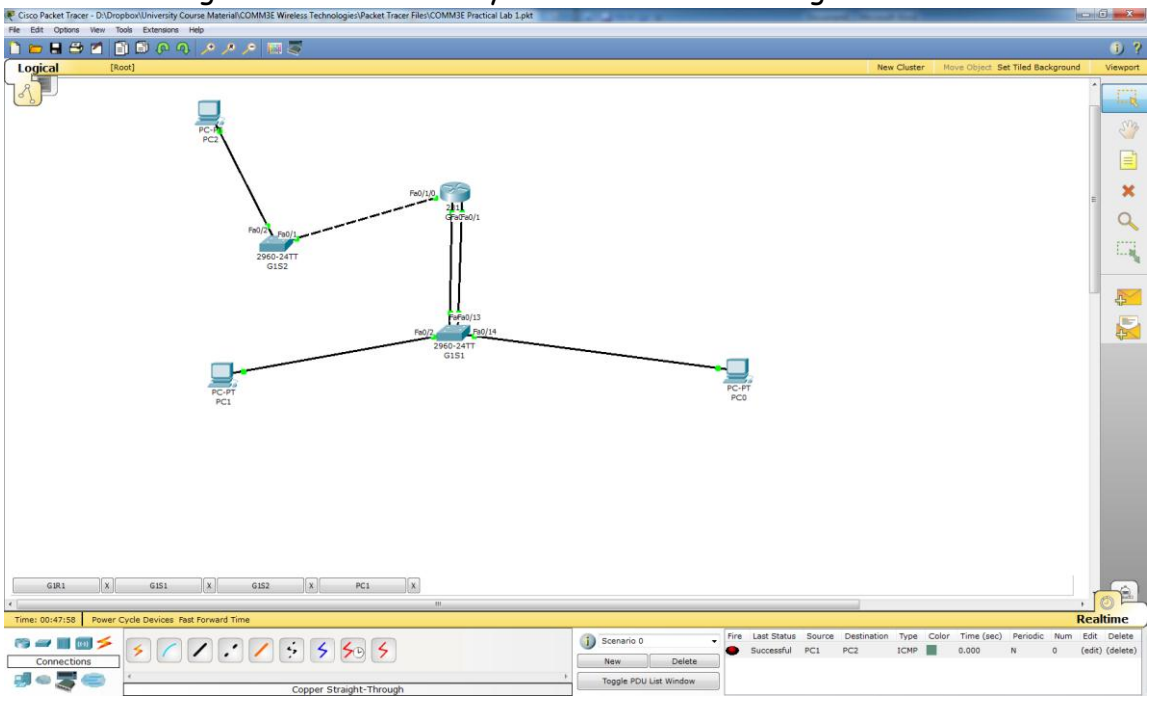
Packet Tracer Lab: Using Packet Tracer to Build a Network

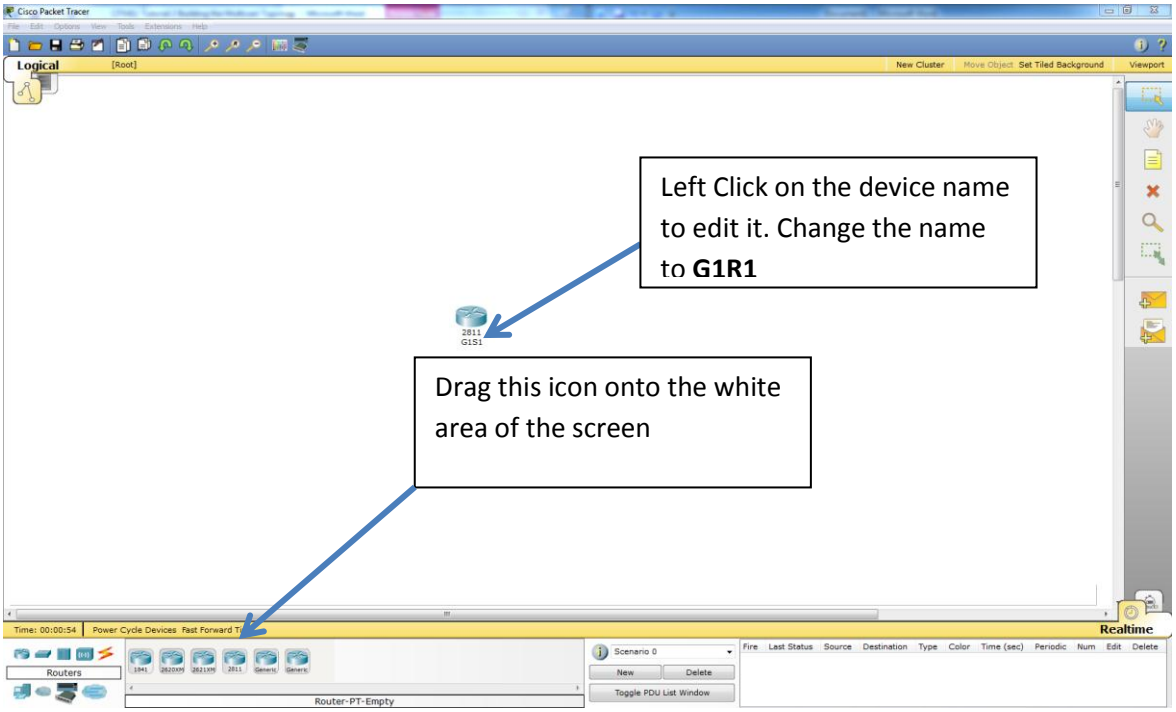
Reference: https://fas-web.sunderland.ac.uk/~cs0ssw/PacketTracerTutorial.pdf.

We will be using Packet Tracer today to create the following network.

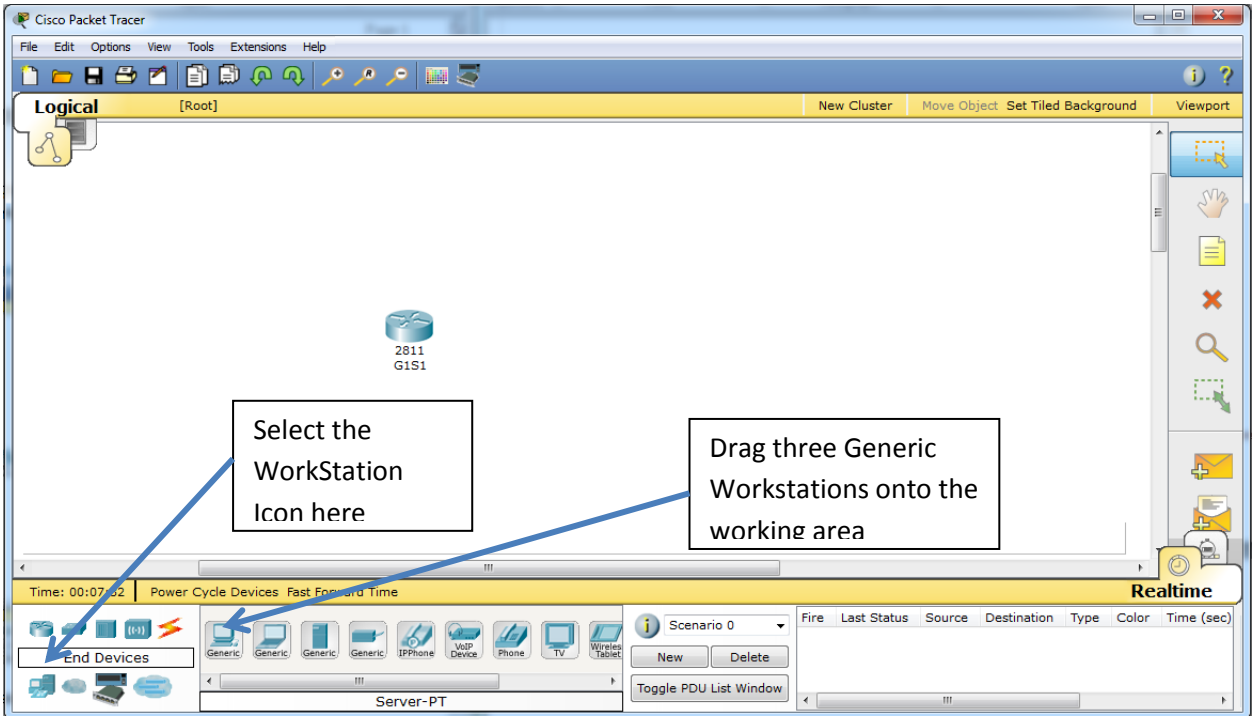


This topology requires **one** 2811 router, two 2960 switches and **three** workstations.

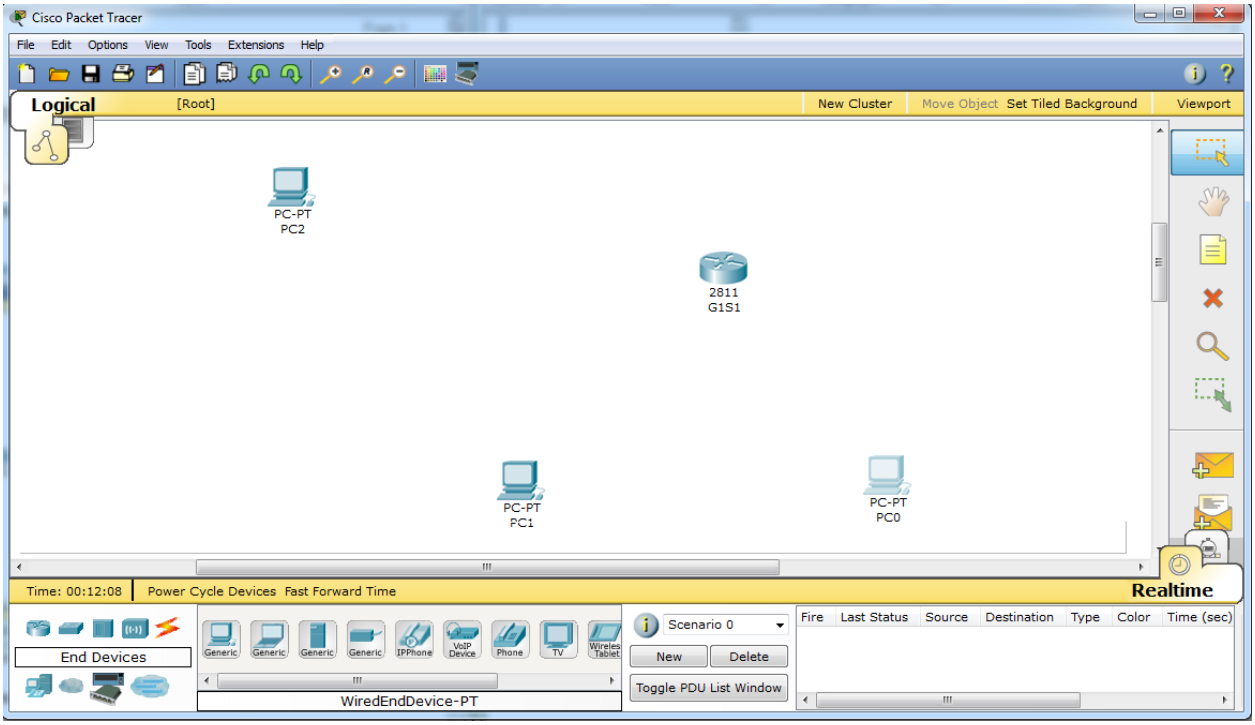
Launch Packet Tracer then drag a 2811 router icon onto the white area of the screen.



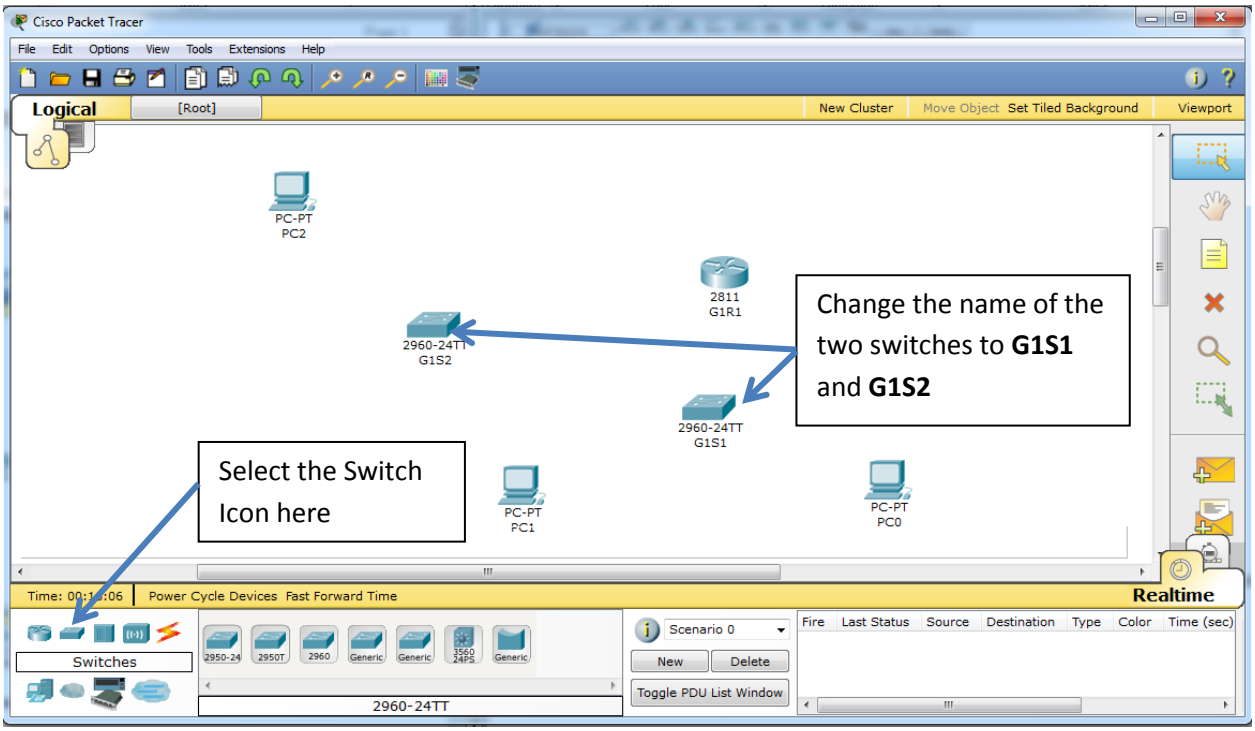
Now select the icon shown below and drag **three Generic Workstations** on to the screen.



