LAB MANUAL 02

Computer Network

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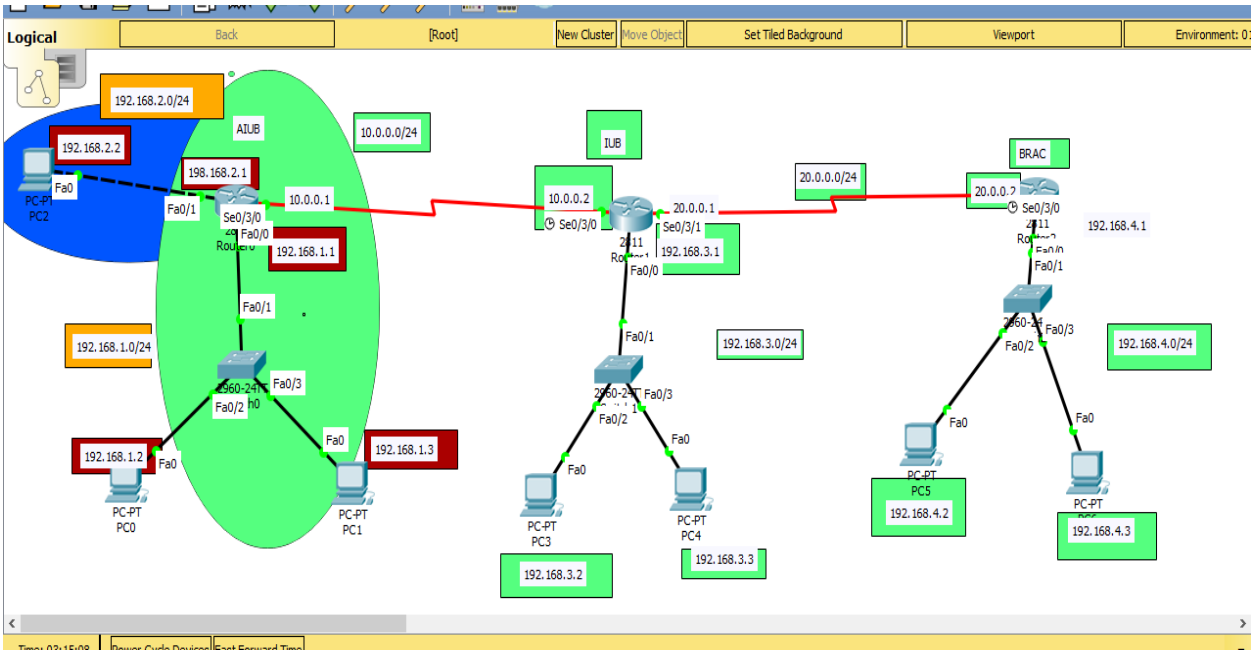
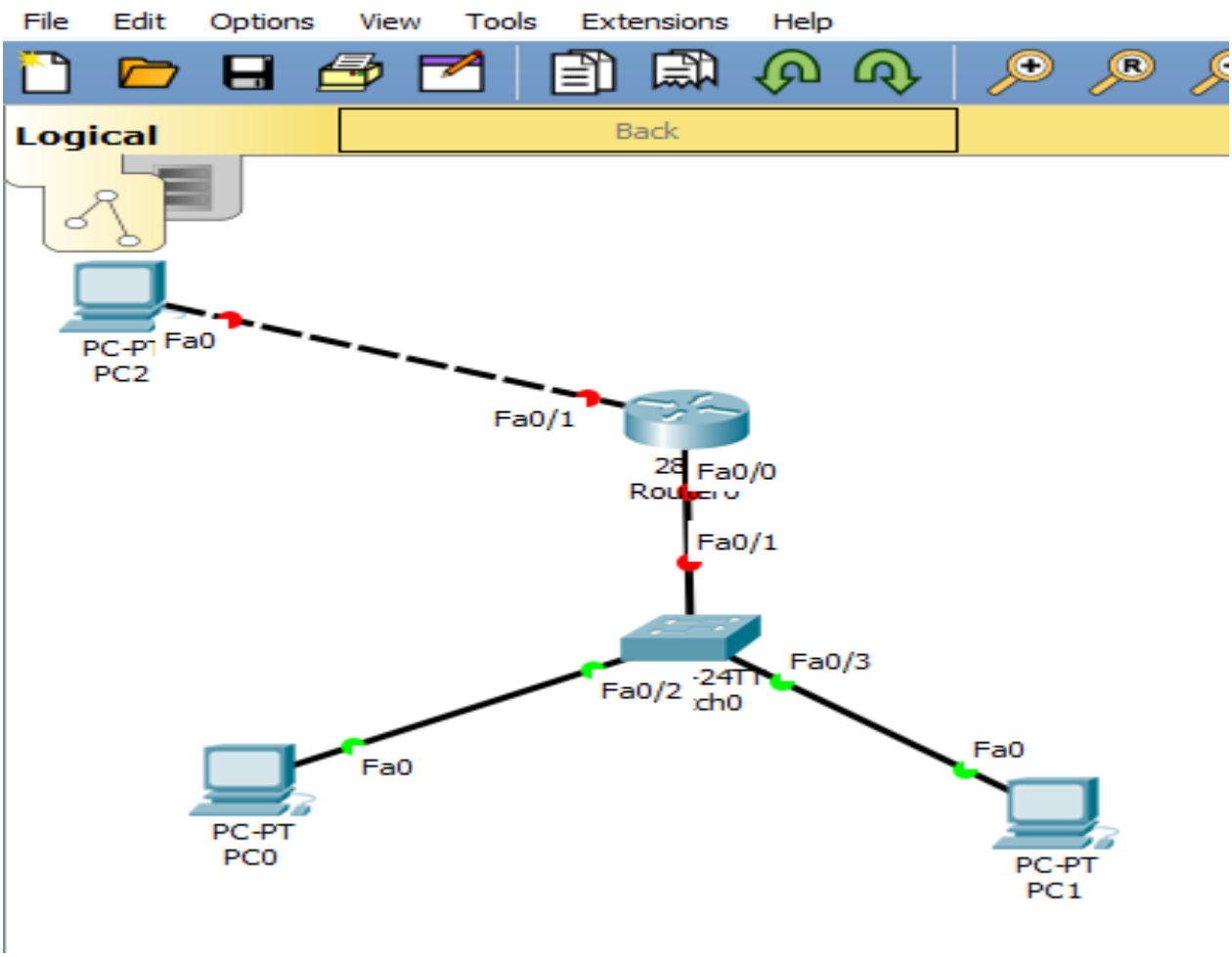


