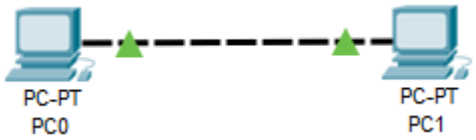
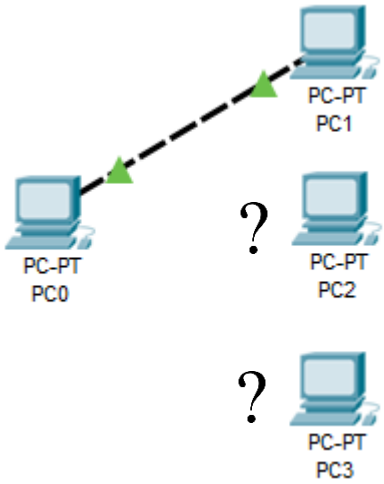
Self-Study Material for Lab 1

What if we need to send some files from a one computer to another? Simply we can use a LAN cable to connect them together and transfer files between two computers with some network adapter configurations in both computers.



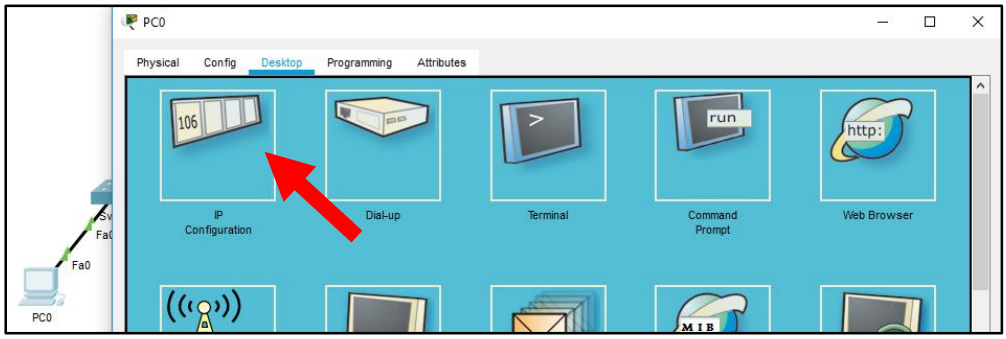
But things get complicated when we need to communicate with more than 1 computer because we have only one network port in our computers.

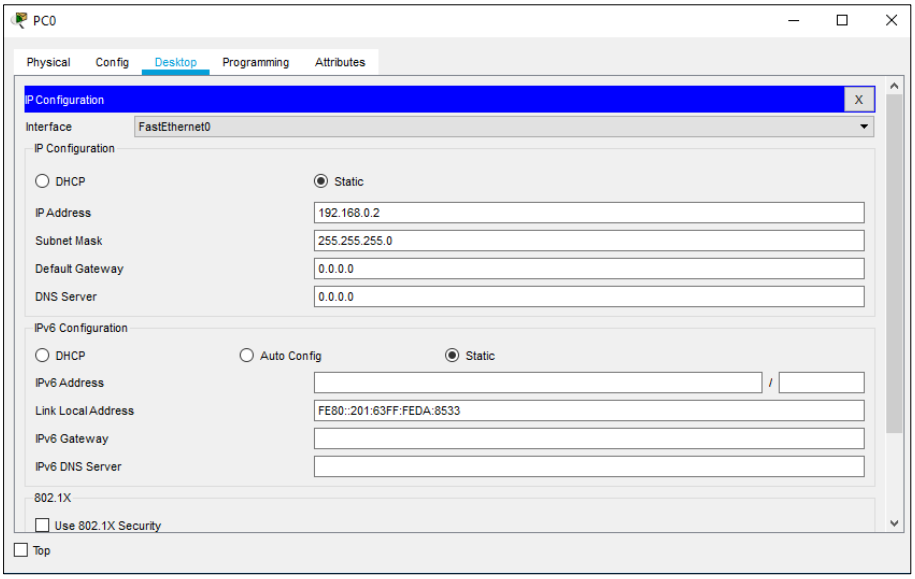


To overcome this kind of situations a “Switch” can be used which logically connects all the devices connected to it together in mesh topology. Then all the computers need to be given a unique name so they can be identified separately. In this context, the names are going to be IP addresses.

