LAB 4: Configuring Basic Switch and Router

Objectives

- Perform basic switch configuration on zero configured Switch in Cisco packet tracer to enable the Switch for the basic functionality.
- Complete walk-through of 100 MB full duplex configuration in Cisco Switch step by step.

1. Introduction

There are a lot of devices that fall into the "network switch" category. Since we're talking about configuration, we'll be referring specifically to managed switches in this article. It's worth noting how you configure a Layer 2 vs Layer 3 switch will be different, as will small office/home office (SOHO) vs. enterprise switches. And don't forget there are always going to be small differences between vendors and software versions.

Because Cisco is so common, and its IOS-style CLI is used on more than just Cisco switches, we'll focus on the command-line configuration of Cisco switches running IOS as our prime example. But you'll be able to use what we cover here in lots of different environments. Because many of the commands and concepts apply to routing devices too, this can also be a good reference for basic router and switch configuration.

From a network perspective, we'll focus on features related to Layer 2 switching.

A good thing about the **Cisco IOS** is that it works quite similarly on both the routers as well as switches, However, there is a difference in the commands that we use for each one of them. For example, some specific commands are meant only for the switches while others are for routers as per the device's functionality.

In this lab, we will assign an IP address to the VLan1 interface and we will configure the default gateway on the Switch. We will also perform some basic configurations which will prepare the Router for the functional network.

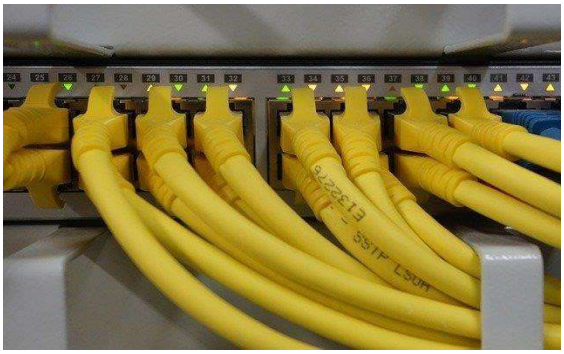


Figure 4. 1 Ethernet cables connected to the Switch

2. Basic Switch configuration:

Basic switch configuration can be thought of as the minimum network, port, and security provisioning required for the production deployment of a switch. In practice, your exact needs

will vary from environment to environment. And overall, effective switch management is a detailed topic in its own right.

Our goal here is to cover some switch and router configurations basics that apply to most production use cases. These include configuring device management settings and hardening the switch and router.

All switches come with default VLAN1, To assign an IP address to the VLAN1 interface, we have to enter interface configuration mode. While configuring the Switch for basic functionality, we should also assign a default gateway to the Switch.

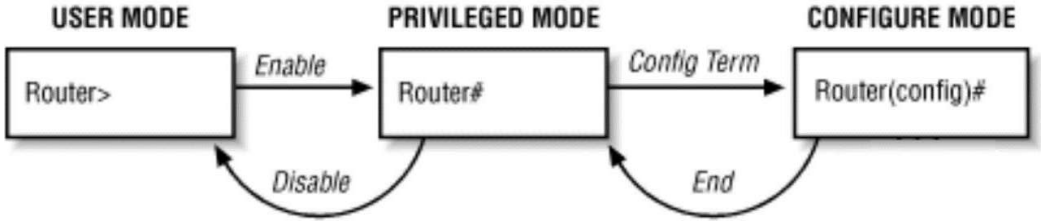


Figure 4.2 modes of switch and Router

It is important to remember that the VLAN1 interface and default gateway IP address must be on the same network. This enables the Switch to redirect traffic to other networks.

Routers however are considered gateways and do not support VLANS. Routers have limited interfaces and each interface requires a different Network address.

2.1. important Commands To Remember

Before we proceed some commands require your attention. They are helpful while you perform actions on the switches.

