

---

नाम			
Name	:	-----	
अनुक्रमांक			प्राप्त अंक
Roll No	:	-----	Marks Awarded :
पाठ्यक्रम			
Course	:	-----	
दिनांक			अनुदेशक का हस्ताक्षर
Date	:	-----	Instructor Initial :

---

Name of the experiment: **Study of the ROUTER**

### **Object**

Study of Router & its interfaces, accessing methods & the modes

### **Introduction**

A Router is similar to a PC. Just like a PC, it has a CPU, RAM, ROM, and an operating system. Operating system is called as IOS (Internetworking Operating System). Instead of a hard drive, Router stores its configuration files (Startup-Configuration) in NVRAM and its operating system in Flash, RAM is used as a working area & stores Running-Configuration files. Flash can be either EEPROM chip or PCMCIA card. Both NVRAM and Flash are the types of RAM that retains the data even after the power is turned off. The router does not need a very powerful CPU, and most routers run on 20 or 25 MHz CPUs (made by Motorola)

### **Router Startup sequence (Boot up sequence)**

1. ROM chip runs Power On Self Test (POST) to make sure that CPU, memory, and interfaces are functional
2. Bootstrap program is executed from ROM and searches for Cisco IOS. Depending on the configuration, IOS can be loaded from ROM, FLASH, or TFTP server. The location of the IOS is determined from the boot field setting in configuration register (in ROM)
3. After IOS is loaded, router searches for configuration file. Configuration file is normally located in NVRAM, but can also be located on the TFTP server. If no configuration file is found, router presents you with a **system configuration dialog**.
4. After the configuration file is found and loaded into RAM, router reads and executes commands from configuration file one at a time. These processes enable interfaces and sets parameters related to protocols, including routing protocols.

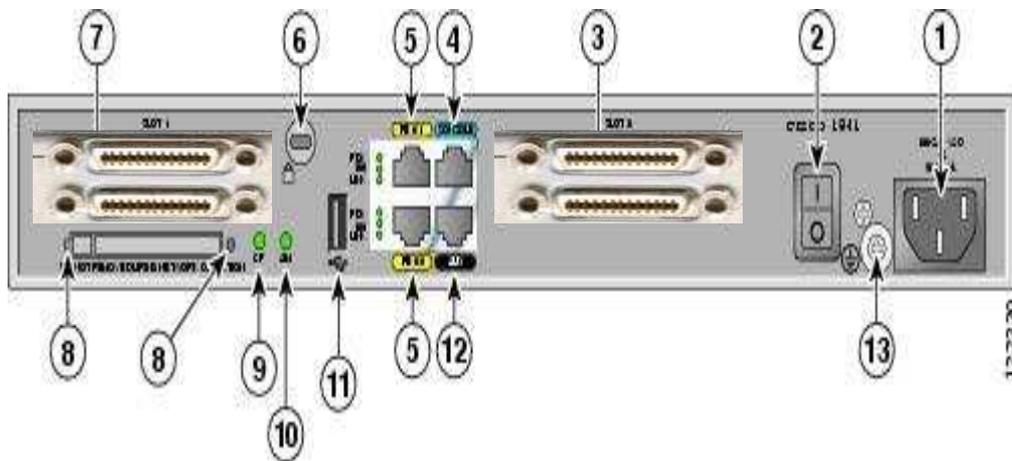
## Apparatus Required

1. Desktop PC with a serial port (or) COM port
2. Console cable
3. Router

## Procedure

1. Study the given CISCO 1841 router and indicate the different interfaces available on the rear panel and other information
2. Connecting and configuring Console interface
3. Study the different IOS command modes