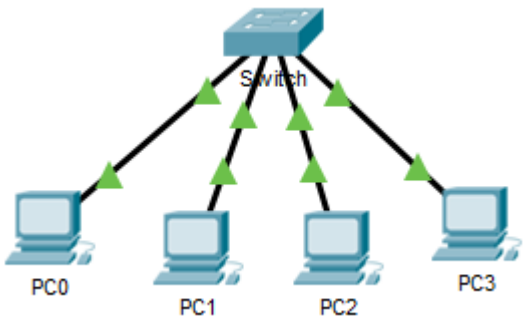
Assigning an IP address to a PC

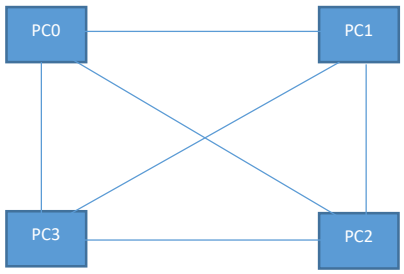
To assign an IP address to a PC, click on the PC and then go to the Desktop Tab. There you can see the icon for 'IP Configuration'. Click on it and then provide the IP address and the subnet mask for the PC.

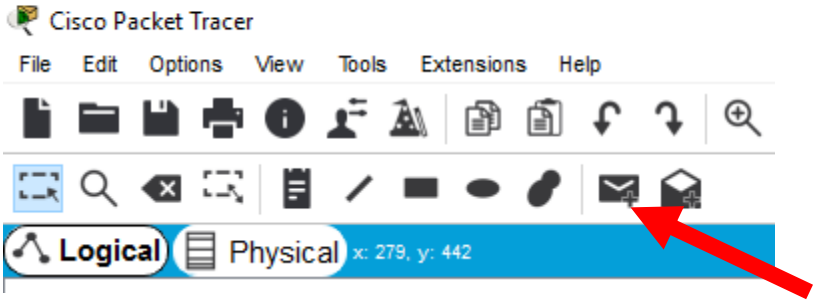




This setup is sufficient to communicate between the 4 PCs given in the example below. (After assigning IP addresses of your choice to the PCs, try using "Add simple PDU" tool to check the communication between 2 computers)

