

Objective:

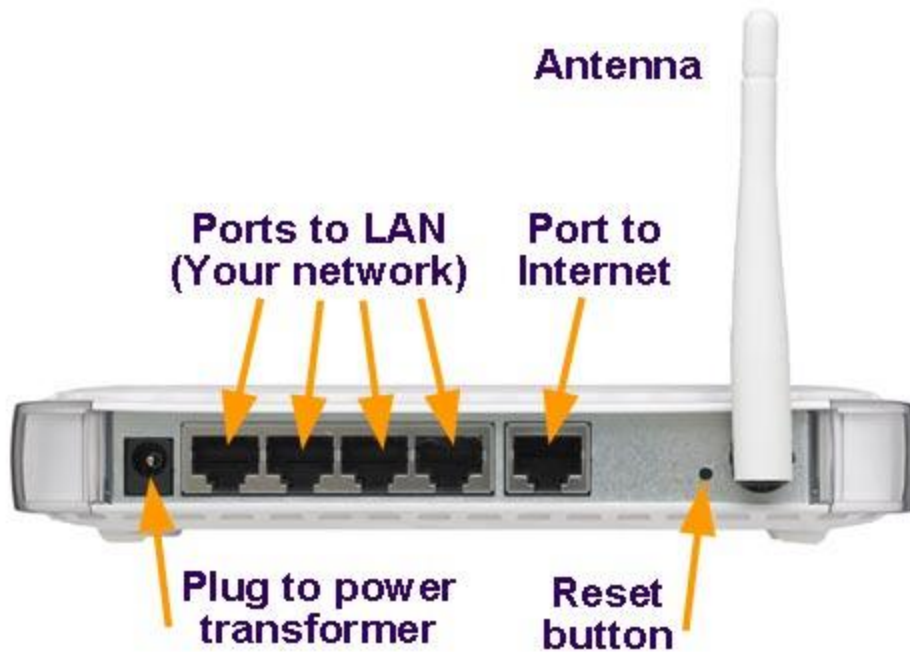
Computer networking devices are units that mediate data in a computer network and are also called network equipment. Units which are the last receiver or generate data are called hosts or data terminal equipment.

Student should have knowledge about physical, data link and network layer in ISO/OSI reference model. You will learn how network devices work above mentioned layers and create a network using Cisco Packet Tracer.

Introduction to the Routers, switches, Hubs and access point.

Routers





Routers enable computers to communicate and they can pass information between two networks—such as between your home network and the Internet. This capability to direct network traffic is what gives the router its name. Routers can be wired (using Ethernet cables) or wireless. If you just want to connect your computers, hubs and switches work well; however, if you want to give all of your computers access to the Internet using one modem, use a router or a modem with a built-in router. Routers also typically provide built-in security, such as a firewall. Routers are more expensive than hubs and switches.

Hubs



Hubs enable computers on a network to communicate. Each computer plugs into the hub with an Ethernet cable, and information sent from one computer to another passes through the hub. A hub can't identify the source or intended destination of the information it receives, so it sends the information to all of the computers connected to it, including the one that sent it. A hub can send or receive information, but it

can't do both at the same time. This makes hubs slower than switches. Hubs are the least complex and the least expensive of these devices.

Access points



Access points (also called **base stations**) provide wireless access to a wired Ethernet network. An access point plugs into a hub, switch, or wired router and sends out wireless signals. This enables computers and devices to connect to a wired network wirelessly. Access points act a lot like cellular phone towers: you can move from one location to another and continue to have wireless access to a network. When you connect to the Internet wirelessly using a public wireless network in an airport, coffee shop, or hotel, you are usually connecting through an access point. If you want to connect your computers wirelessly and you have a router that provides wireless capability, you don't need an access point. Access points don't have built-in technology for sharing Internet connections. To share an Internet connection, you must plug an access point into a router or a modem with a built-in router.