2.1.1. Saving the configurations on Switch

Vlan1 interface allows us to connect with the Switch remotely via telnet, we can use the telnet client to remotely manage and configure the Switch. If you are unable to save the changes made to the Switch, all the hard work will do down the drain. Therefore, if the changes made to the Switch is worth-a-while and nothing unexpected has occurred, the user may save configuration on Cisco devices by typing the command **'write'**. It copies the running-config to the startup-config alternatively we can also use the command **'copy running-config startup config'** to save the running configuration of the device.

2.1.2. No IP Domain Lookup

While configuring Cisco devices, it's common to make typing mistakes. If we mistype a command then the Cisco device will try to resolve the name to the IP address. This makes Cisco devices freeze for about 60 seconds as it resolves IP addresses in the background. One minute is the maximum time taken by the device. Now, we have to wait until the device allows us to type something again. This can be very annoying. It happens because the domain name lookup is enabled by default in Cisco devices. Hence, to solve this problem we can disable

domain lookup by entering the command **'No IP Domain Lookup'** in the switch command line.

2.1.3. Logging synchronous

Now, let us talk about the status of messages received on Cisco devices. When we receive status messages on Cisco devices the message kind of mixes with the text that we type on the CLI. This can also be very confusing sometimes.

So, to solve this problem we can type the command **'logging synchronous'**. This command synchronizes the status messages. Hence, the message does not interfere with our typing.

2.2. Getting started

There are a lot of nuances related to the configuration of a switch that isn't obvious to beginners. Here are some basic tips to be aware of before you start.

Command line completion, Use the tab key, and up/down arrows are time savers

Typos are a pain, and typing out long commands is tedious. Fortunately, Cisco's IOS has features that can help you avoid typos and work faster:

a. Command Line completion. Once you type enough of a command that is unique, you can just hit enter. For example, instead of typing "configure terminal", you can use the command "config t" like this:

Switch#config t

b. Tab completion. Hitting the tab key once you have enough unique text on the screen will auto-complete a command. For example, hitting tab after "conf" auto-completes to "configure":

```
Switch>enable
Switch#
```

c. Command scrolling with up/down keys. Need to rerun a command? You can scroll through your command history with the up/down arrows on your keyboard.

```
Switch#
```

d. Bonus! Use "?" for added help. Hitting "?" at the beginning of a command prompt will show you all the commands that are available in the current context. Hitting "?" after a command will show you all the parameters that are available in that context.

2.2.1. Access levels and modes

There are several Cisco access levels and modes that allow you to run different commands. You can learn more about each mode in the Cisco IOS command hierarchy, but the table below is a reference for our examples.

Cisco Mode	What the prompt looks like for switch and router	Command to enter from upper-level mode	Command to exit to upper-level mode
User EXEC mode	Switch>, **Router>**	Default mode	logout or exit
Privileged EXEC (access from EXEC)	Switch#, **Router#**	enable	disable
Global configuration (access from Privileged EXEC)	Switch(Config)#, **Router(Config)#**	config t	CTRL/Z
Interface configuration (access from global configuration)	Switch(config-if)# **Router(config-if)#**	interface <interface name>	Exit
Routing engine level within configuration mode	**Router(config-router)#**	Router <protocol> RIP	exit
Line level configuration (access from global configuration)	Switch(config-line)# **Router(config-line)#**	line <line name/ number> vty, tty, aux, console	Exit

2.2.2. Console ports and cables

When you're connecting to a switch for the first time, you're often doing it through the console port. Usually, this is done by connecting a serial cable to the switch. You can also use a USB to serial adapter to make the connection.

Once the physical connections are made, how can you access the CLI? By using a terminal emulator. For Windows, there are several popular emulator options, like **Putty, RealTerm, and TerraTerm**.

2.2.3. Startup config vs. running-config

Your switch has two "config" types and locations. A switch's *running-config* is stored in RAM. Its *startup-config* is stored in nonvolatile memory (harddisk).

Why is this important? Take it from someone who has made the mistake too many times: if your configuration changes aren't saved to the startup-config, you'll lose them, when the **switch reboots**. As you make changes to the running config, you'll see them take effect in real-time. However, you need to explicitly save those changes to the running config for them to persist. Save yourself some pain and double-check before moving on.