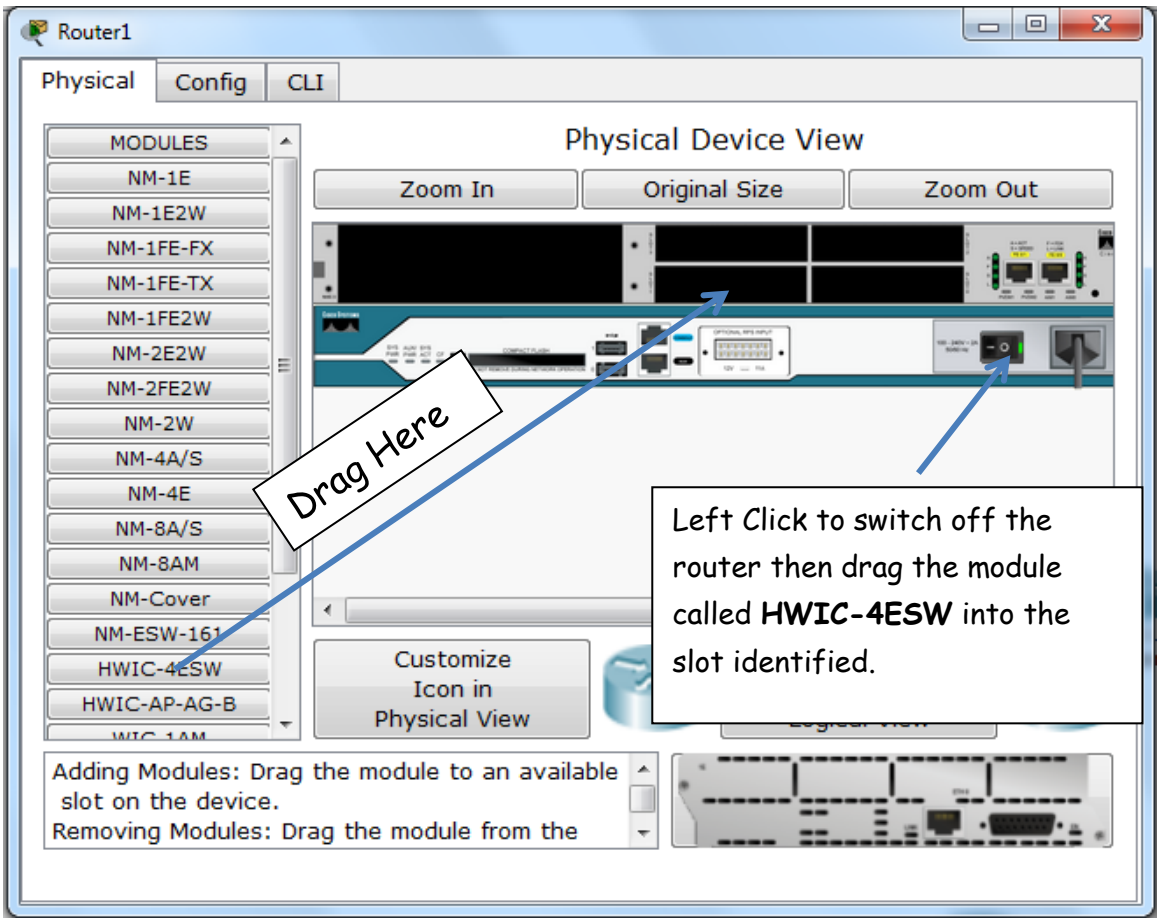
Packet Tracer should now look like this



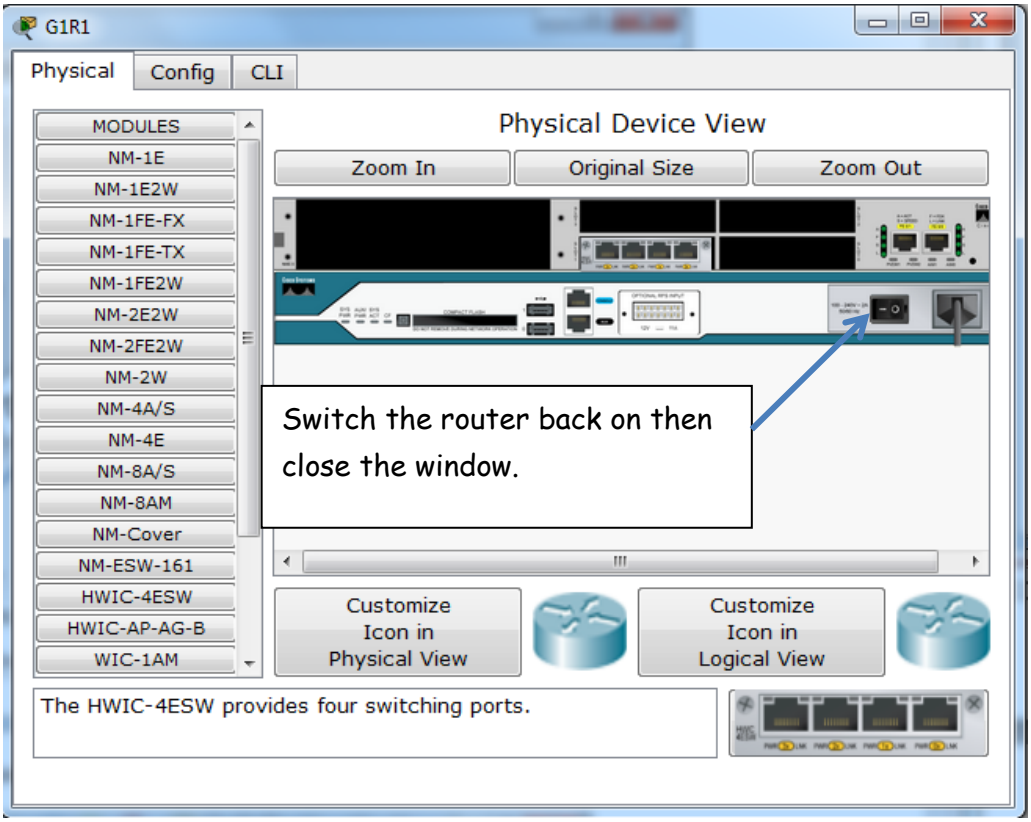
We now need to add two **2960 switches** to the topology so select the switch icon shown below then drag the two switch onto Packet Tracer. Arrange the icons so that the network looks like the image below



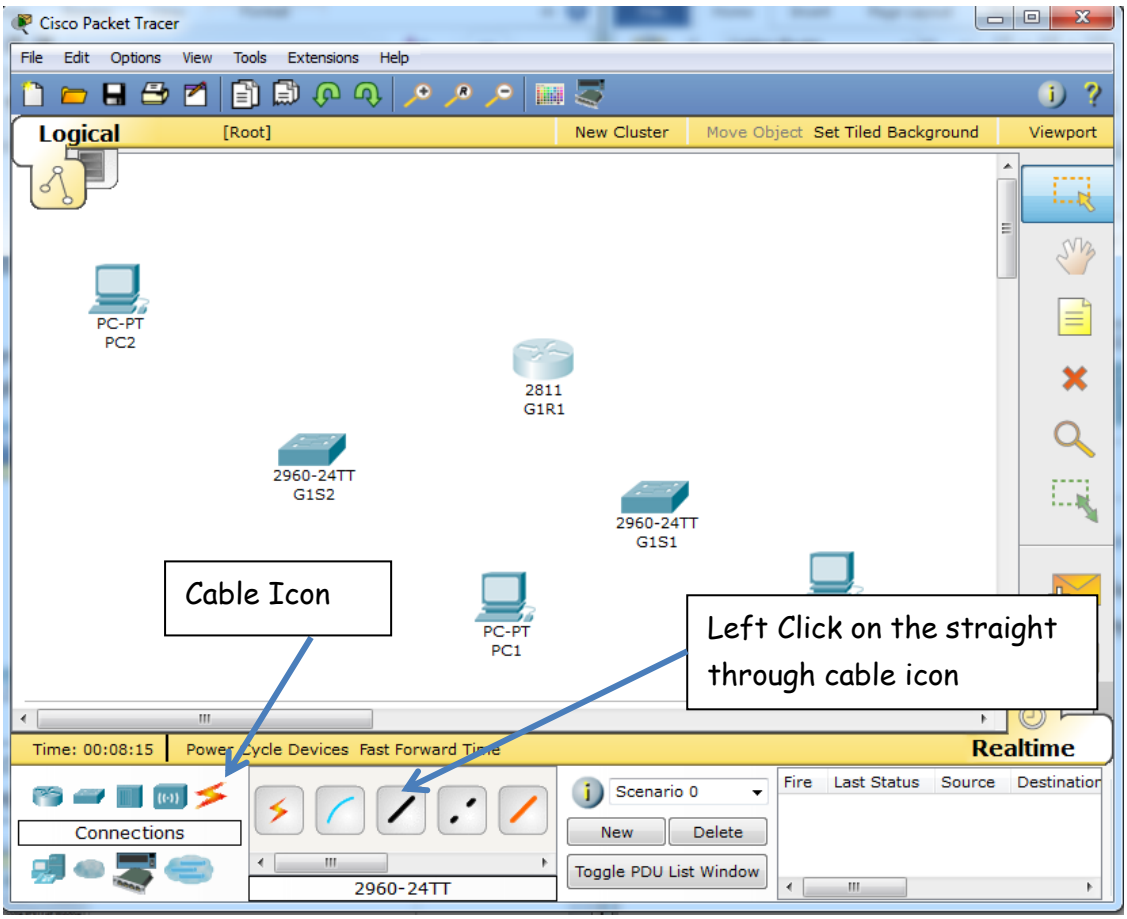
Our Router now needs an upgrade. Left click on the router **G1R1**. The following window should now appear



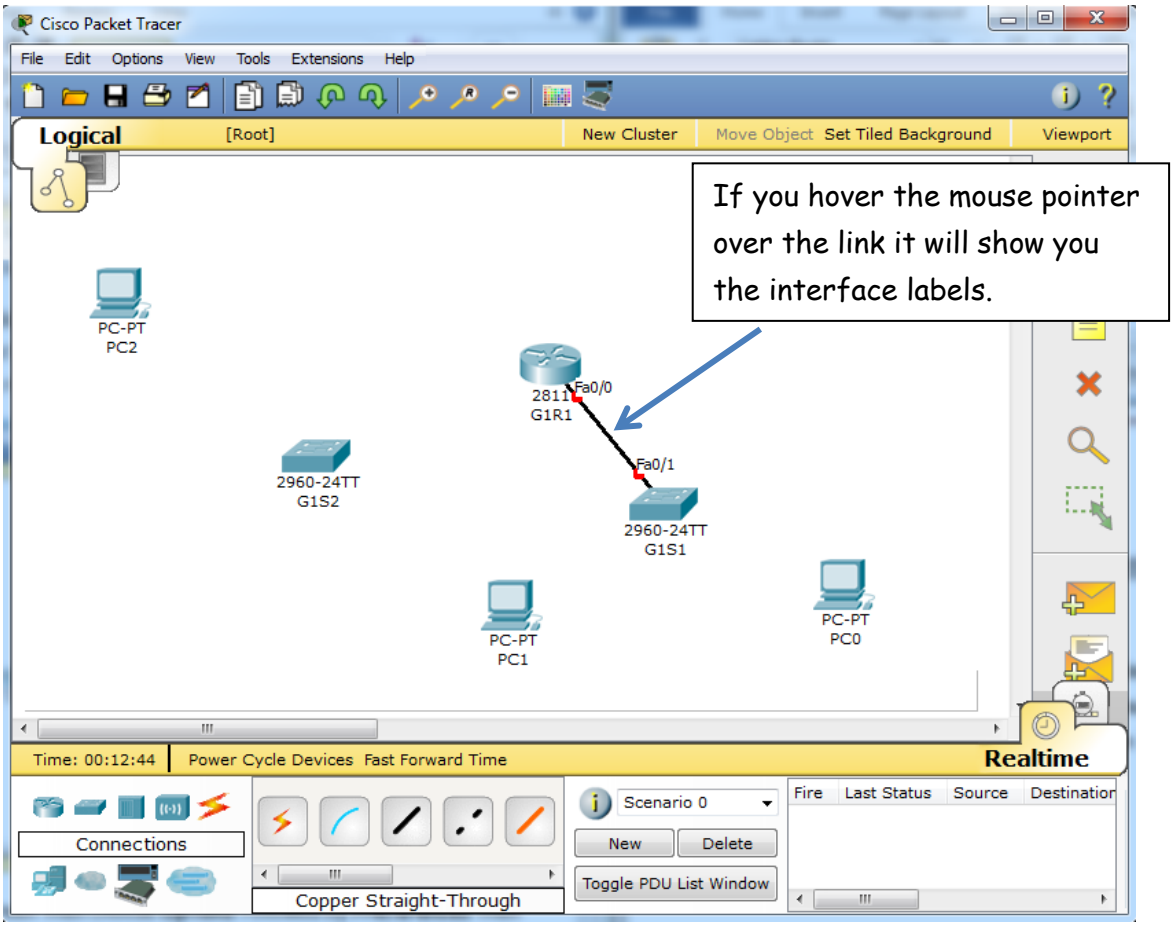
Your window should now look like this



We can now add cables to our topology. Left click on the **cable icon** shown below then select a straight through cable (which is represented by a solid black line)

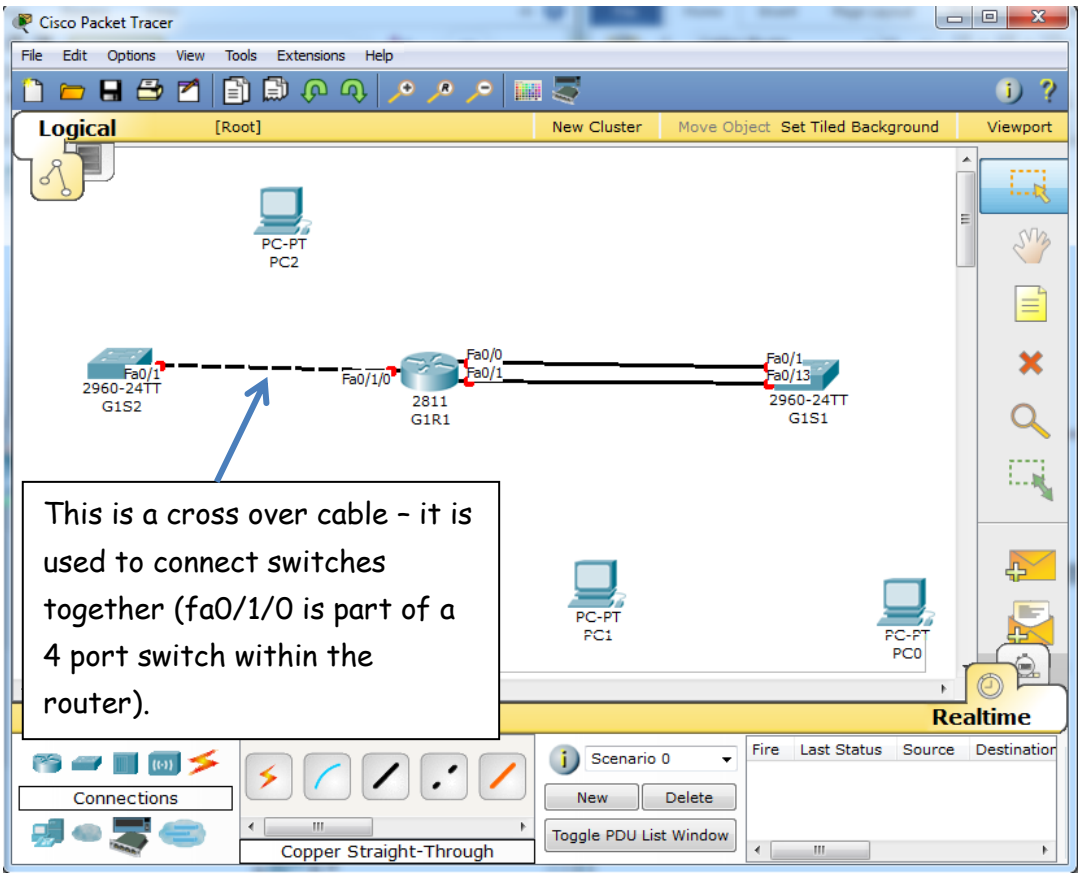


Now left click on router **G1R1**. A list of interfaces should appear. Left click on **Fa0/0**. Now Left click on switch **G1S1**. Another list of interfaces should appear. Select **Fa0/1**. Once this is done, a solid black line should appear on the screen as shown below. This line represents a straight through patch cable.