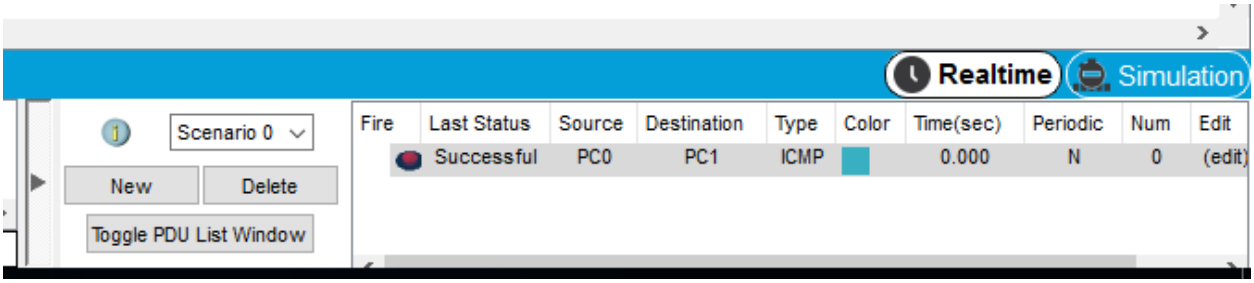




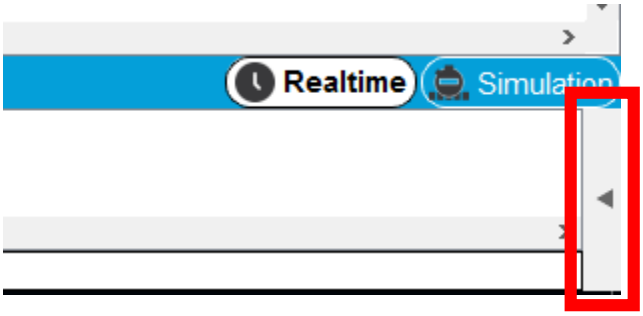


To add a simple PDU, click on the highlighted icon and then click on a computer to specify the source and then click on another computer to specify the destination.

You should see the following result in the bottom right corner panel.

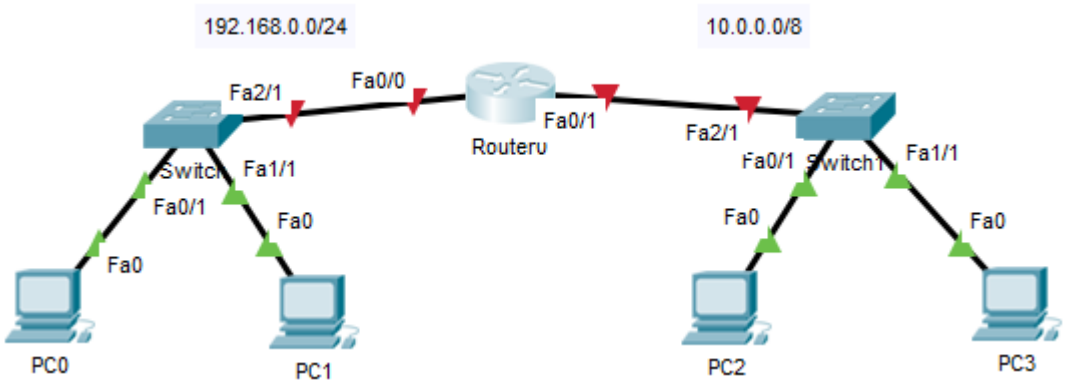


Note: If the panel is not visible click on the small arrow in bottom right corner to make the panel visible.



What if we need to connect **this network** to an **another network**? Then we are going to need a “Router” which is basically capable of directing the network traffic from a network to the relevant destination network. A single router can be connected with several networks at the same time.

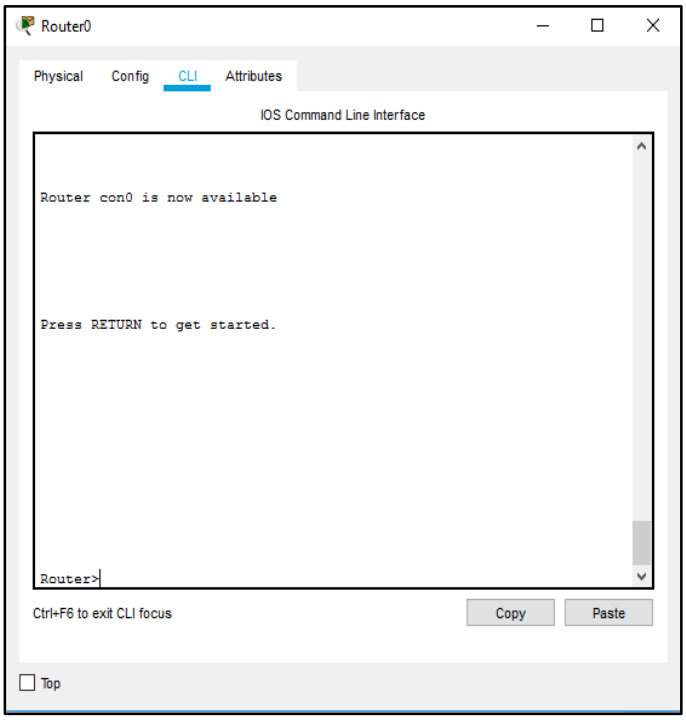
Adding a Router to the setup



In the above example 2 networks are connected to a router. The networks address of 2 networks are, 192.168.0.0/24 and 10.0.0.0/8 . The number after the forward slash represents the subnet mask of the network. For example in the first network subnet mask is 255.255.255.0 and the other network's subnet mask is 255.0.0.0. The ports of the router which are connected with 2 network cables from the switches are also known as interfaces.

