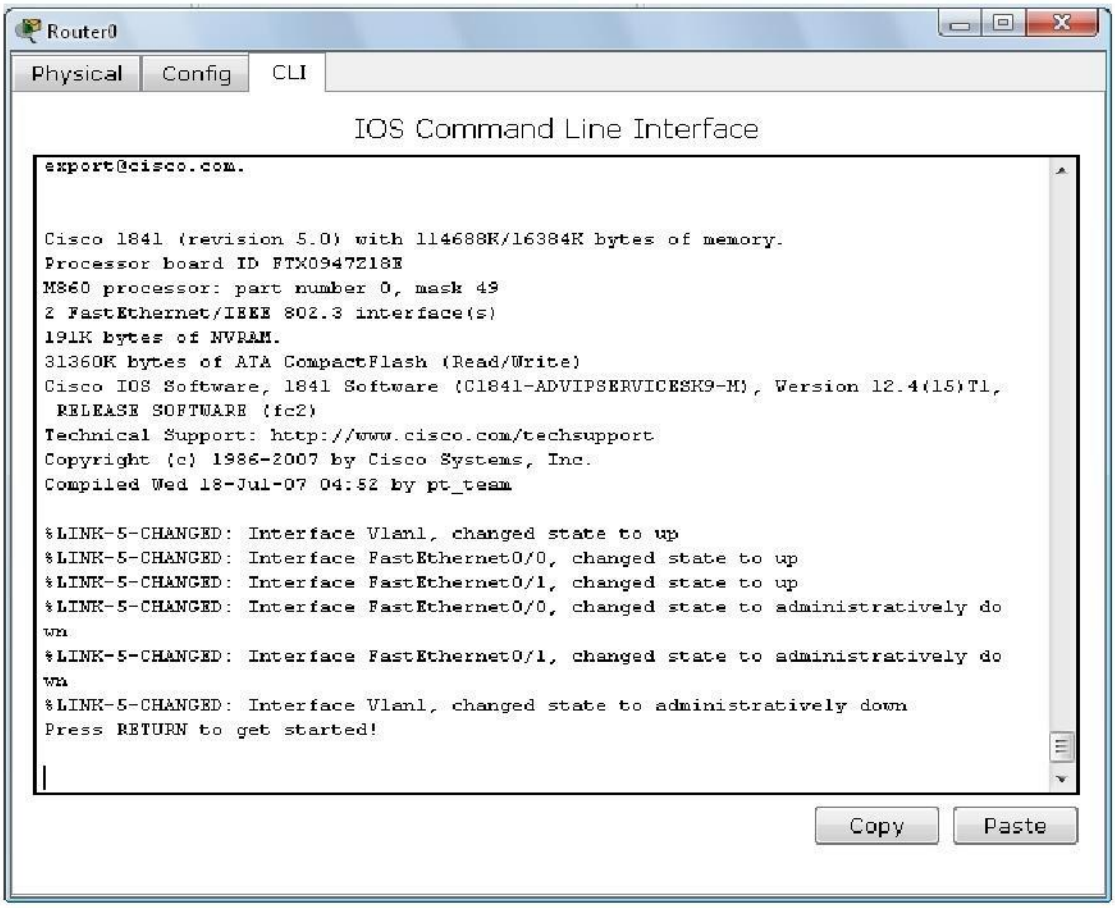


To save the configuration we did in the NVRAM we use (wr or copy commands).