### Rear view of CISCO 1841



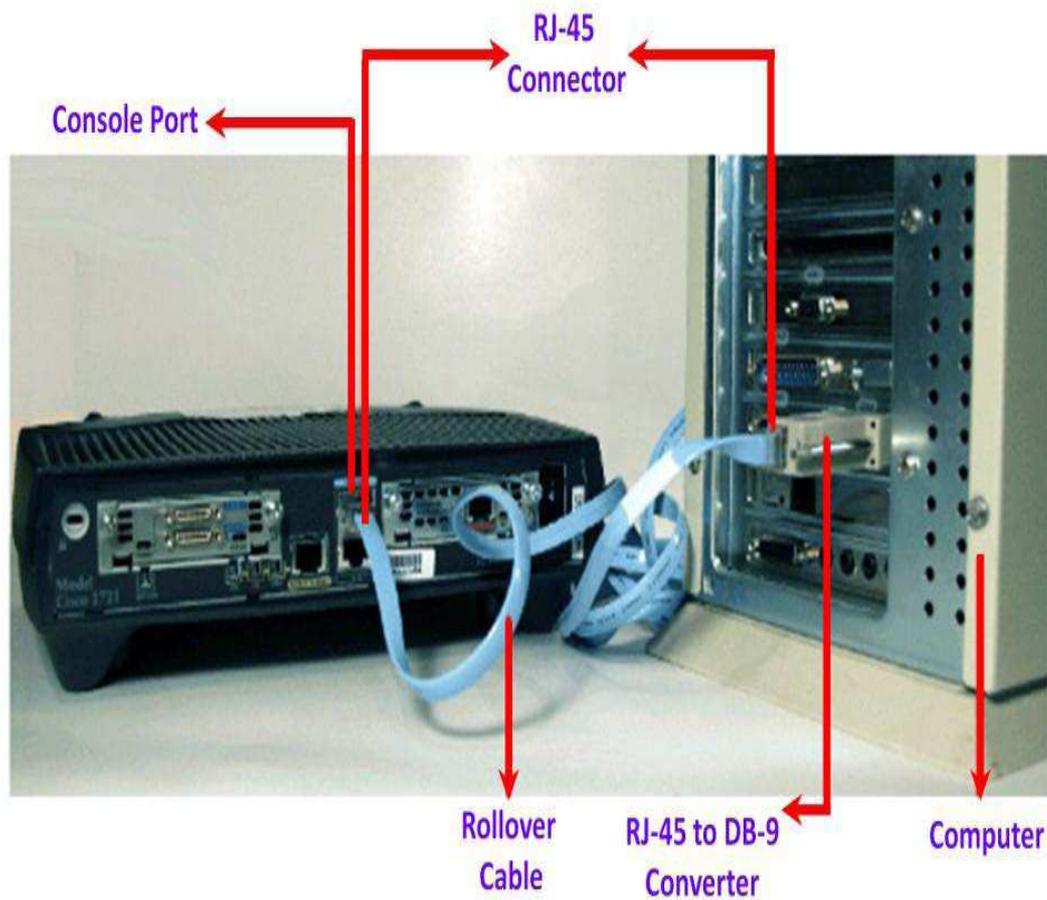
### Rear panel Information

1	Input power connection	8	Compact Flash memory card slot
2	On/Off switch	9	Compact Flash (CF) LED
3	Slot 0 (Smart Serial card)	10	AIM LED
4	Console port	11	USB port
5	Fast Ethernet ports and LEDs	12	Aux port
6	Kensington TM security slot	13	Chassis ground connection
7	Slot 1 (Smart serial card)		

## Rear panel Interfaces

Fixed ports				
Type of interface	Interface number	port number	Purpose	
Modular ports				
Type of interface	Interface number	Slot number	Port number	Purpose

## Connecting and configuring console interface



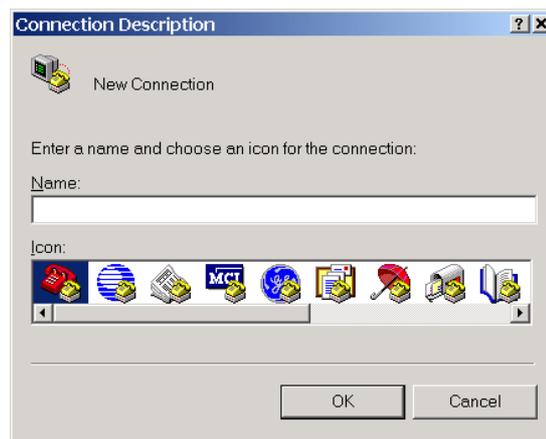
1. Identify the serial port on the Desktop PC
2. Identify the console port on the router
3. Connect one end of the console cable with serial port of the PC and other end with console port of the Router as shown above.
4. Setup the terminal emulation software as given below
  - a) Hyper terminal for Windows 98 / XP os  
OR
  - b) Emulation Software like Putty for Windows Vista OS(third party software)

#### 4.1 **Configuring Hyper Terminal** (For Windows 98 & XP os)

**Start >Programmes >Accessories >Communications > Hyper terminal**

Hyper Terminal will open a “Connection Description “dialogue box

Give a name and click on “ok”