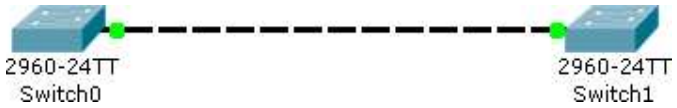
Duplexing and Link Speed

Most of the time **Cisco auto-negotiation** for duplex selection works perfectly. However, in some instances, a Cisco device is unable to detect the duplex mode and it may result in a duplex

mismatch. This could result in collisions in the network. Therefore, to fully utilize the bandwidth and the capacity of the Switch, it is a good practice to hard-code the speed and duplex on the Cisco devices.

In this lab, we will learn how to configure a basic switch and how can we connect it with LAN to communicate between the terminals. First, we will learn how to enter the command line of the switch using the console cable to configure the basic settings, once that set we will perform further settings like giving it an IP address, gateway address, duplex, and speed to links, we will have to go into the specific interface on which we want to hard-code the speed and duplex setting.

Please note that full-duplex configuration must be configured on each interface on which we want to hardcode the full-duplex mode.



Show Commands For Switch Configurations

The following example shows how to list the show commands available in privileged mode:

```
Switch> enable
Switch# show <command>

Frequently used command are highlighted

Show commands:
-------------------------------------------------------------------------------------------------
show arp              Show ARP table
show cdp              Show Cisco Discovery Protocol Information
show running-config   Show system configuration
show flash            Show system flash information
show interface        Show network interfaces
        └status       Duplex/speed
        └Vlan <No.>   VLan information
        └switchport   all vlan ports information
        └trunk        trunk information
show ip               Show IP Information
show logging          Show system logging information
show mac-address-t    Show MAC table information
show port-security    Show port information
show spantree         Show spantree information
show trunk            Show trunk ports
show users            Show active Admin sessions
show version          Show version information
show vlan             Show Virtual LAN information
show vtp              Show VTP Information
Console> (enable)
```

Lab Task: Configure A Network Switch

Now that you know the basics, we can move on to the commands. Here, we'll walk through some of the most important basic network switch configuration tasks.

While any particular production deployment will likely require specific additional steps (e.g. for additional hardening and user management), these commands will help you hit the ground running.

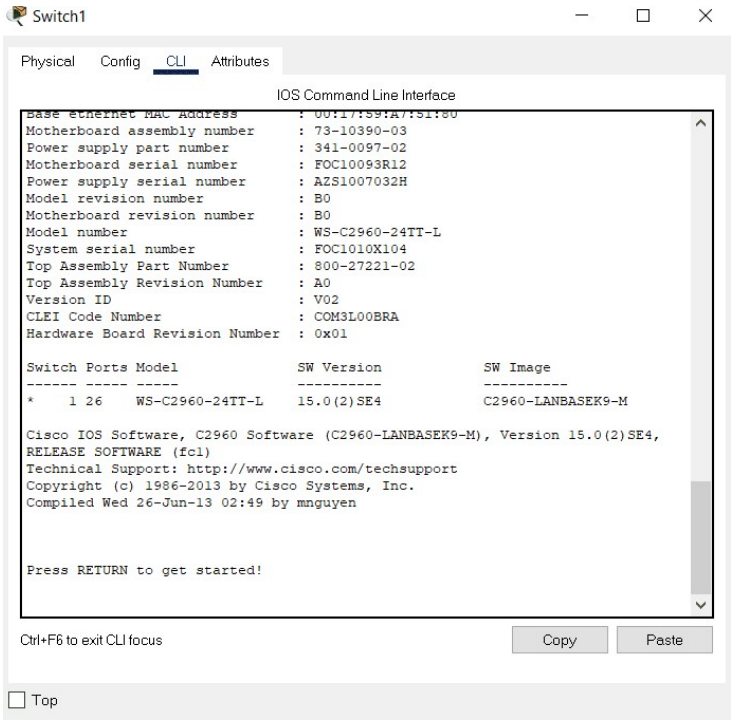


Fig 4.1 shows the start-up of a typical CISCO Switch

Task 1: Connect to the console

You need to start with a connection to the console port. That means configuring your terminal emulator software and connecting your rollover cable between your switch's console port and your PC.

