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LAB # 07: INTRODUCTION TO SWITCHING

1. SWITCH

Switches are the devices that connect multiple other devices (like PCs, hubs, other switches, routers) to form a network. This device usually has 24 ports with each port having the ability to learn 132 mac addresses this can give you an idea of how accommodating a switch can be.

Un-like hub a switch enables multiple ports to communicate with each other this is achieved through hardware called ASIC (application specific Integrated Circuit) it create circuits between two ports so that they can communicate without collision with other port traffic. The basic symbol of a switch which is universally used is shown below

Figure 1. Switch

Image of such a switch is shown below with all its ports that accommodate variety of devices.

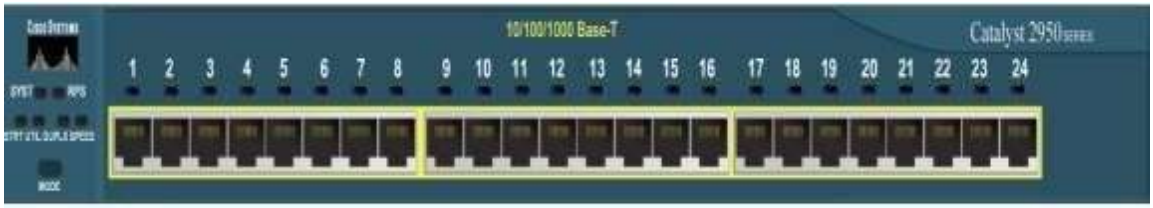

Figure 2. Switch Ports

Initially the ports of switch use to support data rates of 10Mbps with 2 special ports for high speed data traffic called "Fast Ethernet" having data rate of 100Mbps these ports are used to connect two switches together or a switch with a router.

There are three modes once you enter command line interface of a switch these modes are named below:

1) User Mode.
2) Privileged Mode.
3) Configuration Mode.

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2. USER MODE

This mode contains non-destructive commands that can be used either to see present state of device or to check its connectivity. User mode begins with > symbol. Some of the commands that can be used in this Mode are shown below:

User Mode Commands	Description
enable	Used to move from User Mode to Privilege Mode
Exit	To exit from present Mode
Ping	Echo message usually sent to check network connectivity
Show	Used to see running system configuration
Trace route	It is used to trace the whole route to destination and showing all intermediate networks being traversed.

Table 1. User Mode

3. PRIVILEGE MODE

Privilege mode gives us freedom to set clock, copy from one file to another configure virtual LAN settings and many more list of some useful commands are shown below:

Commands	Description
Delete	Delete a file
enable	To move to configuration mode
write	To write running configuration to memory
clock	Manage the system clock

Table 2. Privilege Mode

4. CONFIGURATION MODE

Configuration mode can be accessed if you type config t at privilege mode. This mode is used to configure individual port which is referred to as “interface” you can specify how your device will behave from this mode.

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Here in this lab we will see what switch is and how it is configured. We have already done a lab in which we connected two PCs directly but in real world the network is all about several devices working together to perform a task and for that we need switches that have multiple ports and some switches also have provision for ports to be added for greater connectivity.

Our task is to connect two switches together successfully while doing so we will get acquainted with the devices and will also see how these devices can be configured to work.

We will perform this task on both "Packet tracer" and "Boson Network Simulator" but for better understanding it is advice to perform the above mentioned task on "Packet Tracer" first before moving on to "Boson Network simulator".

Step 1:

First step is to select two switched and drag n drop them on your work area.

Step 2:

Select appropriate wire to connect the two devices. The suitable wire for such connectivity is "copper cross over".

Step 3:

After following above steps you will see your work area as follow:

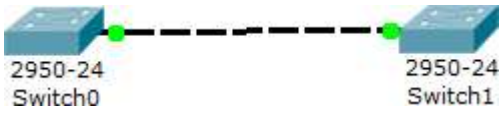

Figure 3. Connect Switches

Step 4:

In the above image you can see green dots these dots are representing LEDs on switch that can be green or amber.

Amber means switch is in learning mode and once it recognizes a link it turns green showing link is physically up now you have to configure it to make it work.

Step 5:

Click on switch 0.

Step 6:

Go to Command Line Interface (CLI) of this switch.

Step 7:

Press enter to go in to User Mode.

Step 8:

Here type "enable" or "en" to move in to Privilege mode.

Step 9:

Here type following command

Switch# **show interface fa0/1**

Explanation of above Command

"Show" command is used to view certain configuration.

In the above command I have used interface along with **"show"** command this means that I want to view interface configuration. **(**interface is something through which a device can connect to another device for example all the ports of a switch or router or PC are interfaces**)**.

After Interface comes **fa0/1 , "fa"** is short for fast Ethernet we can also use term **"fast Ethernet"** instead of **"fa"** then comes **0/1 "0"** is slot number/ module number and **"1"** is port number.
By using this command, a huge list will open showing different parameters the only parameter that is of concern to you at this level is the first line that should display
Fa0/1 is up and line protocol is up

The above means that there is physical connectivity.

Step 10:

Now move on to "configuration" mode by simply typing configure terminal command or config t.

Switch # **configure terminal.**

Or

Switch # **config t.**

Step 11:

Now you are in configuration mode. Here type vlan which stand for Virtual LAN. To connect two switches together you have to create virtual LAN basically VLAN tells that the two switches and their devices can communicate with each other as if they are part of same LAN.

Switch (config) # **vlan *number of vlan***

Step 12:

After specifying vlan number, allocate a Name to it.

Switch (config) # **name vlan2**

Step 13:

Now type "exit" to come back to **"configuration mode"** here after allocating name and number to vlan we will finally configure it.

Switch (config)# interface vlan 2

With the above command we entered in to interface of vlan .

Step 14:

Next we will specify IP Address to this VLAN. IP Address is important for accessing this VLAN remotely.

Switch(config-if)# **ip address 192.168.1.1 255.255.255.0**

IP Address is followed by subnet mask 255.255.255 means that first 24 bits are of network and last 8 bits are for end node or client or users that can be part of this network (254 end users in this network)

Switch (config-if)# **no shutdown**

"No shutdown" command will make this interface active or up because by default the interface is usually down.

Here comes an important step now all you have to do is to place the interface that you connected with other switch in to your vlan list.

Step 15:

Go to interface fa0/1 because fa0/1 of **switch 0** is connected with fa0/1 of **Switch 1**

switch(config)# interface fa0/1

switch(config-if)#switchport access vlan 2

Above command is stating that we are switching the selected port to vlan 2

Now repeat the above steps for "switch 1" assign it IP address 192.168.1.2 rest of the steps will be same after configuring both the devices use PING command to check the network connectivity if PING is successful then it means connection is up and running.

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Answer The Following

1. What is VLAN? Why do we require VLAN?

2. Differentiate between HUB, Bridge and Switch?

3. Show command can be executed from Configuration mode (T/F)

4. What information we get on using following commands:
   - Show interface
   - Show VLAN
   - Show history

5. What measures should be taken if following output is received
"**Fa0/1 is down and line protocol is down"**

Lab Tasks

1. What is the difference between 29xx switch series and 35xx/36xx switch. What benefit the later series will give explore using Packet Tracer.

2. Implement the scenario given below on packet tracer and show the connectivity between PC's by using PING Command.