As you can see **initially** the interfaces are in the **down state** (triangles are in red colour). Which means we need to configure the interfaces of the router (FastEthernet 0/0 and 0/1) to make the communication possible between the 2 networks.

Configuring router interfaces (ports)

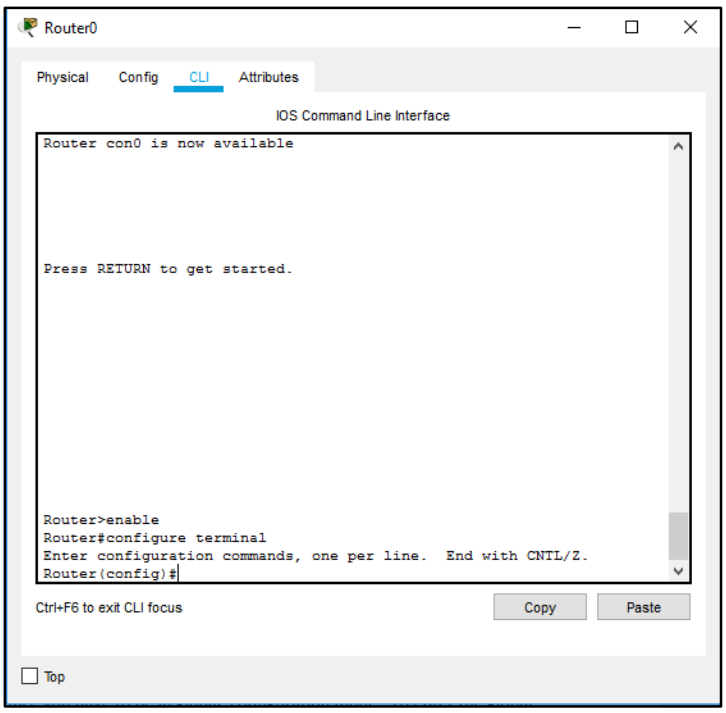


When configuring a router ,it is a norm to assign the first IP address of the network to the interface of router which is connected with that specific network. For example for the fastEthernet0/0 the IP address 192.168.0.1 is assigned. Likewise for Fa0/1 IP address is 10.0.0.1.

To assign an IP address to an interface, first click on the router and then click on CLI tab and press enter to get the prompt.

A router have several interfaces built in it (Depends on the router modal being used). So first we need to access the required interface and then assign the IP address and the subnet mask for that interface.

Initially the router is in 'User mode'. You can check that by looking at the prompt. While in the user mode the prompt is like **Router>**