Switches



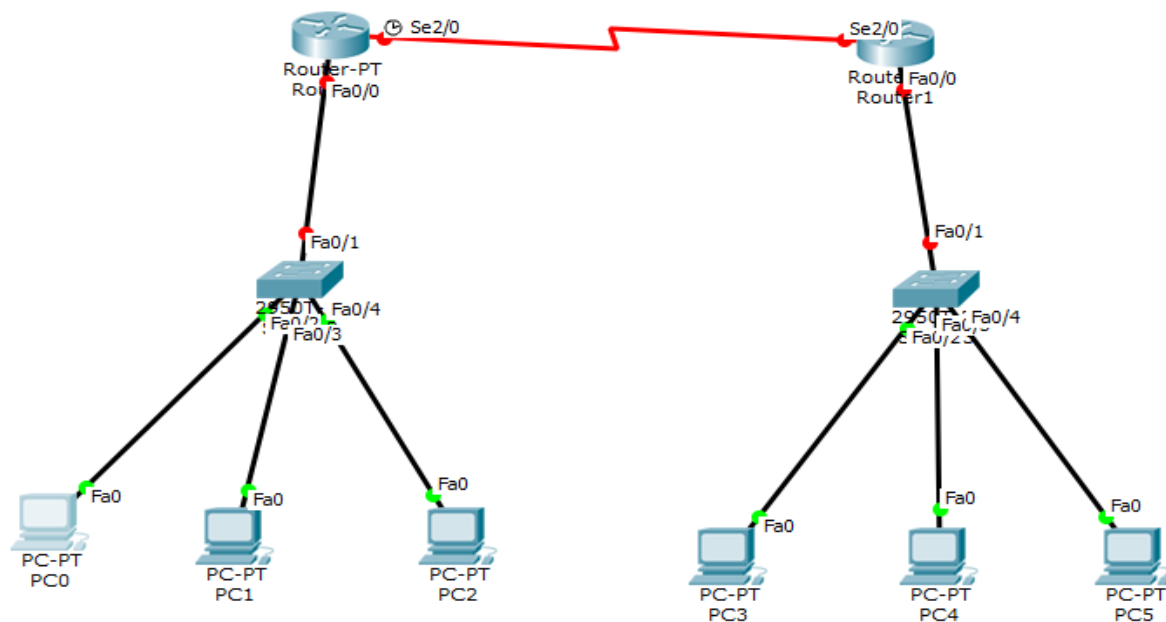
Switches work the same way as hubs, but they can identify the intended destination of the information that they receive(learn MAC addresses of connected devices), so they send that information to only the computers that are supposed to receive it. Switches can send and receive information at the same time, so they can send information faster than hubs can. If your home network has four or more computers, or you

want to use your network for activities that require passing a lot of information between computers (such as playing network games or sharing music), you should probably use a switch instead of a hub. Switches cost a little more than hubs.

Basic Lab Overview

This lab will introduce the Cisco Internetwork Operating System (IOS) command line interface (CLI). You will need to logon to a router and become familiar with the different levels of access on the router. You will also become familiar with the commands available to you in each mode (user or privileged) and the router help facility, history, and editing features.

Create below drawn network using Cisco packet tracer software. And try out below mentioned command check the results.



User vs. Privileged Mode

User mode is indicated with the '>' next to the router name. You can look at settings but can not make changes from user mode. In Privilege mode (indicated by the '#') you can do additional tasks than user mode. To get into privilege mode the keyword is '*enable*'.

Router >

Router > enable

Password:

Router

HELP

To view all commands available from this mode, type '?' and press Enter Key. This will give you the list of all available commands for the router in your current mode. You can also use the question mark after you have started typing a command. For example if you want to use a show command but you do not remember which one it is, type 'show ?'. This will output all commands that you can use with the show command.

Router#show ?

access-lists List access lists

arp Arp table

cdp CDP information

clock Display the system clock

controllers Interface controllers status

crypto Encryption module

debugging State of each debugging option

dhcp Dynamic Host Configuration Protocol status

flash: display information about flash: file system

frame-relay Frame-Relay information

history Display the session command history

--More--

Configuration Mode

From privilege mode, you can enter to the configuration mode by typing '*configure terminal*'. To exit configuration mode, type '*exit*' or <CTL>+z

Router#configure terminal

Router(config)#exit

Show Version

The '*show version*' command gives you a lot more information than at first you may think. Use '*show version*' to obtain critical information, such as router platform type, operating system revision, operating system last boot time and file location, amount of memory, number of interfaces, and configuration register.

Router>show version

Cisco Internetwork Operating System Software
IOS (tm) PT1000 Software (PT1000-I-M), Version 12.2(28), RELEASE SOFTWARE
(fc5)
Technical Support: <http://www.cisco.com/techsupport>
Copyright (c) 1986-2005 by cisco Systems, Inc.
Compiled Wed 27-Apr-04 19:01 by miwang
Image text-base: 0x8000808C, data-base: 0x80A1FECC

ROM: System Bootstrap, Version 12.1(3r)T2, RELEASE SOFTWARE (fc1)

Copyright (c) 2000 by cisco Systems, Inc.

ROM: PT1000 Software (PT1000-I-M), Version 12.2(28), RELEASE SOFTWARE (fc5)

System returned to ROM by reload

System image file is "flash:pt1000-i-mz.122-28.bin"

PT 1001 (PTSC2005) processor (revision 0x200) with 60416K/5120K bytes of memory

.

Processor board ID PT0123 (0123)

PT2005 processor: part number 0, mask 01

Bridging software.

X.25 software, Version 3.0.0.

32K bytes of non-volatile configuration memory.

16384K bytes of processor board System flash (Read/Write)

--More--

Routing Protocols

To view the status of any routing protocols currently configured on the router, can use the 'show protocols' command.