If you want the interface labels to appear on the screen all the time then choose **Options** followed by **Preferences** then select the check box next to **Always show port labels**.

Add additional cables until the network looks like this

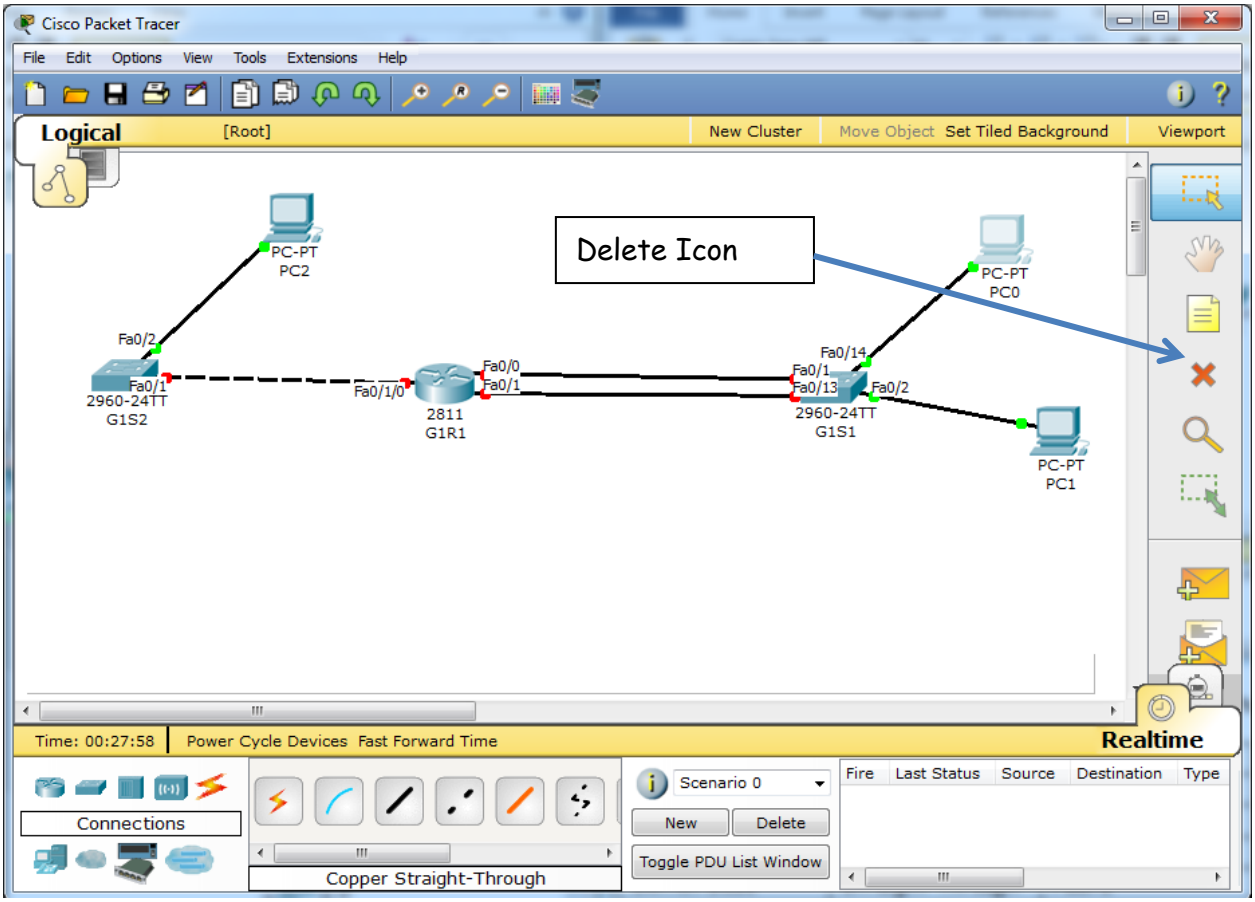


The table below shows the cables connections you must use to complete the wiring for this network

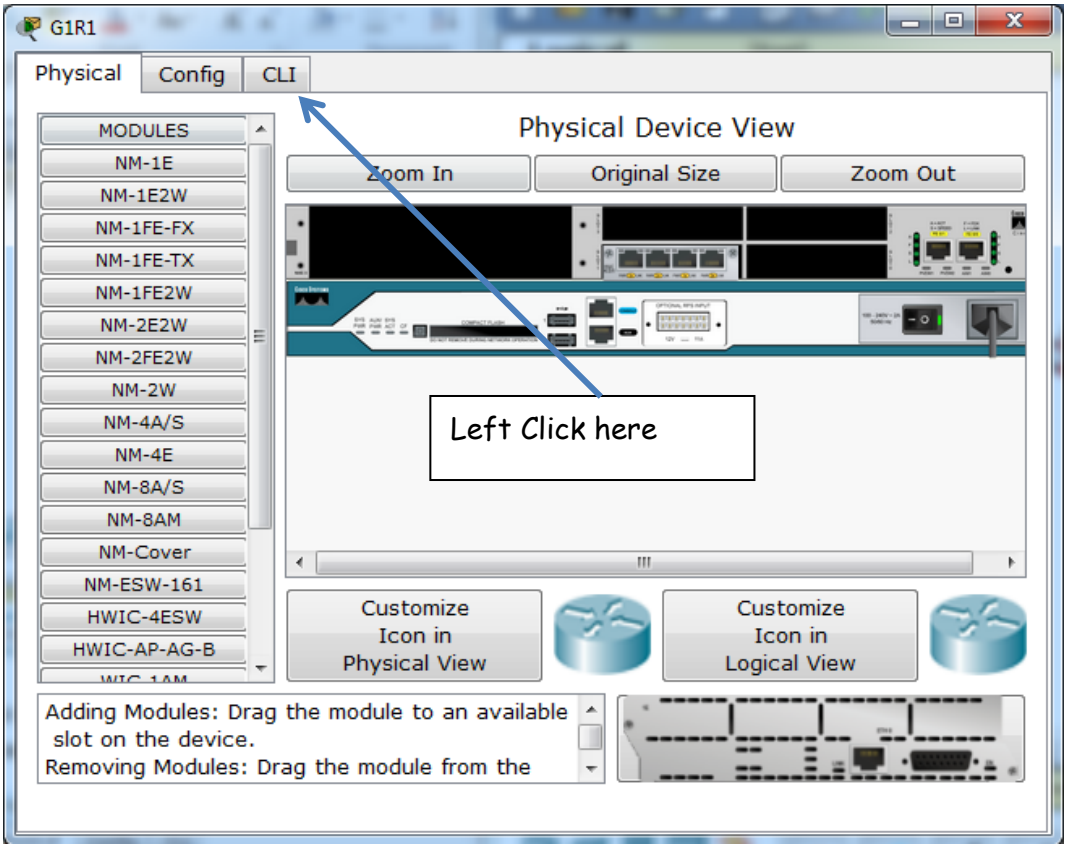
Local Device	Cable Type	Port	Remote Device	Port
Router G1R1	Straight Through	Fa0/0	Switch G1S1	Fa0/1
Router G1R1	Straight Through	Fa0/1	Switch G1S1	Fa0/13
Router G1R1	Cross Over	Fa0/1/0	Switch G1S2	Fa0/1
Switch G1S1	Straight Through	Fa0/2	PC1	FastEthernet
Switch G1S1	Straight Through	Fa0/14	PC0	FastEthernet
Switch G1S2	Straight Through	Fa0/2	PC2	FastEthernet

The screenshot on the following pages shows the finished wiring plan. Check over your work to make sure that everything is correct before proceeding.

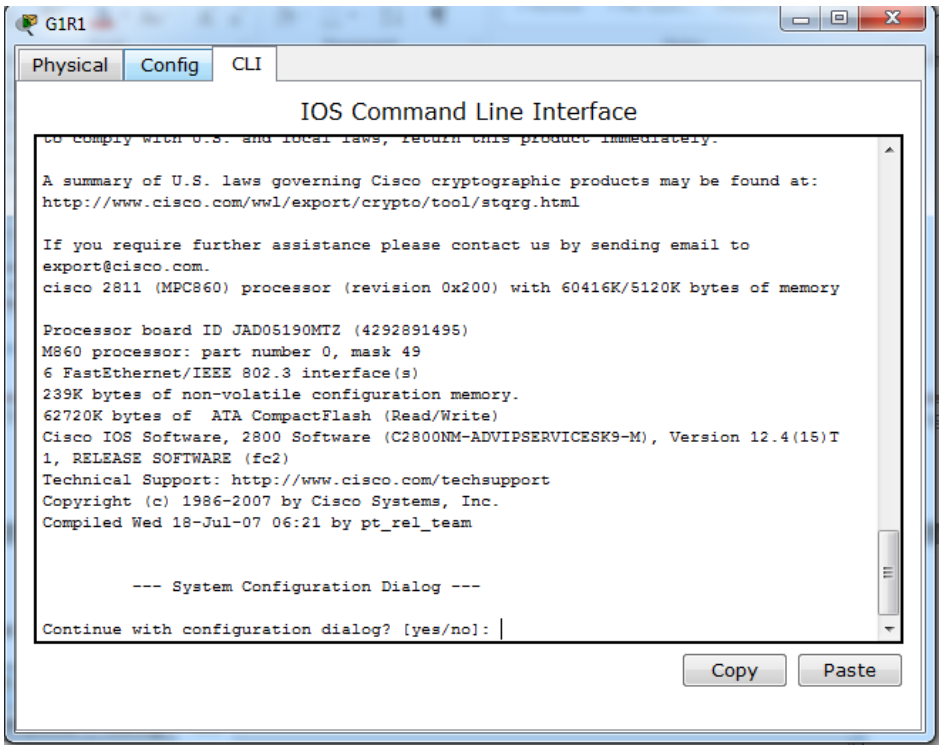
If you make a mistake and choose the wrong cable type or you connect the cables to the wrong interfaces then use the **Delete** icon shown below to delete your mistakes



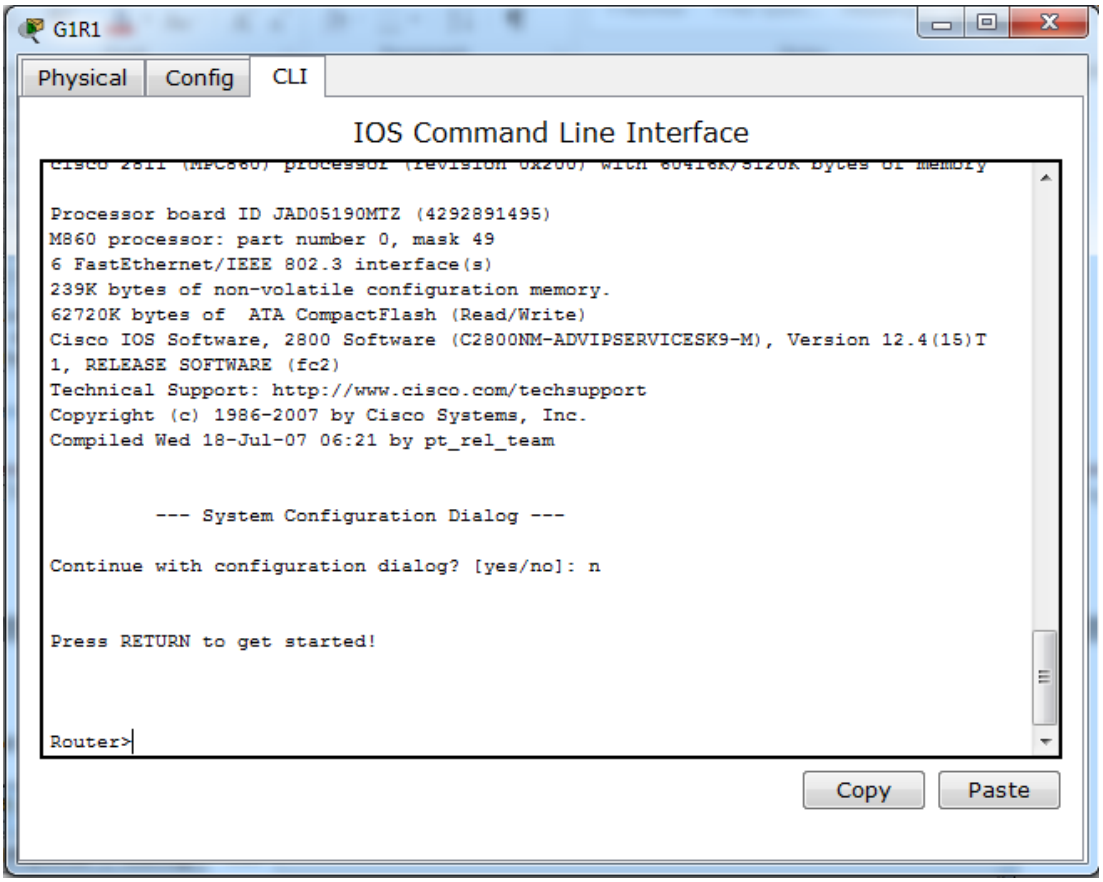
You are now ready to start configuring your Router. Left click on Router **G1R1** then select the **CLI** tab shown below:



The following window should appear. Type **n** then press **Enter** to continue.