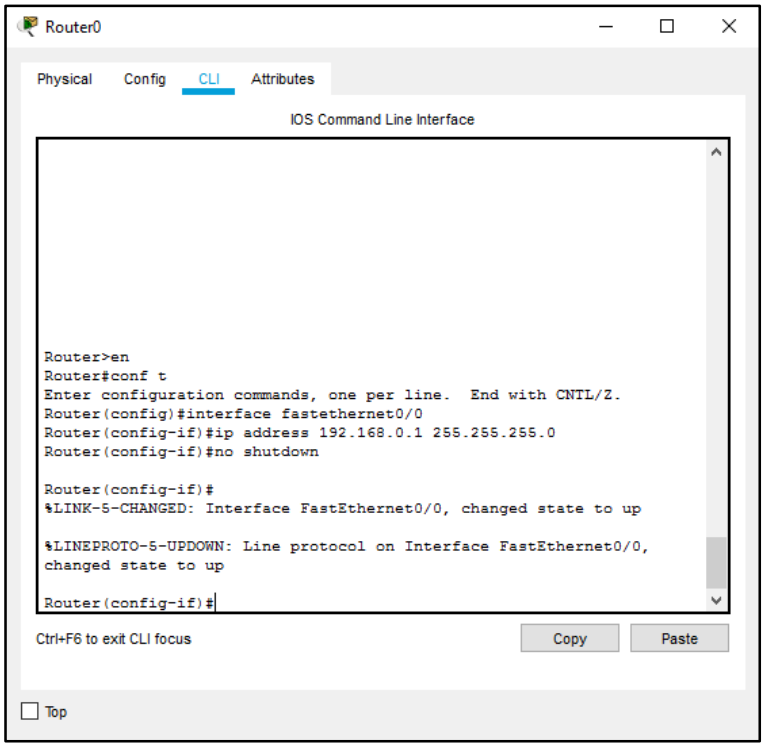


Then type the command '**enable**' and press enter to go to 'Privilaged mode'. The prompt will be changed to **Router#**

To assign an IP address to an interface you have to be in 'Global configuration mode'. To enter the global configuration mode, while you are in privilaged mode type '**configure terminal**' and press enter. The prompt will change to **Router(config)#**

If you want to go back to a previous mode you can type '**exit**' and press enter.

Assigning IP addresses to router interfaces



Now that we are in the global configuration mode, to assign an IP address to an interface, first we need to access that specific interface. To do so excute the following command,

'**interface fastEthernet 0/0**'

which will bring you to configuration mode of the specified interface. Then to assign an IP address execute the following command which contains the ip addesss and the subnet mask.

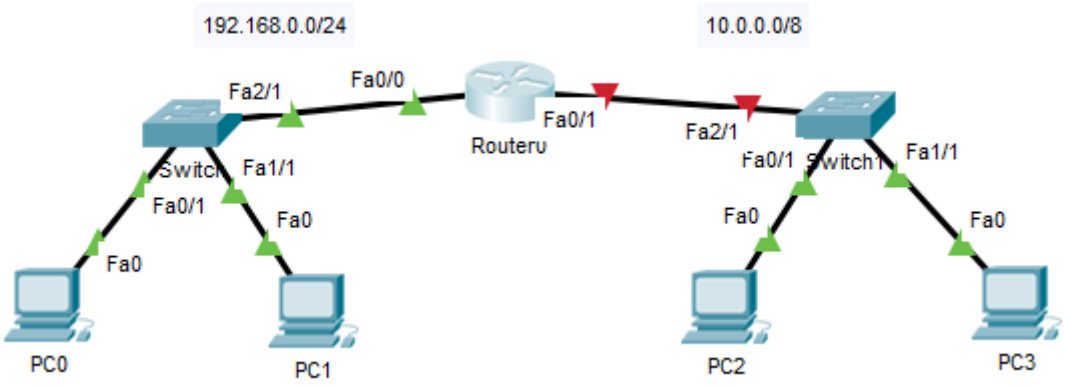
'**ip address 192.168.0.1 255.255.255.0**'

By default the interface is in down state. To turn on the interface you have to execute the command