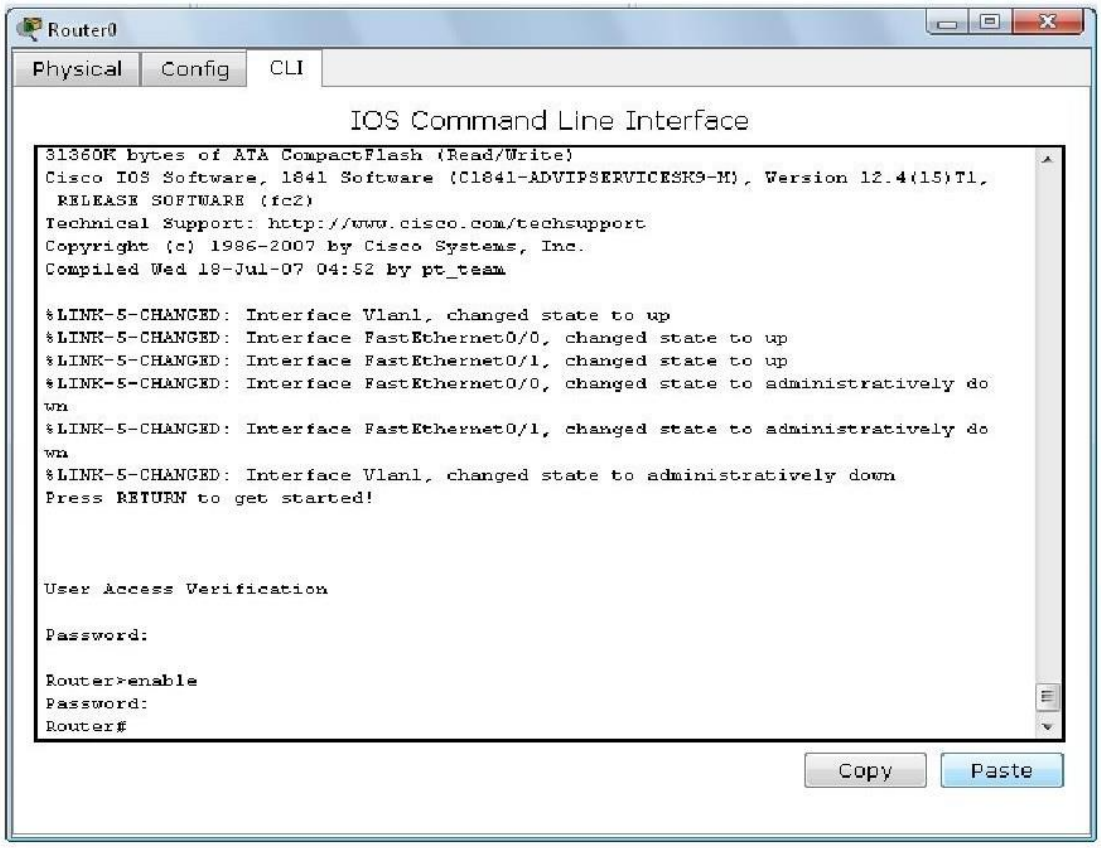


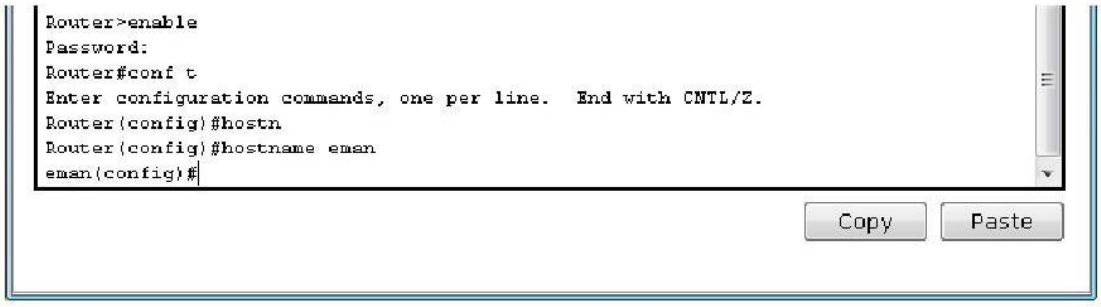
To restart we use the command (reload):


Router0
Physical
Config
CLI
IOS Command Line Interface
Building configuration...
[OK]
Router#copy
Router#copy
Router#copy ?
running-config Copy from current system configuration
startup-config Copy from startup configuration
tftp: Copy from tftp: file system
Router#copy run
Router#copy running-config ?
startup-config Copy to startup configuration
tftp: Copy to current system configuration
Router#copy running-config start
Router#copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]
Router#reload
Proceed with reload? [confirm]
%SYS-5-RELOAD: Reload requested by console. Reload Reason: Reload Command.
System Bootstrap, Version 12.3(8r)T8, RELEASE SOFTWARE (fc1)
Cisco 1841 (revision 5.0) with 114688K/16384K bytes of memory.
Self decompressing the image :
############################
Copy
Paste