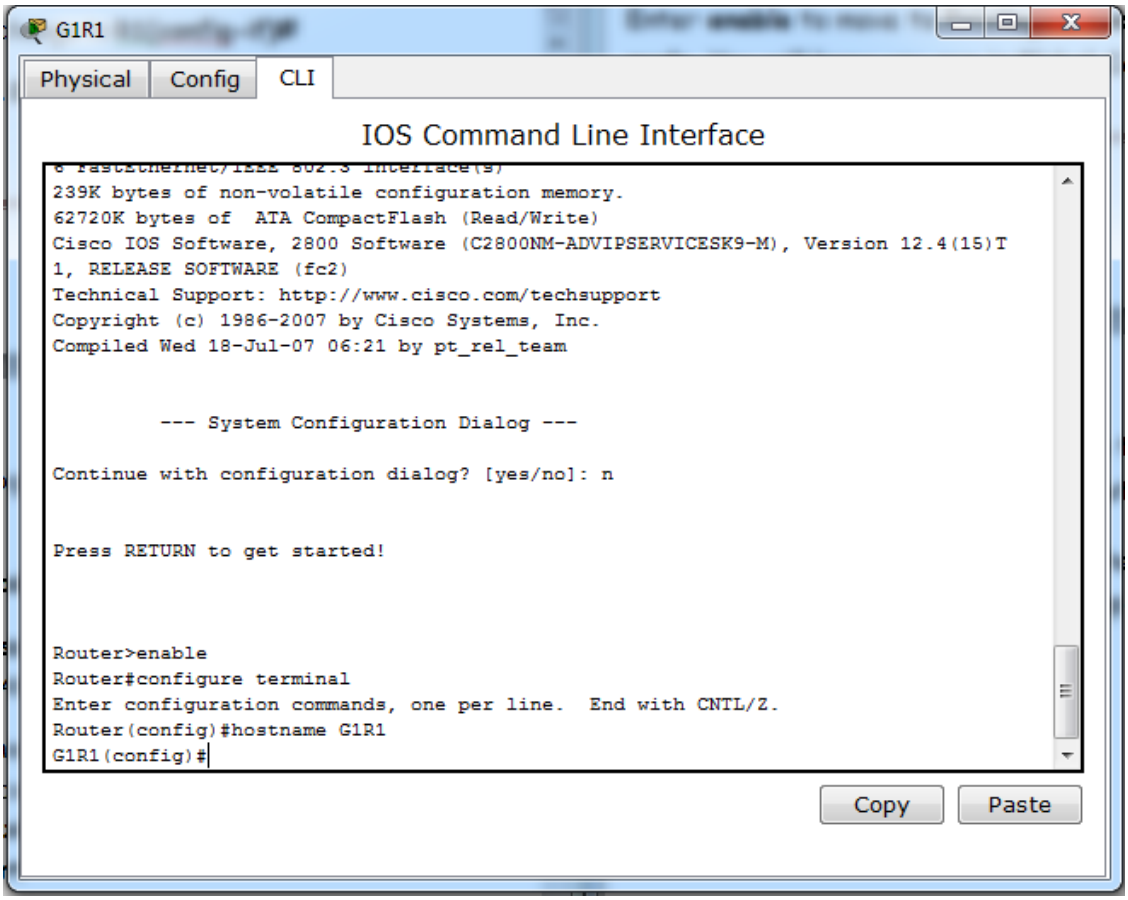
Press **Enter** again and the screen should now look like this



Enter **enable** to move to **Privileged mode** then type **configure terminal** to enter **Global Configuration mode**. You will know you are in Global Configuration Mode because the prompt will have changed to **Router(config)#**

It is from **Global Configuration mode** that we enter commands that affect the whole router. It is also from here that we enter specialist modes used to configure particular aspects of the router.

Type the command **hostname G1R1** then press **Enter**. You have now changed the name of the device. This should be evident from the prompt which should now be **G1R1(Config)#** The screenshot below contains the commands described above.



We must now configure the interfaces labelled fa0/0 and fa0/1 on our router. Each interface must be given an IP address and must be activated.

Issue the command **interface fa0/0** then press **Enter**. The prompt should now have changed to **G1R1(config-if)#** which indicates that the router is now in interface configuration mode. Any command issued now will apply to the interface **fa0/0**.

The table below identifies the interface labels, IP addresses and subnet masks for router G1R1

Interface label	IP Address	Subnet Mask
Fa0/0	10.0.6.1	255.255.255.0
Fa0/1	10.0.7.1	255.255.255.0
Vlan 2	10.0.2.1	255.255.255.0
Vlan 3	10.0.3.1	255.255.255.0
Vlan 4	10.0.4.1	255.255.255.0
Vlan 5	10.0.5.1	255.255.255.0

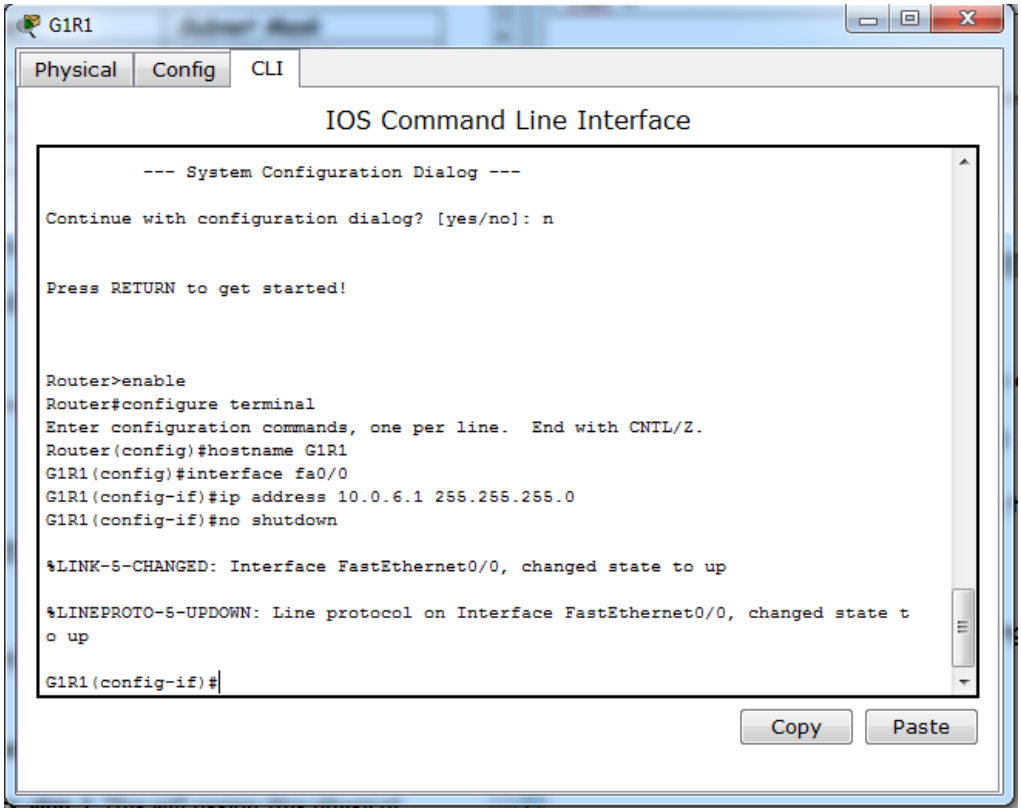
Assign interface **fa0/0** its IP address and subnet mask by issuing the command

ip address 10.0.6.1 255.255.255.0

Now activate the interface by issuing the command

no shutdown

You should receive a message indicating that the interface is now active as shown in the screen shot below



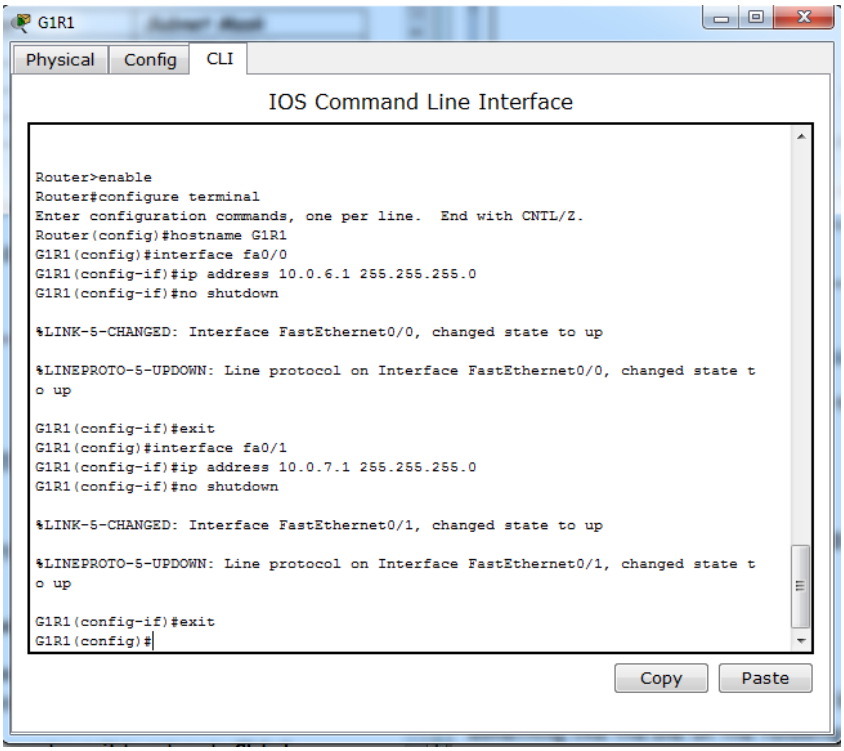
Type **exit** then press **Enter** to return to **Global Configuration mode**. Now configure interface **fa0/1** by issuing the following commands:

Interface fa0/1

Ip address 10.0.7.1 255.255.255.0

No shutdown

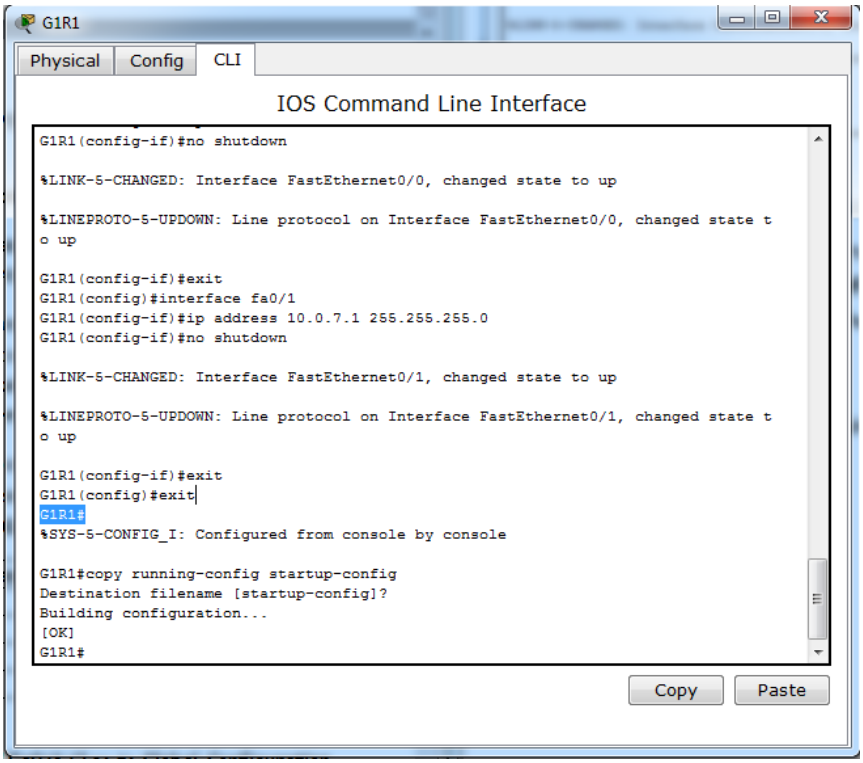
Return to **Global Configuration mode** by issuing the **exit** command again. Your screen should look something like the one on the following page



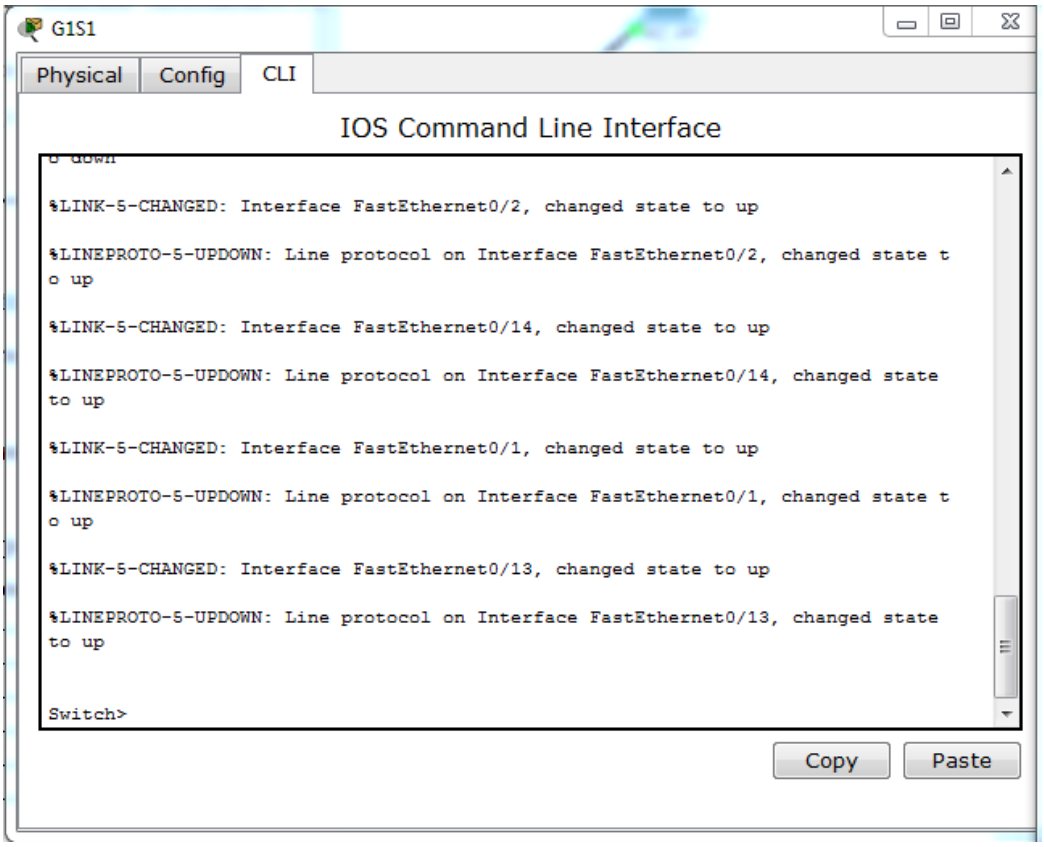
It would be a good idea at this stage to save our configuration. This must be done from **Privileged mode**. We are currently in **Global Configuration Mode**. Type exit then press **enter** to return to Privileged mode. The Prompt should change to **G1R1#** Now issue the command

Copy running-config startup-config

Press **Enter** to confirm. Your screen should now look like this



We will now turn our attention to switch G1S1. Left click on its icon. The following screen should appear. If you cannot see the prompt, press the **enter** key until it appears.