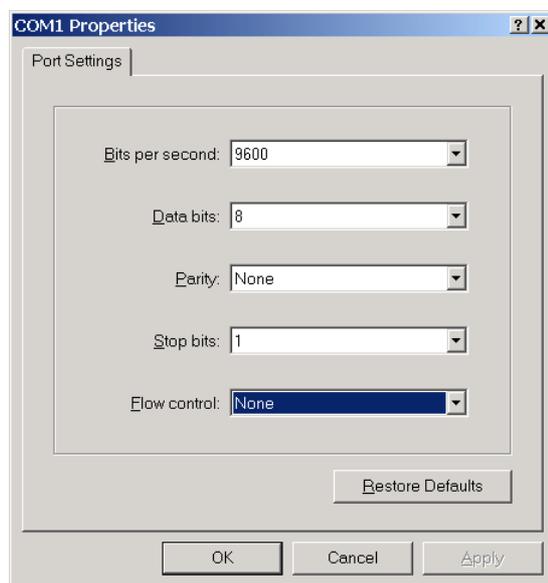
Select the “COM” port to which console cable is connected and click “ok”



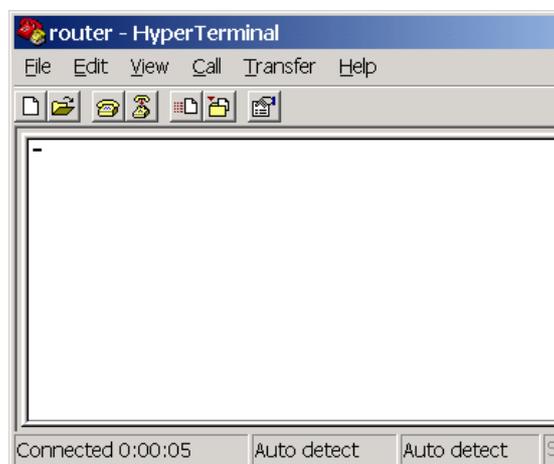
Set values as:  
Bits per second: 9600  
Data bits: 8  
Parity: None  
Stop Bits: 1  
Flow Control: none

(OR)

Click on “Restore Defaults” button, the said values are assigned.



The Hyper terminal window will appear as



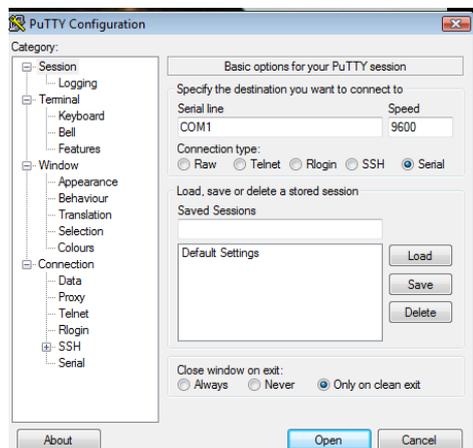
## 4.2 Configure terminal emulation Software like Putty (For Windows Vista OS)

This emulation software is freeware, this software to be installed in the PC to which Console cable from the Router is connected via COM port.

Double click on the **Putty icon** available on desktop

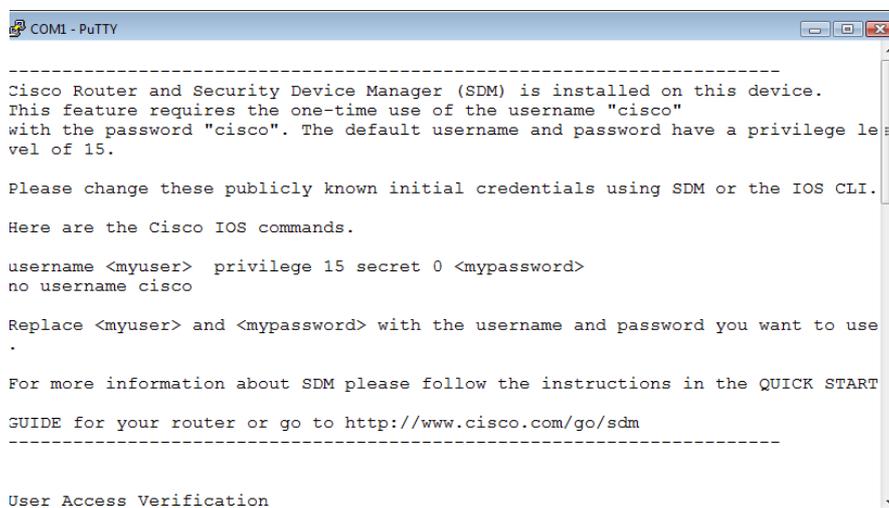


Putty configuration dialogue box will open, select **connector type as serial** and click **“open”**



Once the Hyper terminal **or** Emulation Software like Putty is ready, now switch on the Router.