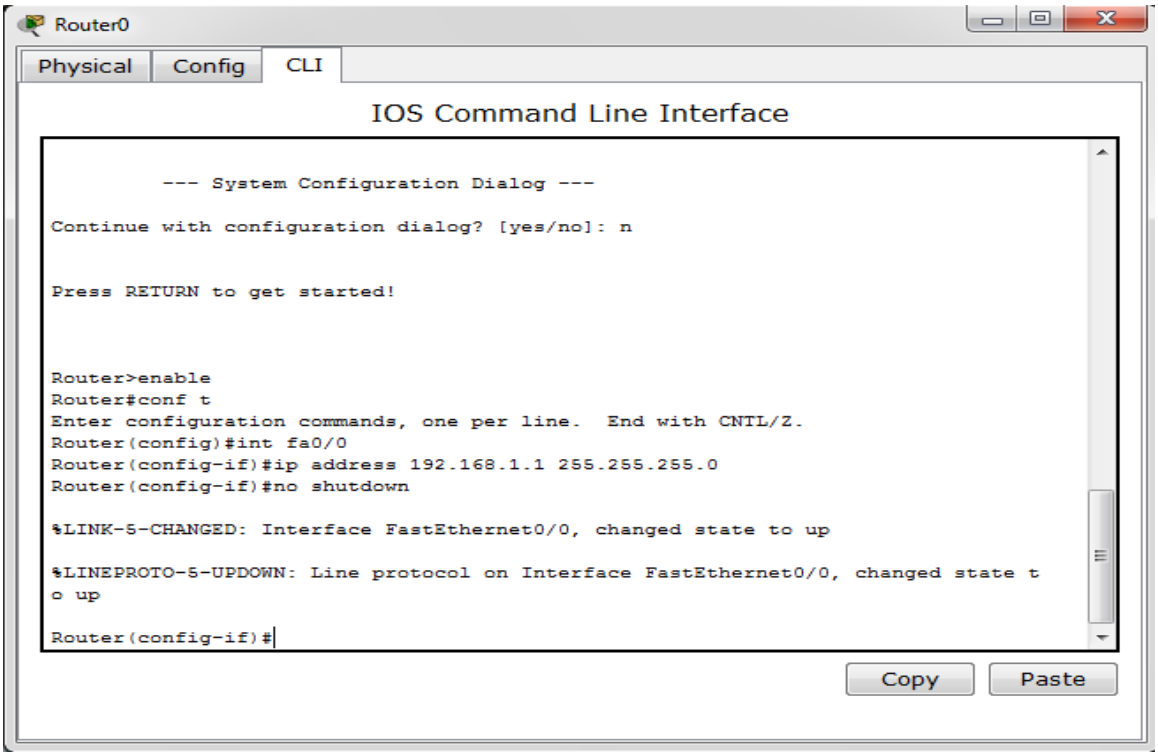

Router0
Physical
Config
CLI
IOS Command Line Interface
export@cisco.com.
Cisco 1841 (revision 5.0) with 114688K/16384K bytes of memory.
Processor board ID FTX0947Z18E
M860 processor: part number 0, mask 49
2 FastEthernet/IEEE 802.3 interface(s)
191K bytes of NVRAM.
31360K bytes of ATA CompactFlash (Read/Write)
Cisco IOS Software, 1841 Software (C1841-ADVIPSERVICESK9-M), Version 12.4(15)T1,
RELEASE SOFTWARE (fc2)
Technical Support: http://www.cisco.com/techsupport
Copyright (c) 1986-2007 by Cisco Systems, Inc.
Compiled Wed 18-Jul-07 04:52 by pt_team
%LINK-5-CHANGED: Interface Vlan1, changed state to up
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up
%LINK-5-CHANGED: Interface FastEthernet0/1, changed state to up
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to administratively do
wn
%LINK-5-CHANGED: Interface FastEthernet0/1, changed state to administratively do
wn
%LINK-5-CHANGED: Interface Vlan1, changed state to administratively down
Press RETURN to get started!
Copy
Paste