Figure 4.2 connecting a switch using a console cable

Many Cisco switches use these serial settings shown in Figure 4.3.

1. Double-click on PC0, click on the “Desktop” tab, and then click on “Terminal”.
(Note: In real life, you can use HyperTerminal or PuTTY for Windows XP.)

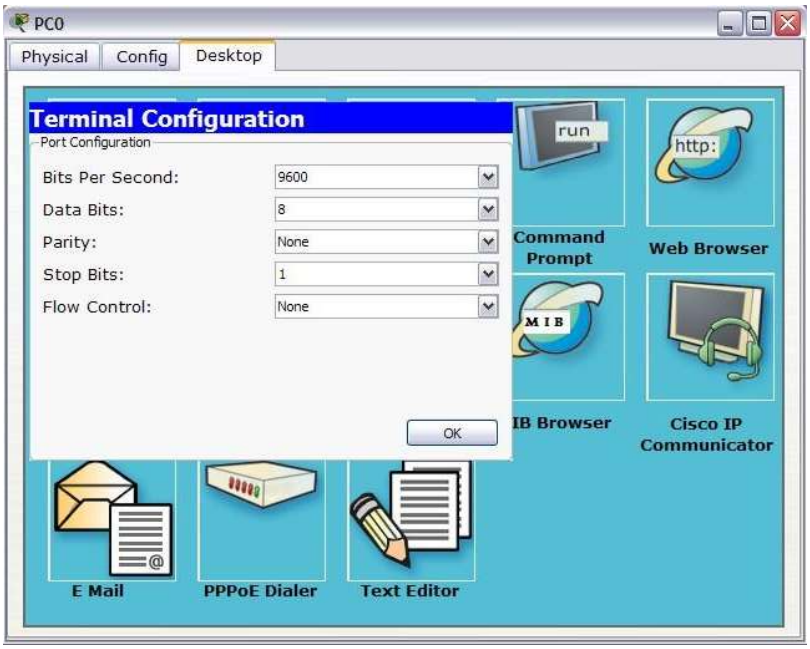


Figure 4.3 setting up the serial connection to switch

2. Set the parameters according to the above screen, and click “ok” to continue.

3. From now on, use the “Terminal” of PC0 to configure the router instead of using the CLI in the router.

(Note: “Terminal” is how a router is configured in the real world. “CLI” shown in Figure 4.4 is just a “convenience” in Packet Tracer. “CLI” does not exist in the real world”.)

Figure 4.4 The “CLI” of the Router does not exist in the real world.