Router>show protocol

Global values:

Internet Protocol routing is enabled

FastEthernet0/0 is administratively down, line protocol is down

FastEthernet1/0 is administratively down, line protocol is down

Serial2/0 is administratively down, line protocol is down

Serial3/0 is administratively down, line protocol is down

FastEthernet4/0 is administratively down, line protocol is down

FastEthernet5/0 is administratively down, line protocol is down

Flash Memory

Flash memory is a special kind of memory on the router that contains the operating system image file(s). Unlike regular router memory, Flash memory continues to maintain the file image even after power is lost.

Router>show flash

System flash directory:

File	Length	Name/status
-------------	---------------	--------------------

1	5571584	pt1000-i-mz.122-28.bin
----------	----------------	-------------------------------

[5571584 bytes used, 58444800 available, 64016384 total]

63488K bytes of processor board System flash (Read/Write)

Running Configuration

The currently active configuration script running on the router is referred to as the 'running configuration' on the routers command-line interface. Note the privilege mode required. The running configuration script is not automatically saved on a Cisco router, and will be lost in the event of power failure. The running configuration must be manually saved with the 'copy' command (discussed in a later lab).

Router#show running-config

Building configuration...

Current configuration : 514 bytes

!

version 12.2

no service password-encryption

!

hostname Router

!

!

!

!

!

ip ssh version 1

!

!

interface FastEthernet0/0

no ip address

duplex auto

speed auto

shutdown

!

interface FastEthernet1/0

no ip address

duplex auto

speed auto

shutdown

!

interface Serial2/0

no ip address

shutdown

!

interface Serial3/0

no ip address

shutdown


```
!  
interface FastEthernet4/0  
no ip address  
shutdown  
!  
interface FastEthernet5/0  
no ip address  
shutdown  
!  
ip classless  
!  
!  
!  
line con 0  
line vty 0 4  
login  
!  
!  
end  
  
Router#
```

Command history

The routers Command Line Interface (CLI) maintains by default the last 10 commands you have entered in memory, for later retrieval. You can change this default value. You cycle through previous router commands entered (since the last power loss), using one of two methods. To view all of the past commands still in router memory at the same time, use the '*show history*' command. For single line retrieval, use either the **Arrow-Up** (for previous command) and Arrow Down (for next command), or Control-P(for previous command)and Control-N(for next command).

```
Router>show history
```

show version
show protocols
show flash
enable
show running-config
disable
show history

Clock

The router keeps its own clock that you can use to synchronize devices to. To view the clock use the show clock command

Router#show clock

***0:1:5.902 UTC Mon Mar 1 1993**

Host Table

You can create a list host name on your router. You can view the entries (if any) by typing show hosts.

Router#show hosts

Default Domain is not set

Name/address lookup uses domain service

Name servers are 255.255.255.255

Codes: UN - unknown, EX - expired, OK - OK, ?? - revalidate

temp - temporary, perm - permanent

NA - Not Applicable None - Not defined

Host	Port	Flags	Age	Type	Address(es)
-------------	-------------	--------------	------------	-------------	--------------------

Show users

The show users command displays users who are connected to the router.

Router#show users

Line	User	Host(s)	Idle	Location
* 0	con 0	idle	00:00:00	

Interface	User	Mode	Idle	Peer Address
-----------	------	------	------	--------------

Show Interfaces

The show interfaces command will display statistics for all interfaces configured on the router

Router#show interfaces

```

FastEthernet0/0 is administratively down, line protocol is down (disabled)
Hardware is Lance, address is 00d0.bc8b.c34b (bia 00d0.bc8b.c34b)
MTU 1500 bytes, BW 100000 Kbit, DLY 100 usec, rely 255/255, load 1/255
Encapsulation ARPA, loopback not set
ARP type: ARPA, ARP Timeout 04:00:00,
Last input 00:00:08, output 00:00:05, output hang never
Last clearing of "show interface" counters never
Queueing strategy: fifo
Output queue :0/40 (size/max)
5 minute input rate 0 bits/sec, 0 packets/sec
5 minute output rate 0 bits/sec, 0 packets/sec
0 packets input, 0 bytes, 0 no buffer
Received 0 broadcasts, 0 runs, 0 giants, 0 throttles
0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
0 input packets with dribble condition detected
0 packets output, 0 bytes, 0 underruns
0 output errors, 0 collisions, 1 interface resets
0 babbles, 0 late collision, 0 deferred
0 lost carrier, 0 no carrier
0 output buffer failures, 0 output buffers swapped out
--More--

```

Show Protocols

The show protocols displays global and interface specific status of layer 3 protocols.

Router#show protocols

Global values:

Internet Protocol routing is enabled

FastEthernet0/0 is administratively down, line protocol is down

FastEthernet1/0 is administratively down, line protocol is down

Serial2/0 is administratively down, line protocol is down

Serial3/0 is administratively down, line protocol is down

FastEthernet4/0 is administratively down, line protocol is down

FastEthernet5/0 is administratively down, line protocol is down