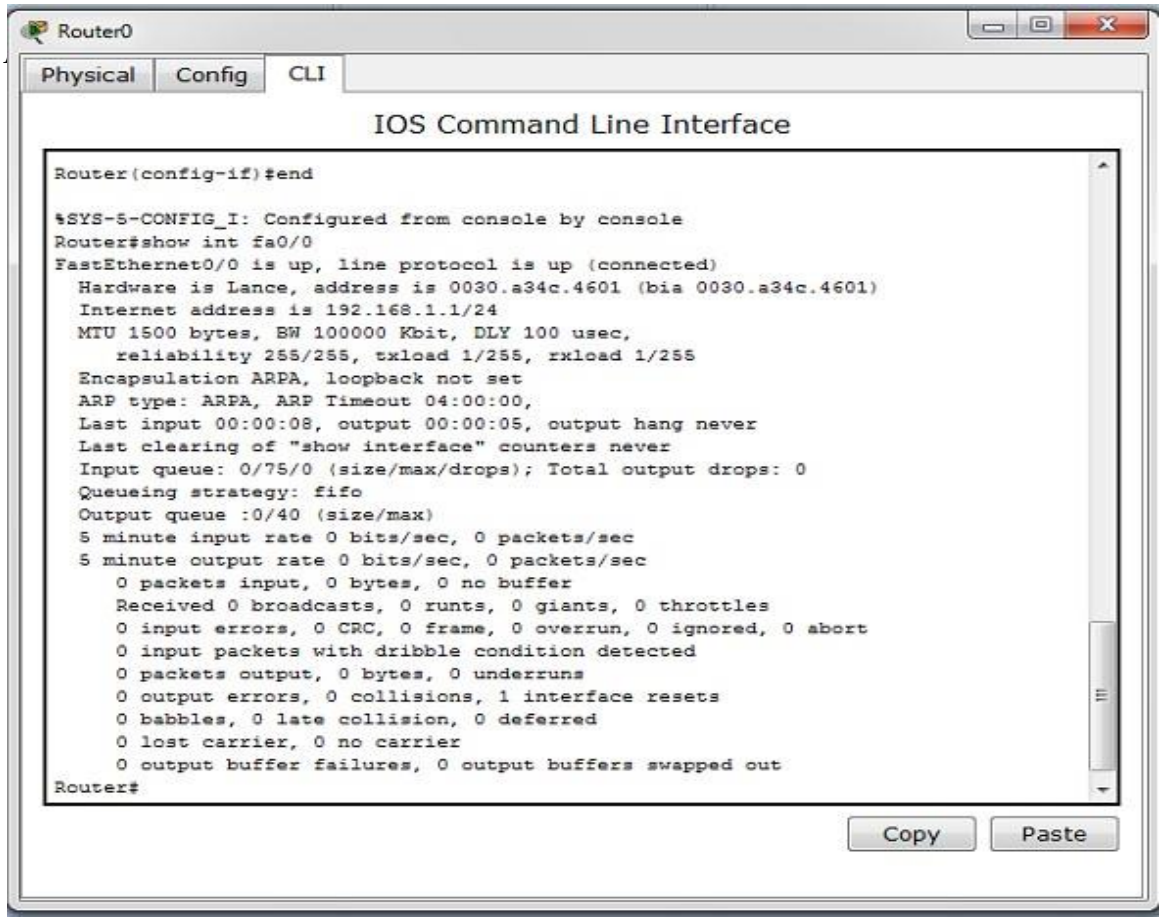
To change the host name of router:





Now to assign the IP's to the interface of the router:





CSE-331 Computer Networks

Task 1:

Choose a router in packet tracer. Name it with your registration # e.g., 2018-CS-XX. Set its Time and Date as today. Enable user mode and privileged mode passwords with your name.

Task 2:

Design a network having one router, a switch and two PC's as shown in the figure. Configure the router and also assign the **Class B** IP addresses to the PC's and ping the default gateway. Also save the current configuration of the router.