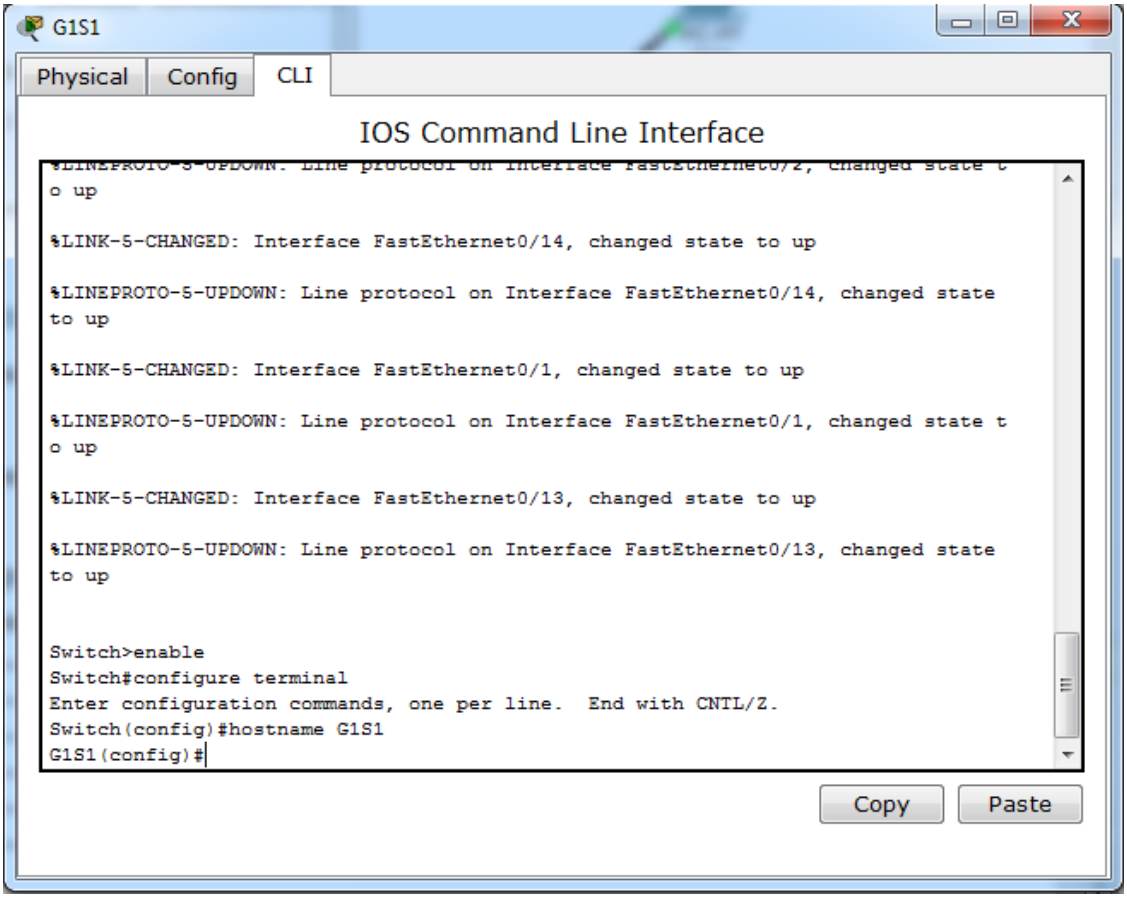
Type **enable** then press **Enter** to move to **Privileged mode**. The prompt should have change to **Switch#**

Now type configure terminal to move to **Global Configuration mode**. The prompt should have changed to **Switch(config)#**

Give the switch its name using the command below

Hostname G1S1

The prompt should have changed to **G1S1(config)#** and the screen should look like the one shown below:



We are going to logically divide this switch into two. Ports **fa0/1** to **fa0/12** will be reserved for Light Weight Access Points (LWAPs). Ports **fa0/13** to **fa0/24** will be reserved for wired PCs. As Packet Tracer doesn't support LWAPs we will pretend that PC 1 is an access point.

A switch may be logically segmented by building VLANs (Virtual Local Area Networks) and by assigning ports to VLANs. If two ports are in different VLANs then direct communication between them is not allowed. Communication between VLANs must be controlled by a router.

We will create the following VLANs

VLAN Number	VLAN Name	Port Range
6	LWAP	Fa0/1 – fa0/12
7	Wired	Fa0/13 – fa0/24

From **Global Configuration mode**, issue the commands below:

Vlan 6

The switch should now have created **vlan 6** and the prompt should have changed to

G1S1(config-vlan)#

Which indicates that you have entered **VLAN Configuration mode**. The screen should look like this

```
G1S1#
G1S1#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
G1S1(config)#vlan 6
G1S1(config-vlan)#
```

Copy Paste

You must now give your vlan its name by issuing the command

name LWAP

Issue the **exit** command to return to **Global Configuration mode** then create **vlan 7** and assign it the name **Wired**. The screenshot below holds the commands you must use.

```
G1S1#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
G1S1(config)#vlan 6
G1S1(config-vlan)#name LWAP
G1S1(config-vlan)#exit
G1S1(config)#vlan 7
G1S1(config-vlan)#name Wired
G1S1(config-vlan)#exit
G1S1(config)#
```

Copy Paste

Type **exit** and press **enter** to return to **Privileged mode** then issue the command **show vlan brief** to verify that our VLANs have been created and given the correct names. The screen should contain the following output:

G1S1

Physical Config CLI

IOS Command Line Interface

```
G1S1(config)#vlan 6
G1S1(config-vlan)#name LWAP
G1S1(config-vlan)#exit
G1S1(config)#vlan 7
G1S1(config-vlan)#name Wired
G1S1(config-vlan)#exit
G1S1(config)#exit
G1S1#
%SYS-5-CONFIG_I: Configured from console by console

G1S1#show vlan brief

VLAN Name                             Status    Ports
---- -------------------------------- --------- -------------------------------
1    default                          active    Fa0/1, Fa0/2, Fa0/3, Fa0/4
                                                Fa0/5, Fa0/6, Fa0/7, Fa0/8
                                                Fa0/9, Fa0/10, Fa0/11, Fa0/12
                                                Fa0/13, Fa0/14, Fa0/15, Fa0/16
                                                Fa0/17, Fa0/18, Fa0/19, Fa0/20
                                                Fa0/21, Fa0/22, Fa0/23, Fa0/24
                                                Gig1/1, Gig1/2
6    LWAP                             active
7    Wired                            active
1002 fddi-default                     active
1003 token-ring-default               active
1004 fddinet-default                  active
1005 trnet-default                    active
G1S1#
```

Copy Paste

At present all of our ports are in the default VLAN which is VLAN 1. We must now move 12 of them to join VLAN 6 and 12 to join VLAN 7.

Enter configure terminal to return to **Global Configuration Mode**. Now issue the command below

Interface range fa0/1 – 12

The prompt should have changed to **G1S1(Config-range-if)#** The range option allows us to assign a number of commands to a group of interfaces. Now issue the commands below:

Switchport mode access

Switchport access vlan 6

exit

The first command tells the switch that each port in the range will belong to just one VLAN. The second command tells the switch that each port in the range will be assigned to VLAN 6. The third command returns you to **Global Configuration mode**.

Issue the commands below to assign ports 13 through to 24 to VLAN 7.

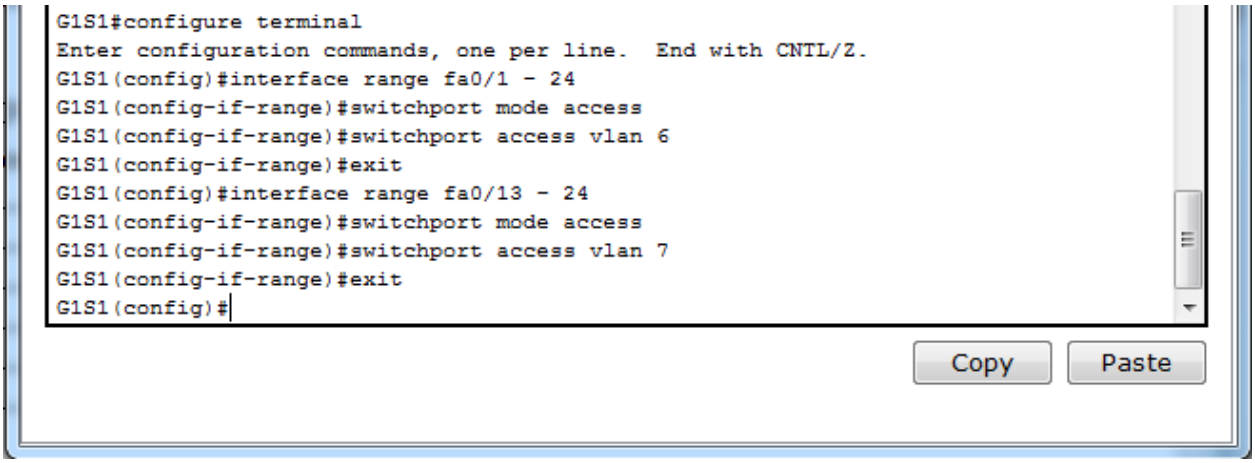
Interface range fa0/13 – 24

Switchport mode access

Switchport access vlan 7

Exit

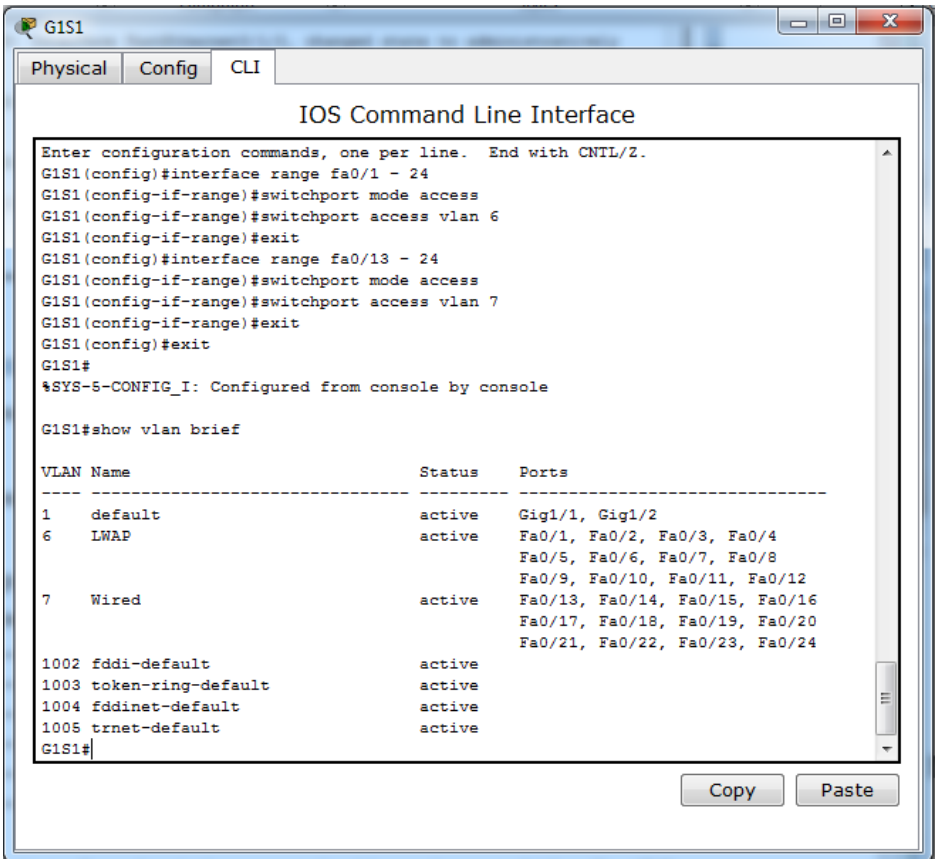
The screen should look something like this:



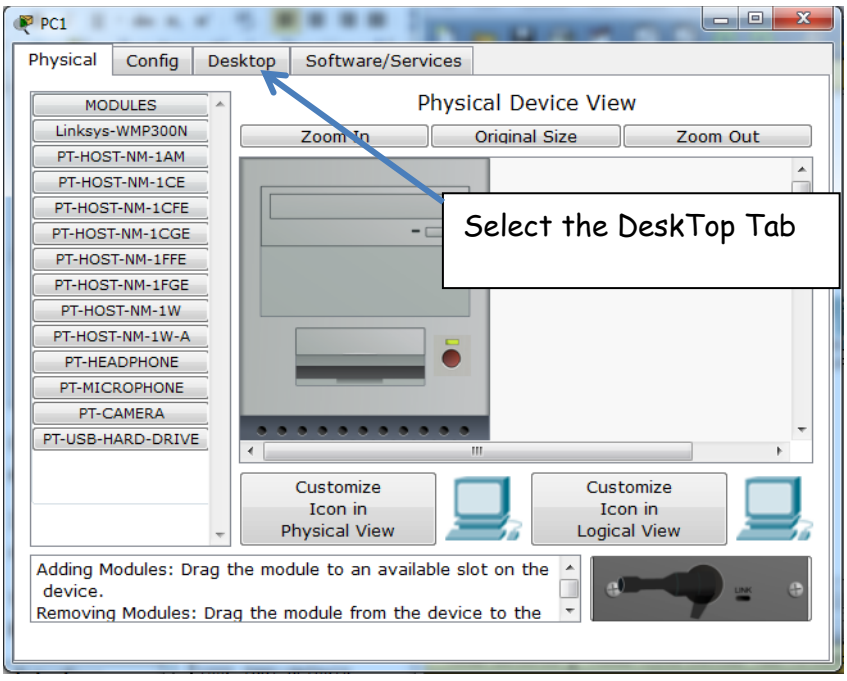
Type exit and press Enter to return to Privileged mode then issue the command

show vlan brief

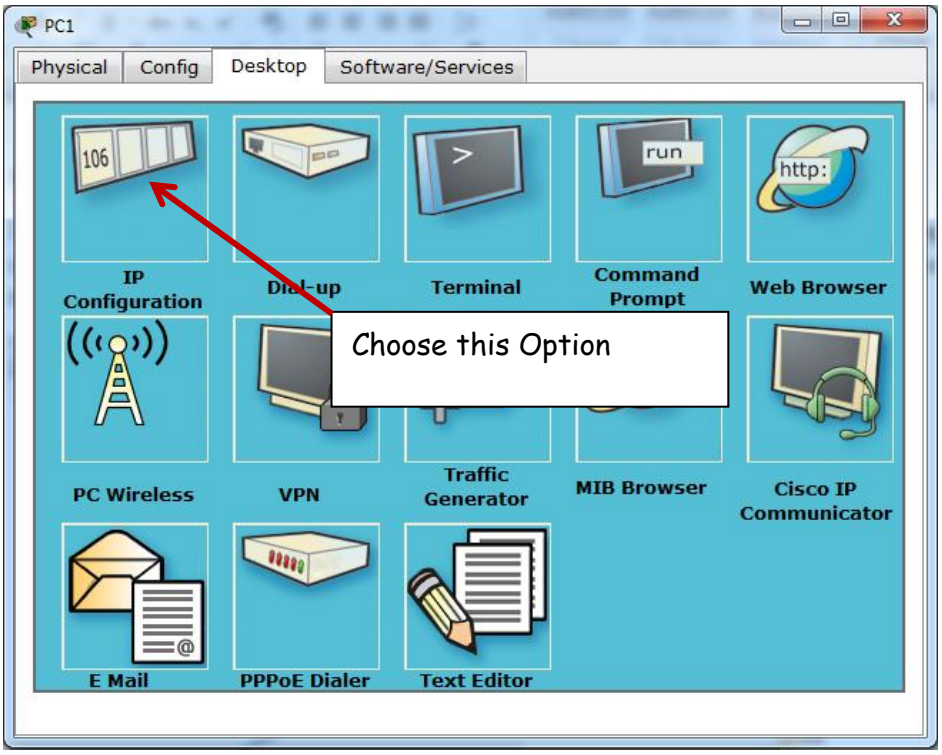
to confirm that the interfaces have been moved to the correct VLANs. Your screen should now look like this:



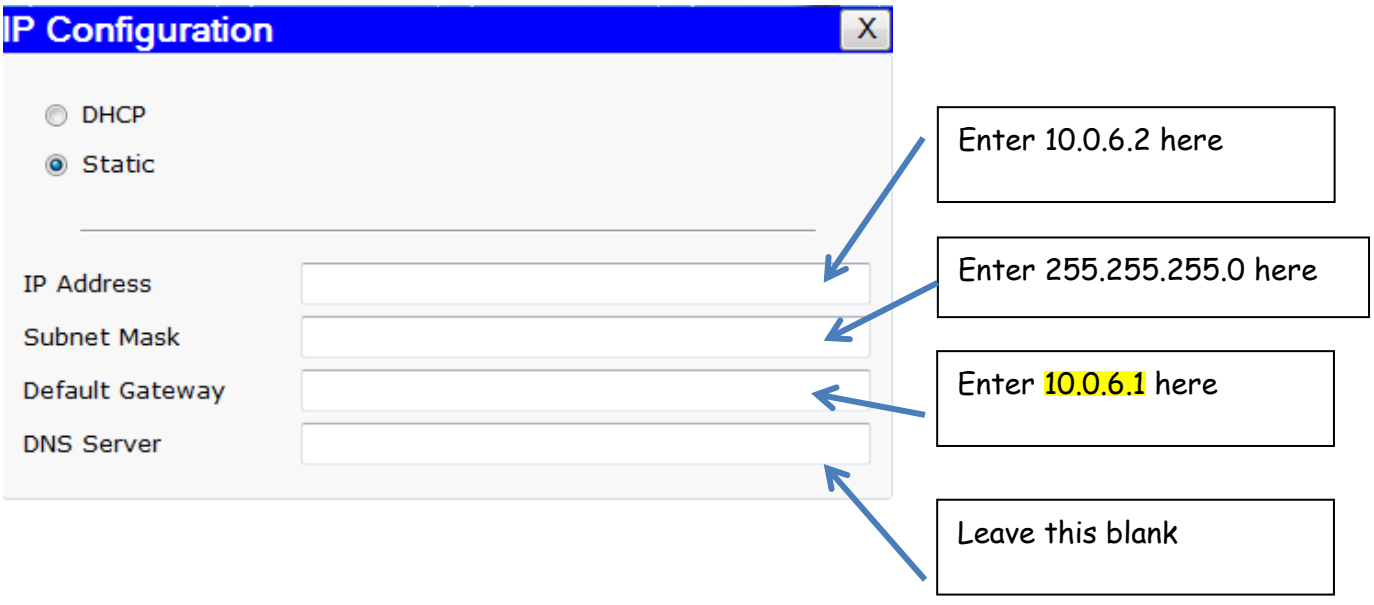
It is now time to assign IP addresses to our Workstations PC1 and PC0 so that they can participate in the network. Left click on the icon for PC1. The following window should appear



Select the **DeskTop Tab**. The following window should now appear:



Left click on the **IP Configuration** button (see diagram above). You should now see the following window:

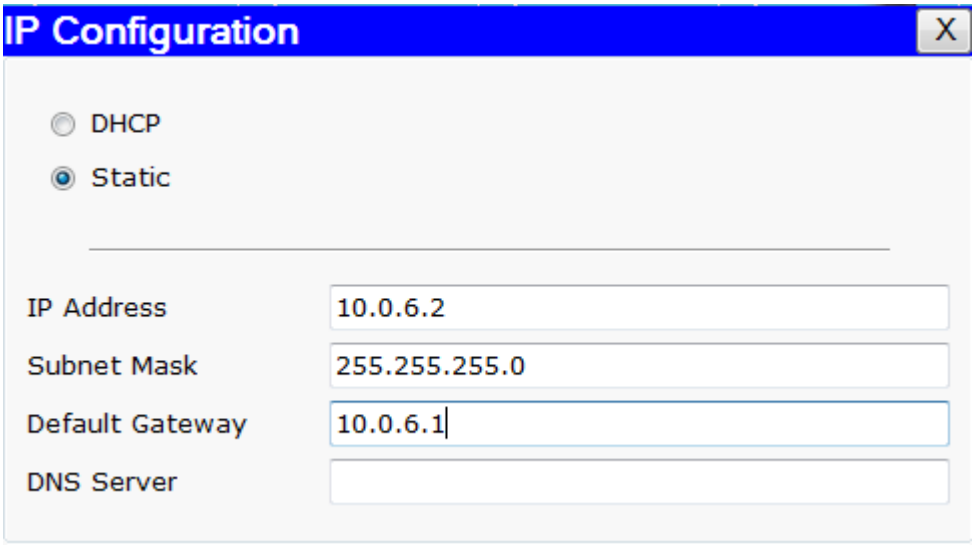


Enter the information shown above. Please note that PC1 is attached to switch port Fa0/2. This port is in VLAN 6 and can communicate with any port in VLAN 6. Router G1R1 is also attached to the switch via VLAN 6 through its fa0/0 interface. This means that PC1 will be able to communicate with the router via its Fa0/0 interface.

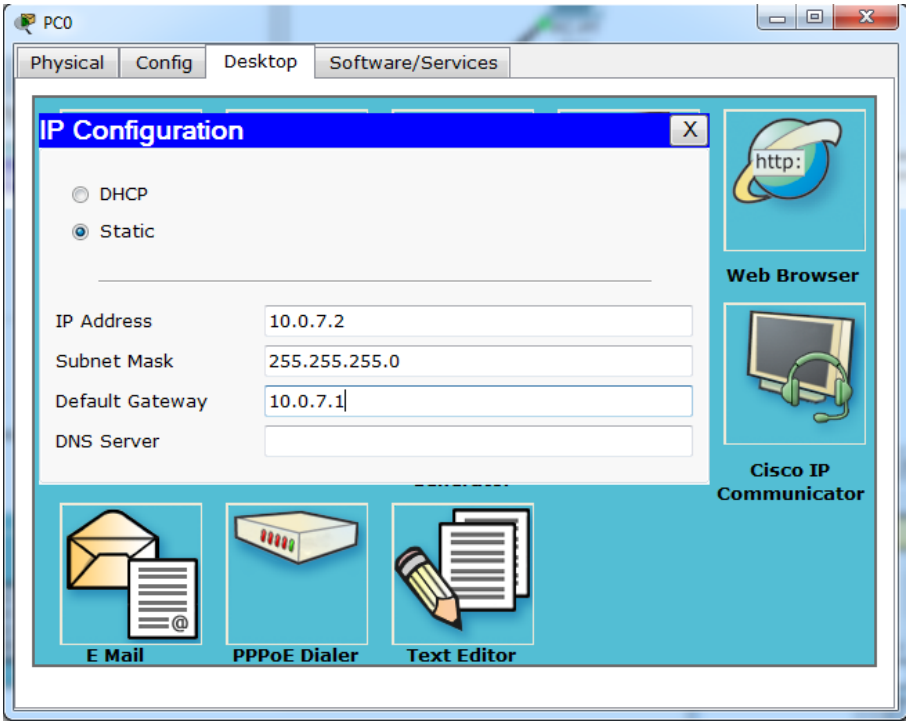
If this is to happen, the PC must belong to the same subnet as the router's Fa0/0 interface. The Fa0/0 interface of G1R1 has IP address 10.0.6.1 and subnet mask 255.255.255.0 We have assigned PC1 an unused IP address from the same subnet (address 10.0.6.2). The PC must also have the same subnet mask as the router if they are to communicate. That is why the PC's mask was set to 255.255.255.0

The Default Gateway is the IP address of a router that the PC can reach. It must be part of the PC's own subnet – the only candidate is 10.0.6.1 which is the IP address of G1R1's fa0/0 interface.

Your screen should now look like this:



Close this window then select the PC0. Repeat the process outlines above to assign PC0 the following IP address, subnet mask and default gateway.



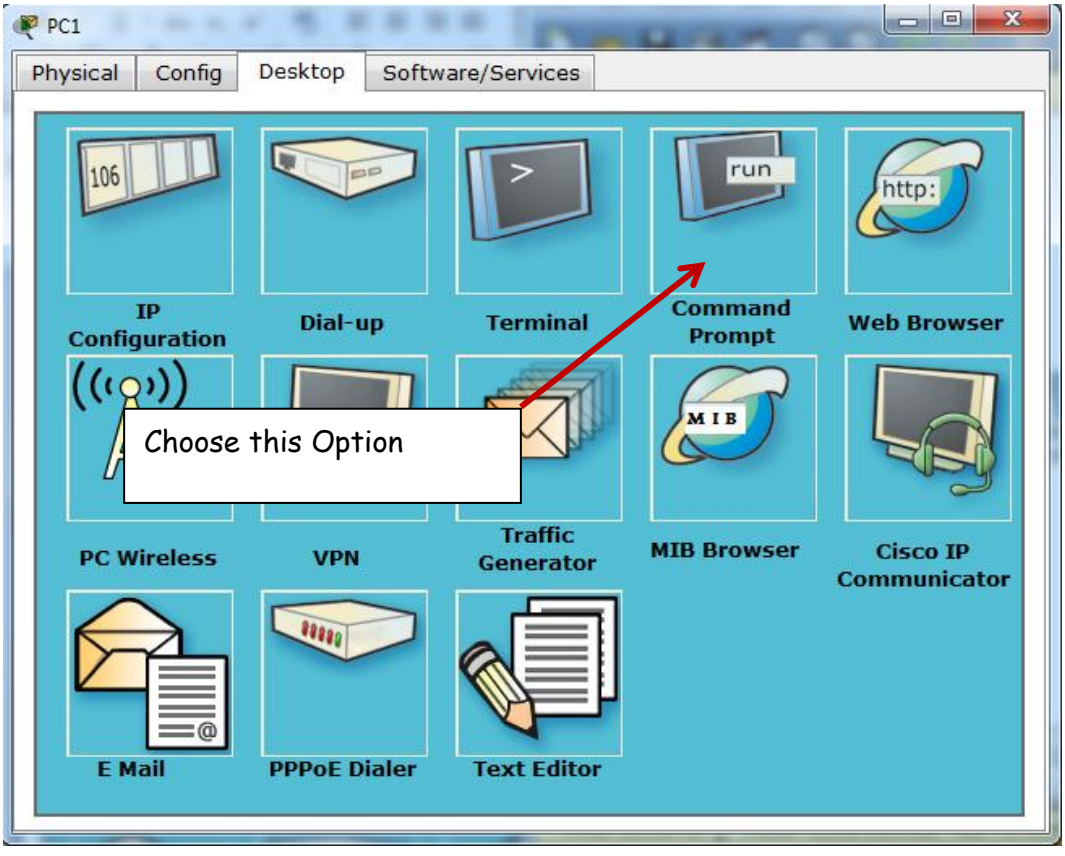
Please note the PC0 is attached to the switch G1S1 via port fa0/13 which is in VLAN 7. It can therefore communicate directly with any device also plugged into VLAN 7. The router G1R1 is connected to VLAN 7 via its f0/1 interface. This interface has IP address 10.0.7.1. If PC0 is to be able to communicate with the router it must be assigned an IP address that belongs to the same subnet as Fa0/1 on G1R1.

The IP address 10.0.7.2 is the first unused IP address from the subnet associated with Fa0/1 of G1R1. The PC must also have the same subnet mask as the router if they are to communicate. That is why the PC's mask was set to 255.255.255.0

The Default Gateway is the IP address of a router that the PC can reach. It must be part of the PC's own subnet – the only candidate is 10.0.7.1 which is the IP address of G1R1's fa0/1 interface.

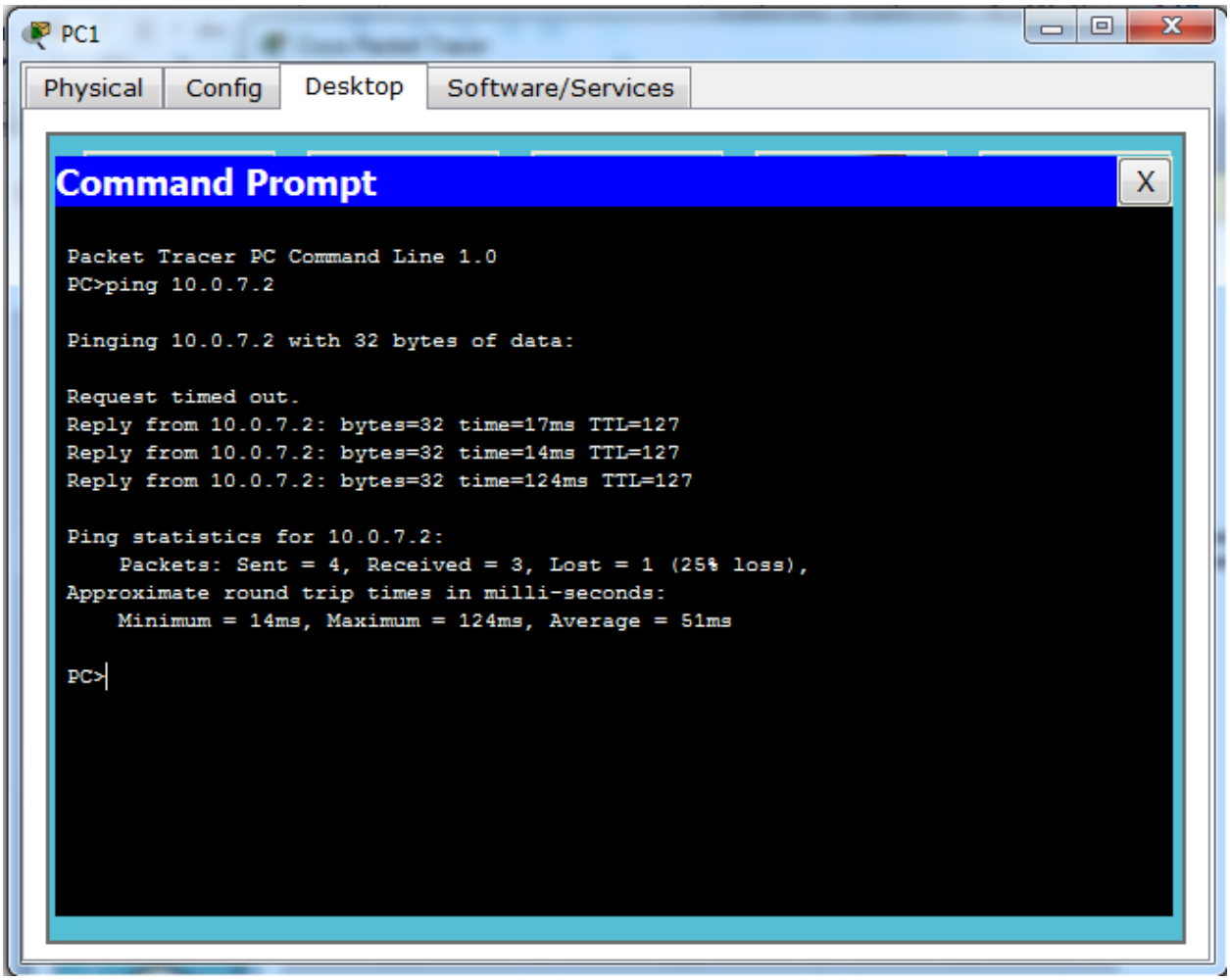
Our two PCs should be able to communicate with each other now through the router – they cannot communicate directly through the switch as they belong to two separate VLANs. Traffic from PC0 will be sent to Fa0/1 of router G1R1. From there the router will route the traffic out of fa0/0 back to the switch. The switch will then forward the traffic to PC1.