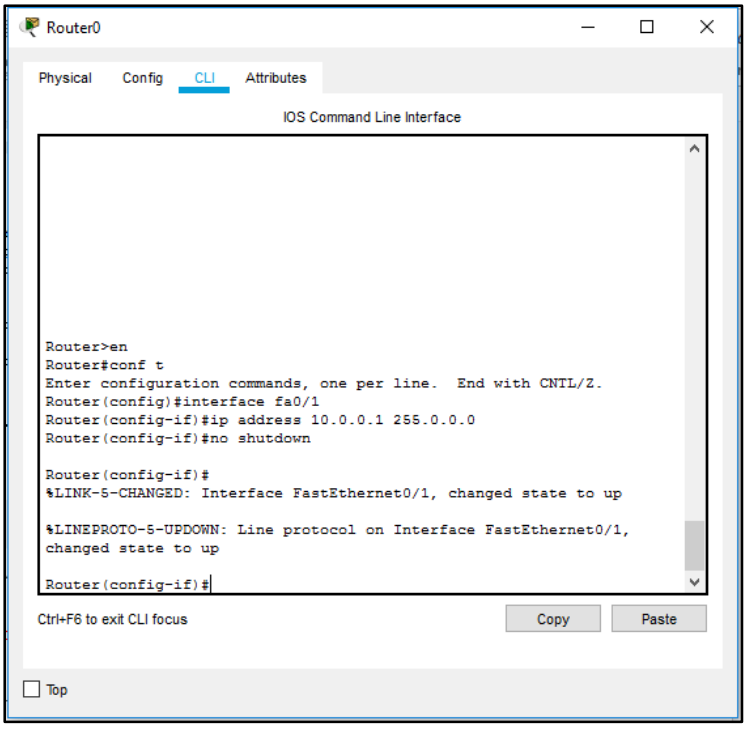
'**no shutdown**'

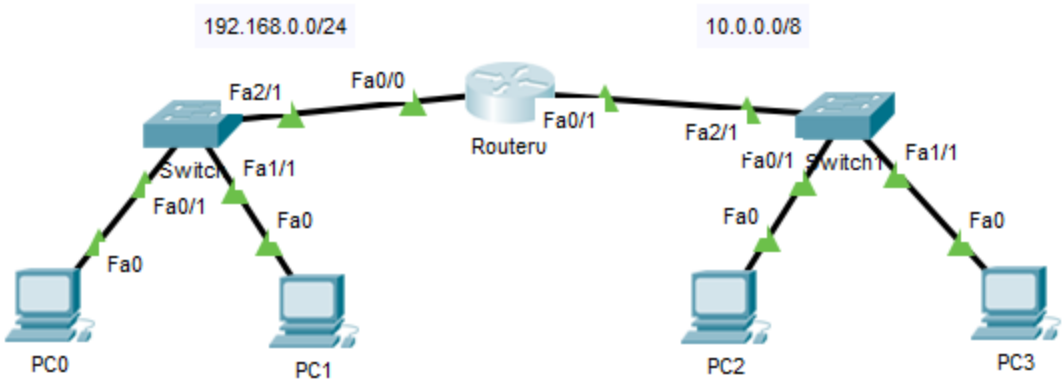
Note: Mind that when executing commands, partialy typed commands are also accepted ('**en**' instead of '**enable**'). To auto complete a partially typed command you can press tab key on your keyboard. If you don't remember a command, you can type question mark '**?**' to view the commands you can execute in the given context.

When you execute the above set of commands, the red color triangle that was on the configured interface will turn green after several seconds.



To assign the IP address to fastEthernet0/1 interface, you have to execute the same set of commands but with a minor modification; the IP address and the subnet mask. The procedure and the command are shown in the below image.





Keep in mind that in this configuration, unlike in the begining of this document, now the PCs need to have proper IP addresses, subnet masks and default gateways which belongs to the network they are in. Accordingly following IP addresses, subnet masks and default gateways should be assigned.

Device/Interface	IP Address	Subnet Mask	Default gateway
Router Fa0/0	192.168.0.1	255.255.255.0	
Router Fa0/1	10.0.0.1	255.0.0.0	
PC0	192.168.0.2	255.255.255.0	192.168.0.1
PC1	192.168.0.3	255.255.255.0	192.168.0.1
PC2	10.0.0.2	255.0.0.0	10.0.0.1
PC3	10.0.0.3	255.0.0.0	10.0.0.1

As the name suggests the default gateway is the gate to go out from the current network. For example if a data packet from PC0 of left side network want to reach the PC2 of the right side network, first the data packet from PC0 must leave its current network. Once the data packet reaches the router, it can be considered as it left its source network. Now the router knows from which interface it should send out this data packet to reach its destination because the destination network is also directly connected to the same router.