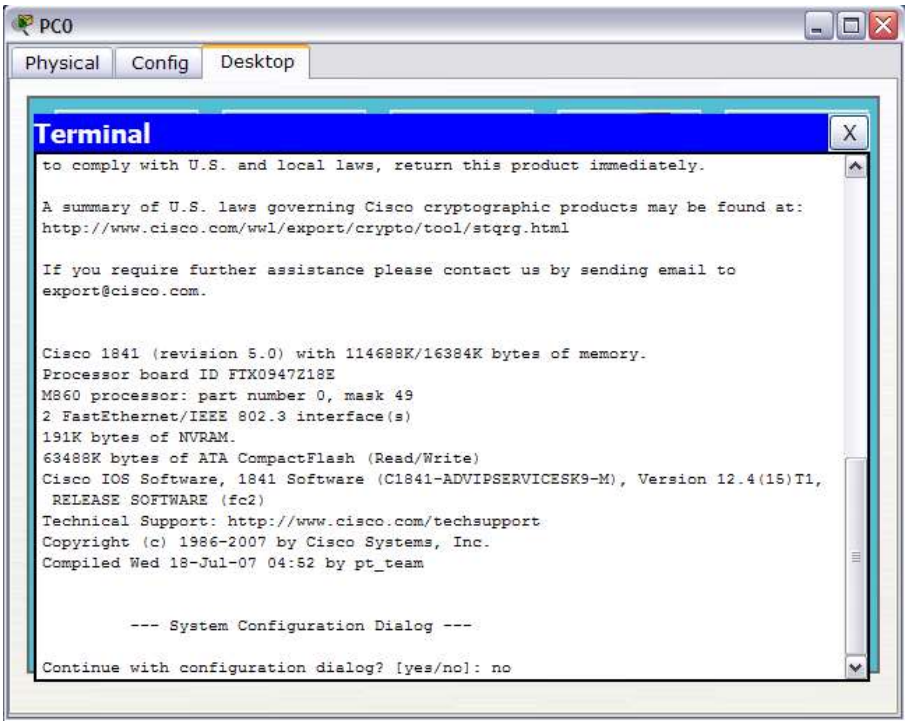


Figure 4.5 shows router configuration in the real world, with a rollover cable and a Terminal program.

3. Wait for the booting up of the switch and router.

NOTE: During booting the router will ask you if you want to setup using dialog.
Type "no" (as shown in the above screen).

5. Hit enters key to get the first router prompt.

`Router>` **OR** `Switch>`

Task 2: Set a management IP and default gateway

The management IP address is where you can log in to the switch for future administrative tasks. Once your management IP is set up, you can use it to SSH into the switch and configure it over the network.

First, we access Privileged EXEC mode with the "enable" switch configuration command:

Switch>enable
Switch#

And
Router> enable
Router#

Assign Ip To A Switch To Use In the LAN

From there, we enter Global Configuration mode with “config t” (or “configure terminal”):

Switch#config t
[Enter configuration commands, one per line. End with “CNTL/Z”.]
Switch(config)#

Next, we access the switch VLAN interface:
Switch(config)#interface vlan 1
Switch(config-if)#
Now, we can assign the management IP and subnet.

In this example, I’ll assign a 192.168.1.0 network address with a 255.255.255.0 subnet.

Be sure to replace that with the correct values for your switch!

Switch(config-if)#ip address 192.168.1.10 255.255.255.0
Switch(config-if)#

We can exit interface configuration mode and assign a default gateway for the switch from global configuration mode.

Switch(config-if)#exit
Switch(config)#ip default-gateway 192.168.1.1
Switch(config)#

Tasks For Router

Unlike the switch, we assign an IP address to each interface on a router.
For the router select an appropriate interface to assign IP, as the example shows IP address is assigned to an interface.

Router(config)# interface FastEthernet 0/1
Router(config-if)# ip address 192.168.1.1 255.255.255.0
Router(config-if)# no shutdown (as the interfaces are shut, use the command to turn them on
Router(config-if)# exit

Task 3: Set hostname
In addition to setting the IP address of the switch, you should give it a logical hostname. To do that, we enter global configuration mode and use the hostname command:

Switch(config)#hostname PepperAndEggSwitch
PepperAndEggSwitch(config)#

Task 4: Setting Duplex of Individual Port
Switch(config)#interface FastEthernet 0/1
Switch(config)#duplex full

Task 5: Setting speed of individual port
Switch(config)#interface fastethernet 0/1
Switch(config)#speed 100

Task 6: For multiple ports assignment (only for Switch)
Apply the above on all ports of Switch, How Use range command

switch(config)#interface range fastethernet 1/24
switch(config-if-range)#
OR
switch(config)#interf r f1/1-24
switch(config-if-range)#

Task 7:Save Configuration
When our configuration is complete, we can save our changes to the startup configuration. Don't forget this step, or all your work will be gone come the next switch reboot!

Switch(config-if)#exit
Switch(config)#exit
Switch#
%SYS-5-CONFIG_I: Configured from console by console

Switch#copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]
Switch#

OR
Switch#write

Task 8:
Switch(config)#no ip domain lookup
Router(config)#no ip domain lookup

Task 9:
Switch(config)#line con 0
Switch(config-line)#logging synchronous

Router(config)#line con 0
Router(config-line)#logging synchronous

Task 10: Show running-config

Switch# show run