We can test this using the **ping** command. Navigate to the following window for PC1 then select the **Command Prompt** button (see below).



Enter the command **ping 10.0.7.2** This command sends several short messages to the destination IP address (10.0.7.2) which is the IP address of PC0. If PC0 replies then we know we have end to end connectivity.

The screenshot below shows you what you should be seeing. If you cannot see any replies then ask your lecturer to examine your configuration.



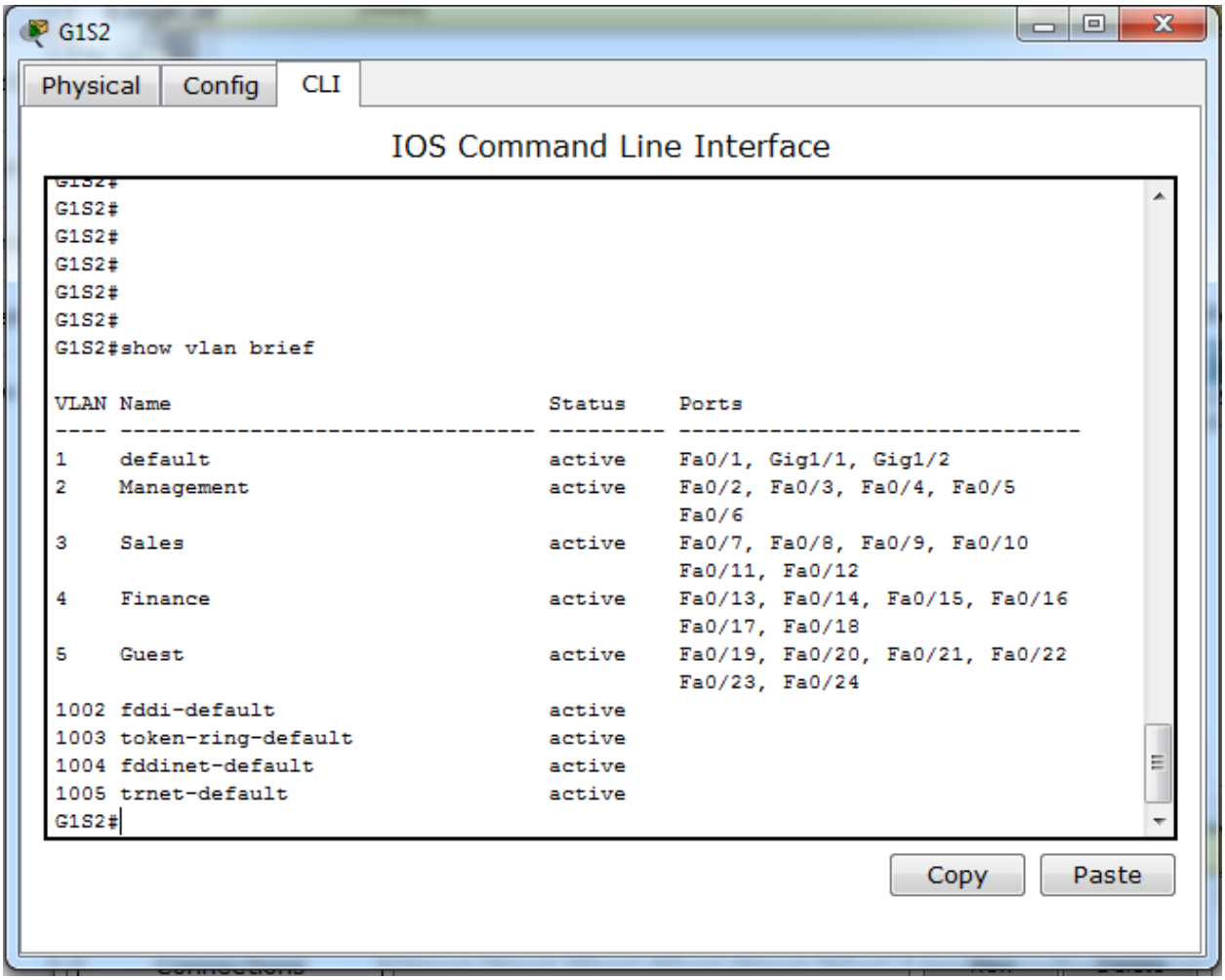
Please note that the first "ping" will often timeout (no reply) because it takes a finite amount of time for the initial connection to be established. This is normal.

Now configure **Switch G1S2**. You will have to:

- Give the Switch the name **G1S2**
- Create the VLANs listed in the following table
- Assign the switch ports of G1S2 to the VLANs identified in the table.
-

VLAN ID	VLAN Name	Ports
2	Management	2 – 6
3	Sales	7 – 12
4	Finance	13 – 18
5	Guest	19 - 24

Use the **show vlan brief** command to verify that switch **G1S2** has been successfully configured. The output should look like this:



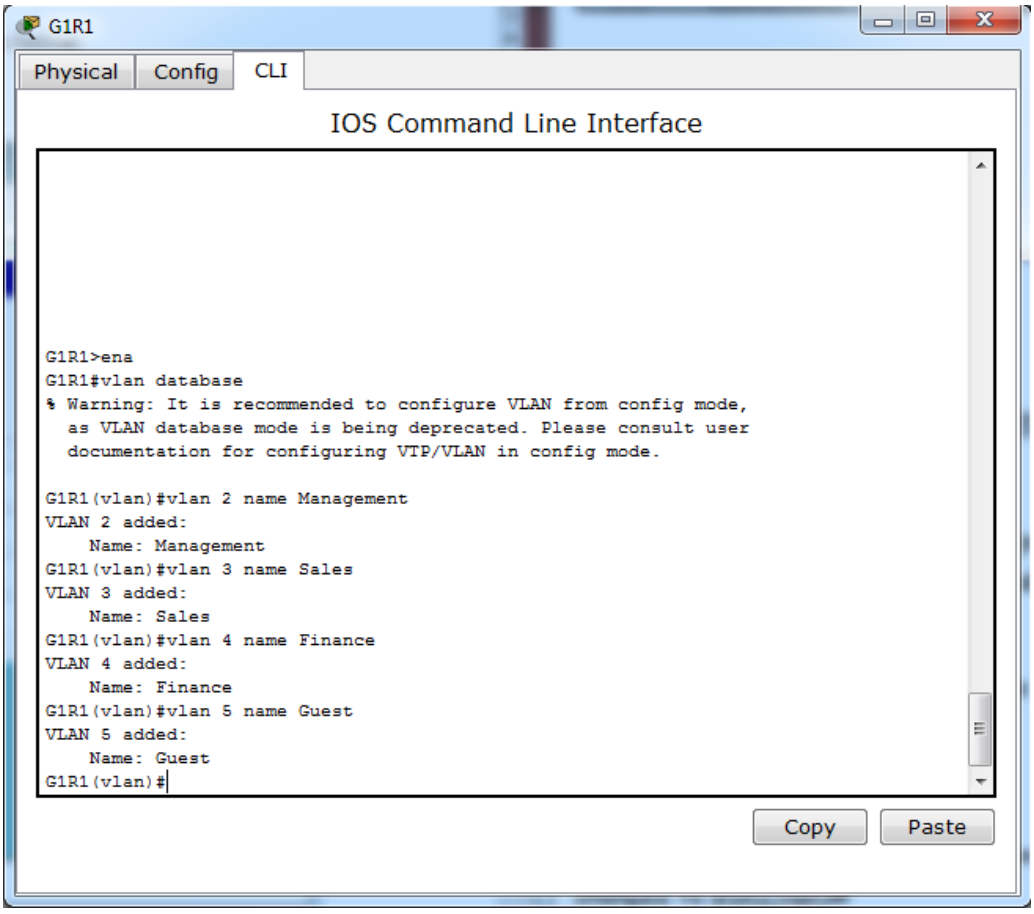
The Router G1R1 also contains a four port switch. This was the module that we added to the router at the beginning of the tutorial. This module must now be configured to operate with the router and the rest of the network.

Packet Tracer requires us to build the VLANs on the router. Navigate to **Privileged mode** on router G1R1 then issue the command

Vlan database

This command accesses the mode from where we build VLANs on a router. The prompt should have changed to G1R1(vlan)#

Issue the command vlan 2 name Management This will create VLAN 2 and assign its name. Repeat this command for VLANs 3, 4 and 5. Refer to the table on Page 21 for the VLAN names. Your screen should now look like this:



Type exit then press Enter to return to Privileged mode. We cannot assign IP addresses directly to the ports within the switch module as they don't support this function. We must instead create virtual interfaces for each VLAN that operate through the ports.

Move to **Global Configuration mode** then issue the commands below to create a virtual interface that works with VLAN 2.

Interface vlan 2

Ip address 10.0.2.1 255.255.255.0

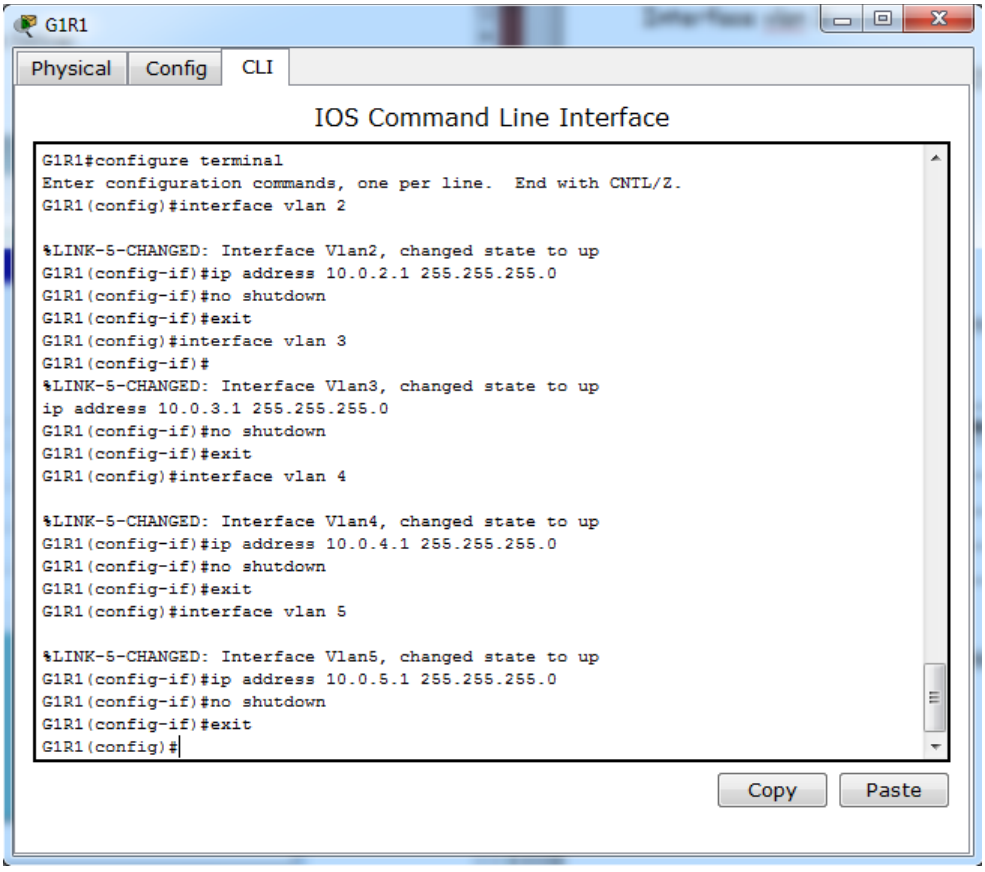
No shutdown

Exit

Now repeat this process to create virtual interfaces for VLANs 3, 4 and 5. Use the information within the table below:

Virtual Interface	IP Address	Subnet Mask
Vlan 2	10.0.2.1	255.255.255.0
Vlan 3	10.0.3.1	255.255.255.0
Vlan 4	10.0.4.1	255.255.255.0
Vlan 5	10.0.5.1	255.255.255.0

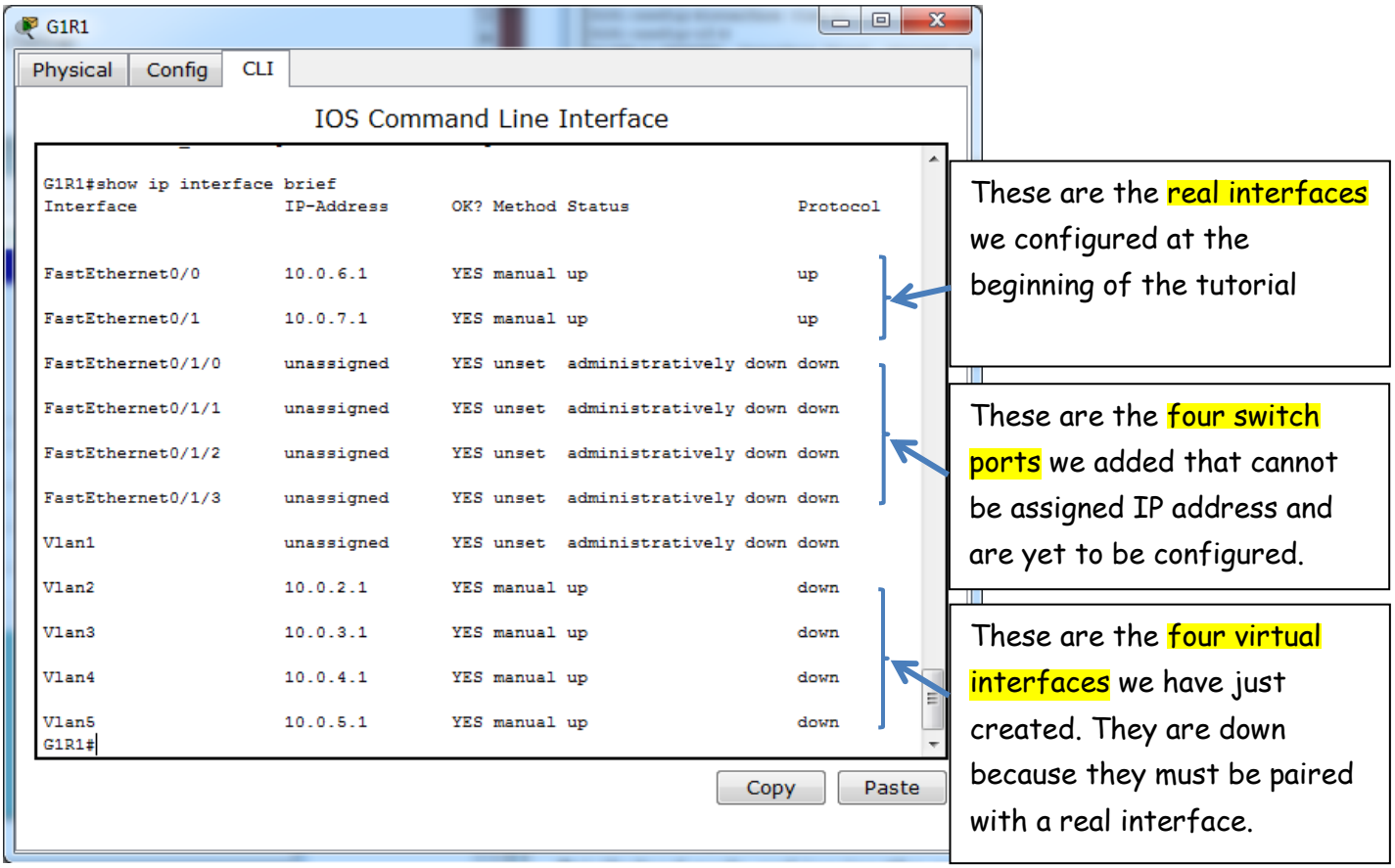
Your screen should look like this:



We can verify that all of our interfaces (virtual and real) are configured correctly by returning to **Privileged mode** and issuing the command:

Show ip interface brief

This command identifies the name, IP address and status of each interface as shown below:



Port **Fa0/1/0** on router **G1R1** is the only switch port currently in use. It must be configured to carry traffic for VLANs 2, 3, 4 and 5 so that our virtual interfaces will be able to work. A switch port will normally only carry traffic for one VLAN. Such a port is called an **Access Port**. We have already configured many Access Ports on our two switches (**G1S1** and **G1S2**).