The putty (COM1) terminal window will appear as



**After the Router boots-up completely. (On a new Cisco Router) it displays the following questions.**

---System Configuration Dialog---

i. Would you like to enter the initial configuration dialog? [Yes / No]: **no**

*“If you choose “Yes”, IOS will prompt questions to gather the information to configure the Router, it is recommended to choose “no”, to configure the Router using IOS commands.”*

ii. Would you like to terminate auto install? [Yes / No]: **yes**  
*“it is recommended to choose “yes”*

### **IOS Command Modes**

*“There are different IOS modes for various configurations”*

1. User Mode:

```
Router>
```

'>' symbol implies “User Mode”. This is the first mode, user interacts with **IOS**. It is a restricted mode and supports only a very few **basic commands**

**Router** is the default hostname and can be changed.

2. Privilege Mode:

```
Router> enable (or) en ↵  
Router#
```

'#' Symbol implies “Privilege Mode”. This mode has full administrative rights. This mode is generally used for **advance trouble shooting** using 'show' and 'debug' commands.

3. Global Configuration Mode

```
Router> enable (or) en ↵  
Router# config terminal (or) config t ↵  
Router (config) #
```

'(config)#' symbol implies “Global Configuration Mode”. Configuration of the Router starts from this mode. In this mode configurations that affect the complete router.

4. Interface Configuration Mode

```
Router> enable (or) en ↵  
Router# config terminal (or) config t ↵  
Router (config) #interface (or) int <interface type>↵  
Router(config-if)#
```

'(config-if)#' implies "Interface Configuration Mode". This mode is used to configure a specific type of interface.

The different types of interfaces are

- |     |                     |                            |
|-----|---------------------|----------------------------|
| 4.1 | LAN interface       |                            |
|     | a. Ethernet         | Represented as <u>e</u>    |
|     | b. Fast Ethernet    | Represented as <u>fa</u>   |
|     | c. Gigabit Ethernet | Represented as <u>gbic</u> |
| 4.2 | WAN interface       |                            |
|     | Serial              | Represented as <u>s</u>    |

Each interface is identified by type of interface / slot number / port number

In a modular router serial interface is represented as

E.g. S0/0/0  
S0/0/1  
S0/1/0  
S0/1/1

## 5. Line Configuration Mode

```
Router> en ←  
Router# config t ←  
Router (config) # line <type of line interfaces (or) ports> ←  
Router (config-line) #
```

'(config-line)' symbol implies "Line Configuration Mode". This mode is used to configure Telnet, Console and Auxiliary.

The different types of line interfaces (or) ports are

- |     |                               |                           |
|-----|-------------------------------|---------------------------|
| 5.3 | Console interface (or) port   | Represented as <u>con</u> |
| 5.4 | Virtual interface (or) port   | Represented as <u>vtv</u> |
| 5.5 | Auxiliary interface (or) port | Represented as <u>aux</u> |

Each line interface is identified by type of interface & number

The first interface is numbered as 0; second interface as 1 and so on

E.g. vty 0 4

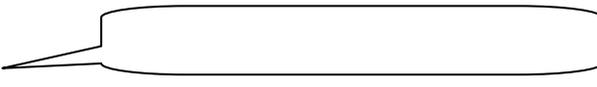
## 6. Router Mode

```
Router> en ←  
Router# config t ←  
Router(config)#router <type of dynamic protocol> ←  
Router(config-router)#
```

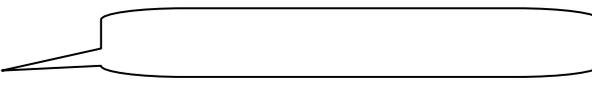
'(config-router)#' symbol implies "Router Mode". This mode is used to advertise network under dynamic routing protocols.

**Exercise:**

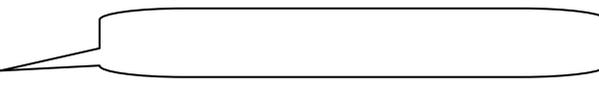
Identify the different modes of the router & write in the box:

Router> 

Router>enable

Router# 

Router# configure terminal

Router(config)# 

1. Name the different ports available on the Router?
  
  
  
  
  
  
  
  
  
  
2. What is IOS, where it is stored in a Router?
  
  
  
  
  
  
  
  
  
  
3. Write the different memories used by the Router