Sometimes, as in this instance, a switch port must carry traffic for more than one VLAN. Such a port is called a Trunk port. We must configure port Fa0/1/0 on **G1R1** as a Trunk. We must also configure port Fa0/1 on Switch **G1S2** as a trunk since it must also send and receive traffic from several VLANs.

Move to **Global Configuration mode** on router **G1R1** the issue the following commands

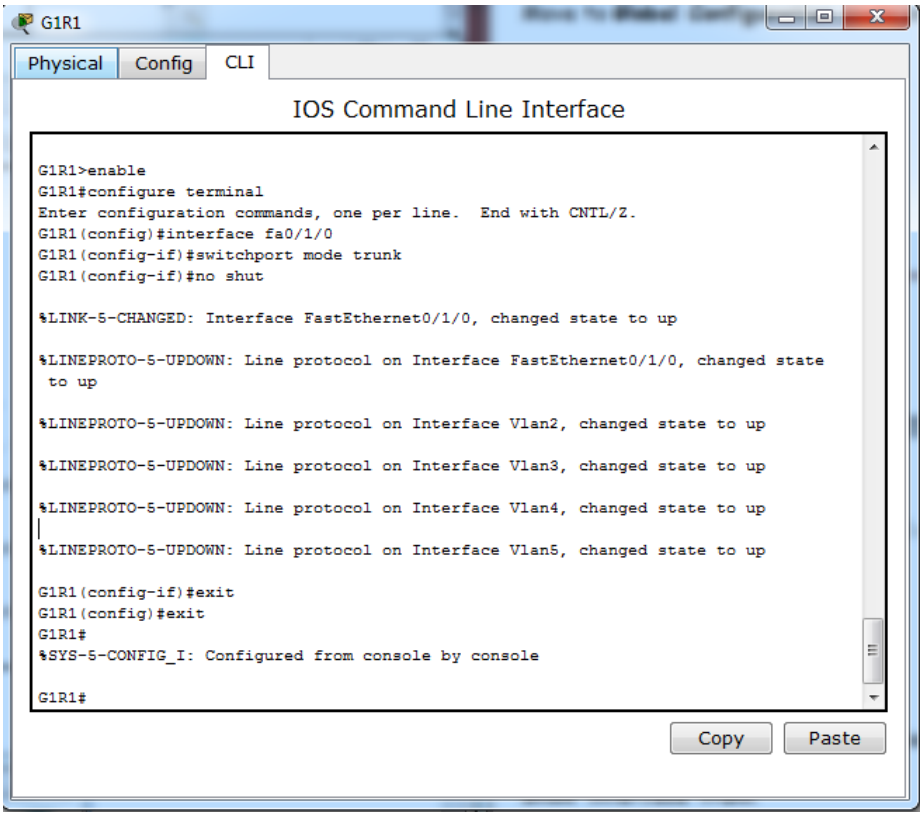
Interface fa0/1/0

Switchport mode trunk

No shutdown

Exit

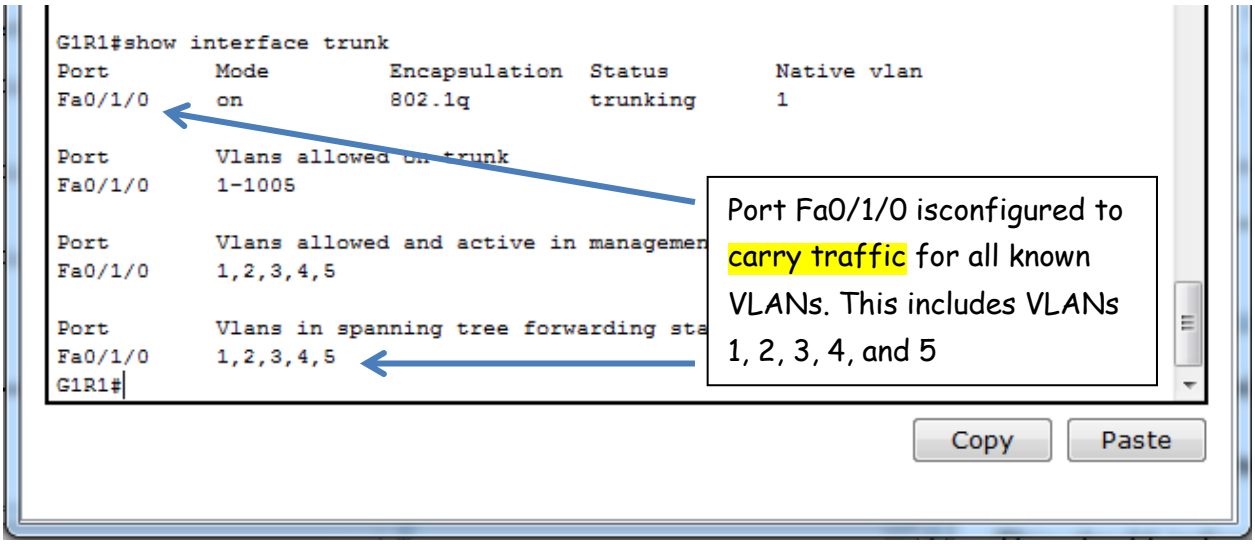
As soon as you entered the command no shutdown you should have seen the four virtual interfaces activate as in the screenshot below:



Now Return to **Privileged mode** and issue the command

Show interface trunk

This should indicate that port **Fa0/1/0** is a **trunk** port and is now carrying traffic for multiple VLANs. Your screen should look like this:



We must now complete configure the other end of the link between G1R1 and G1S2 as a trunk otherwise both devices will be confused and unable to communicate.

Go to Switch **G1S2** and access **Global Configuration mode**. Now issue the commands below

Interface fa0/1

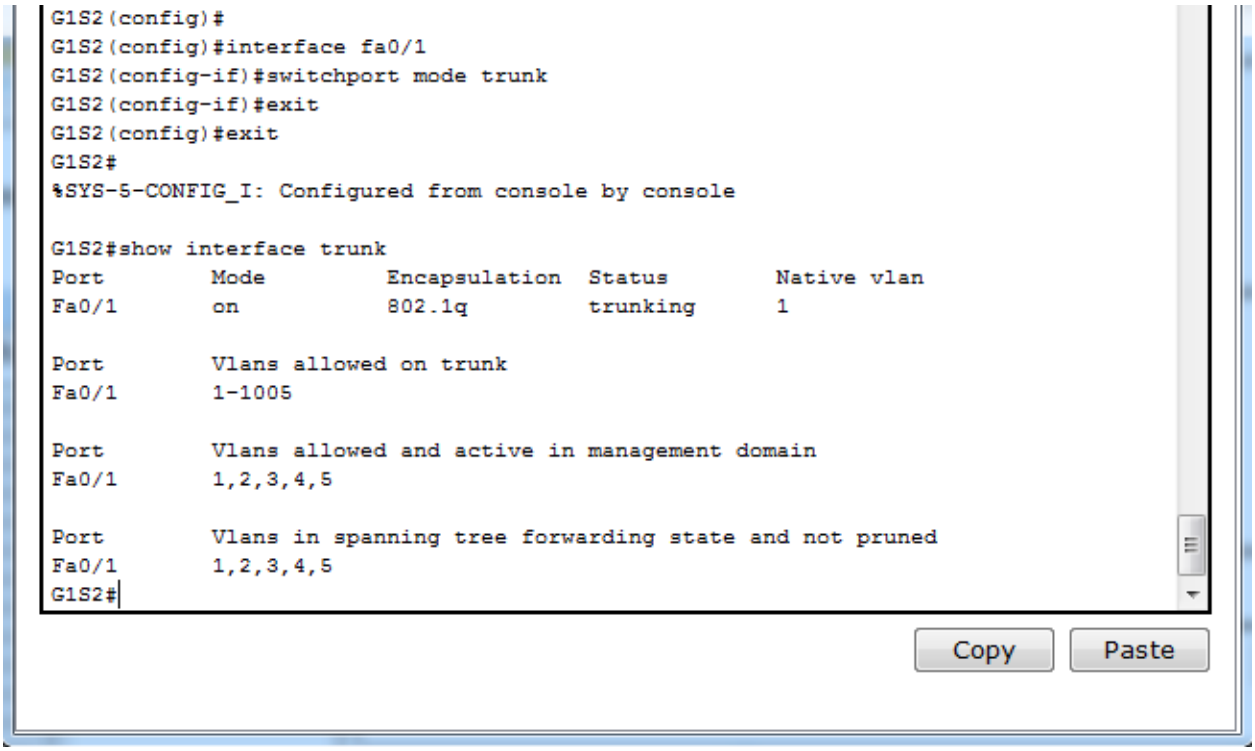
Switchport mode trunk

Exit

Now access **Privileged mode** and issue the command below to verify that interface fa01 is now configured as trunk

Show interface trunk

Your screen should look like this:



The only thing left to do is to assign **PC2** an IP address, subnet mask and default gateway so that it may properly join the network. PC2 is attached to switch **G1S2** by port fa0/2 which is assigned to VLAN 2. Switch **G1S2** is connected to the router **G1R1** via a trunk port which will carry all VLANs including VLAN 2. The VLAN 2 virtual interface on router **G1R1** has been assigned the IP address 10.0.2.1 so PC2 must be given a spare IP address from this subnet if it is to be able to connect to the network. We will assign it the IP address **10.0.2.2** with mask **255.255.255.0**. The default gateway should be the router IP Address from this subnet which is **10.0.2.1**

Configure PC2 accordingly then use the ping command to verify that it can communicate with PC0 and PC1.

Save your configurations. Go to **Privileged mode** on G1R1, G1S1 and G1S2 and issue the command

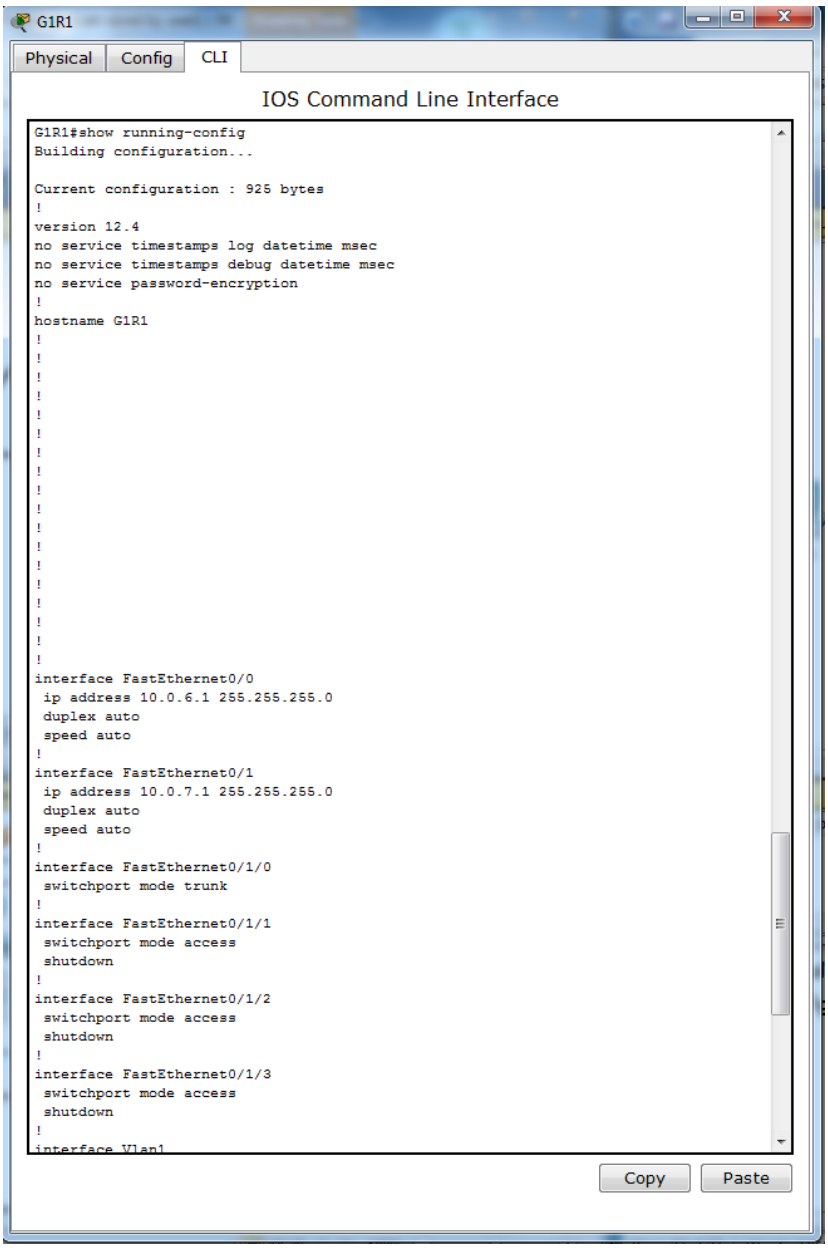
Copy running-config startup-config

Now **Save** your Packet Tracer configuration. The **Save** command is accessed from the File menu on the Packet Tracer main window.

You may view your complete configuration by accessing Privileged mode on a router or a switchand then issuing the command

Show running-config

Here is a partial configuration taken from router **G1R1** using this command.



Final Step: Report

Submit your Packet Tracer file named ***StudentCode_StudentName_LabNumber.pkt*** to BKeL.