Fig: A Network Topology

We will learn in this module step by step that how to configure a router.

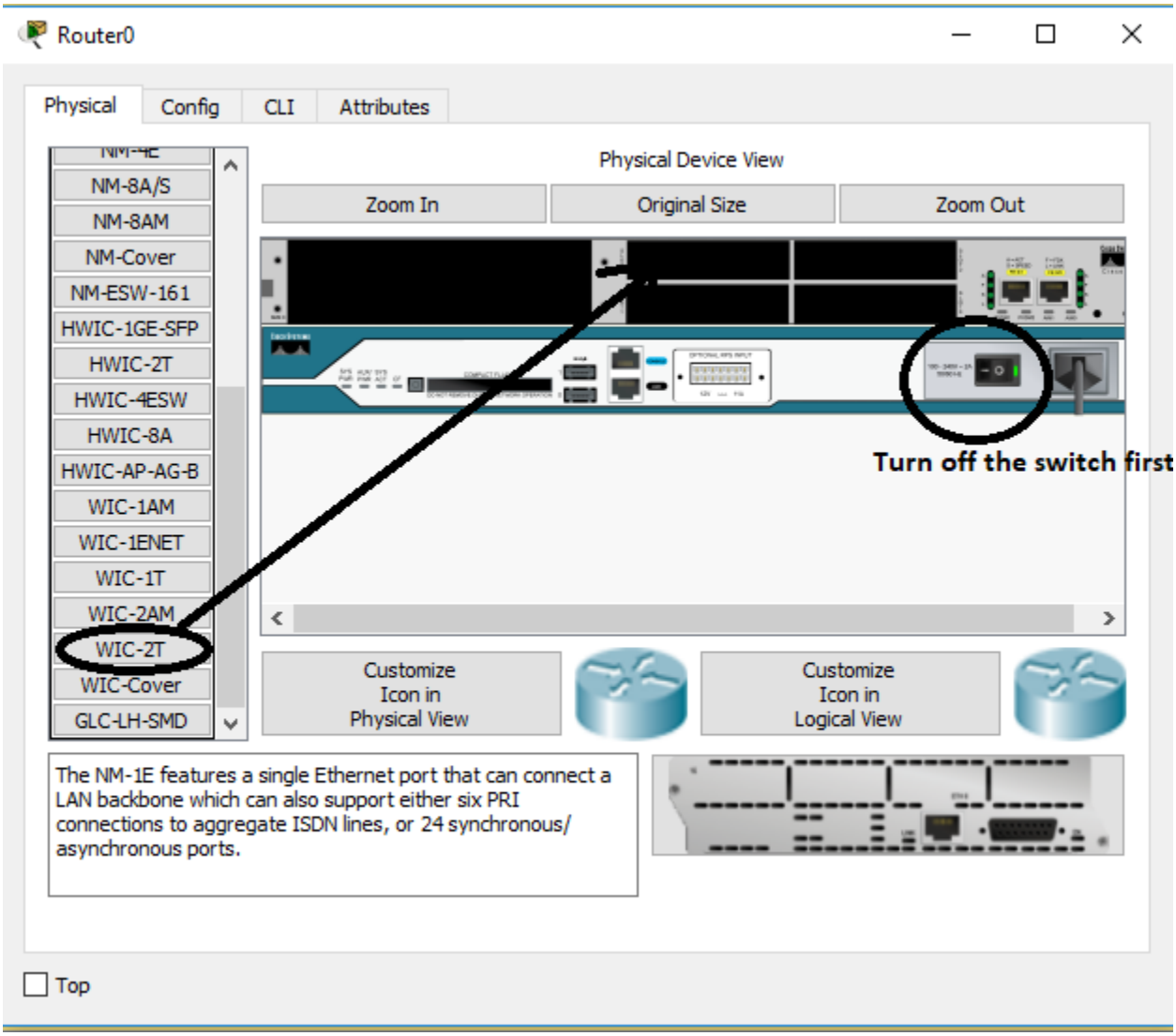
At first we will see configuration details of the first router of the above topology.
For that, take a router 2811 and a switch 2960 and end devices connected through CST and CCO wire.
This is shown below:



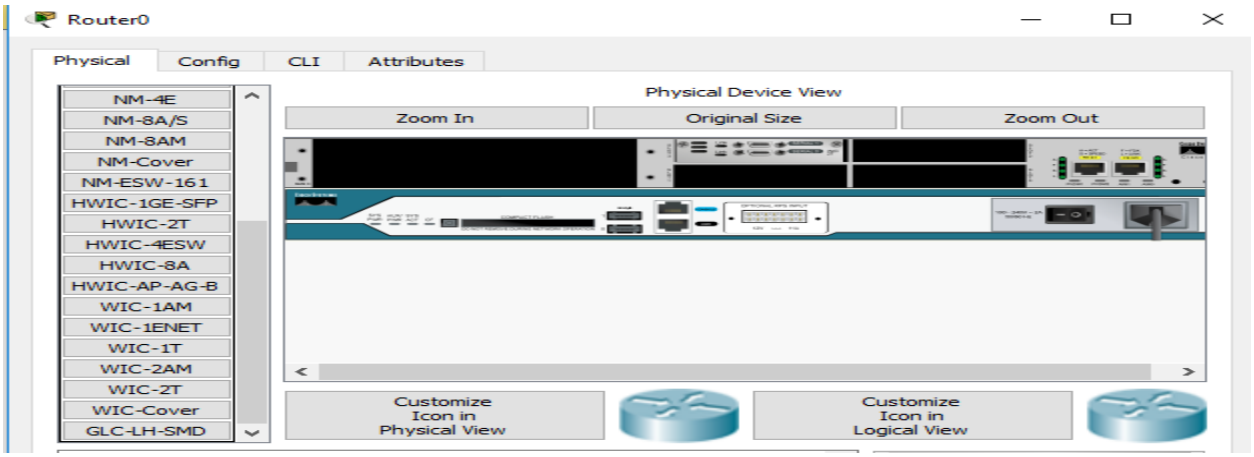
Click the router and see in the physical option. We will add a module to the router. Why?

Because, when we will need to connect another router with this one, it will need serial port which can be added by adding a new module to it. We will take WIC-2T here.

See the picture below:

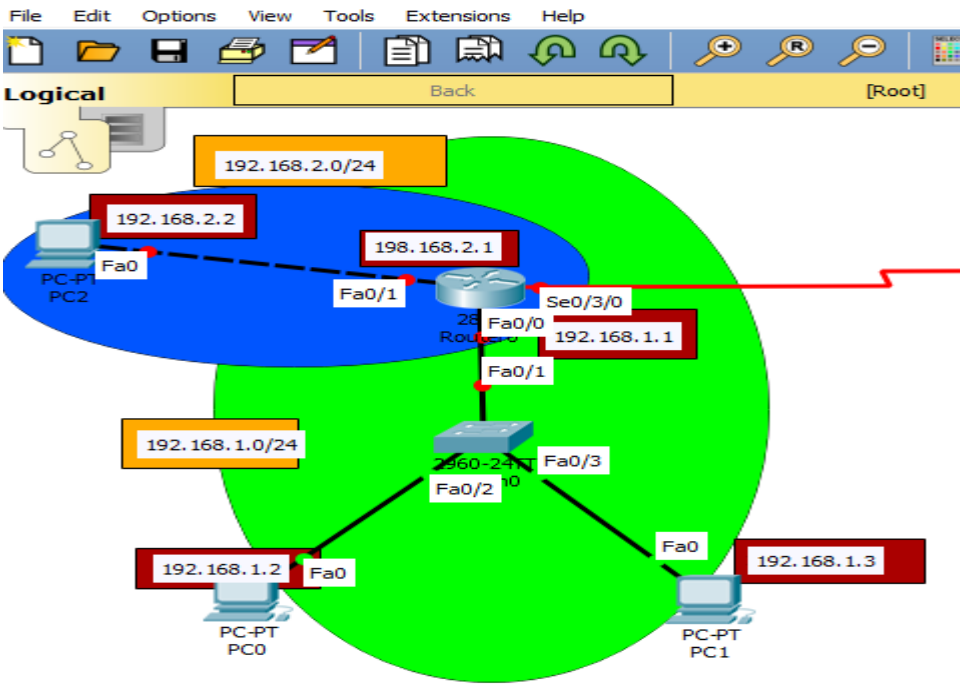


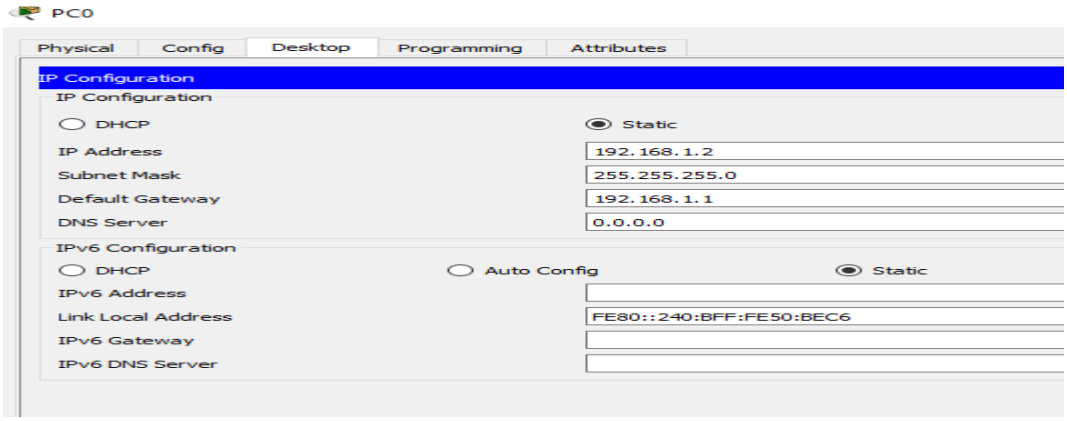
To add this module, you will have to turn off the switch first, because you cannot add anything in running mode. So turn off the switch, select the module, drag and drop in the shown socket and then turn on the switch again. See the picture below:

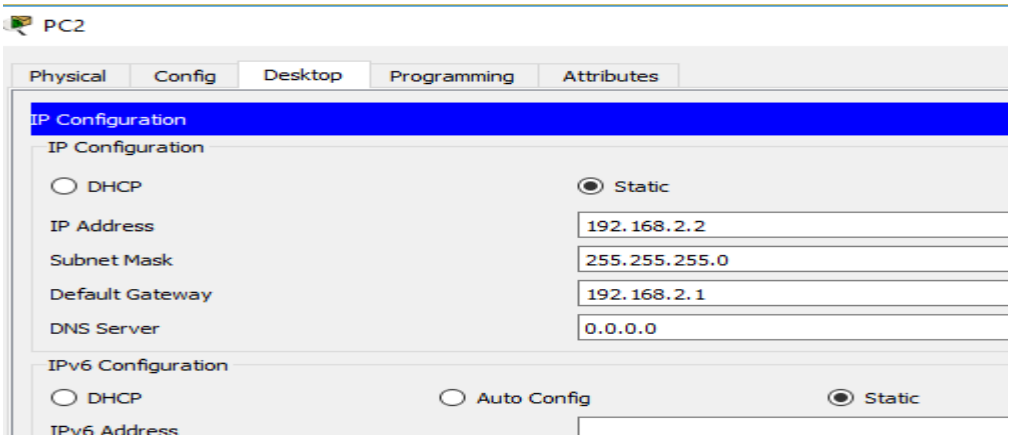


After that, configure the PCs. [Shown in previous manual]

See the pictures below:





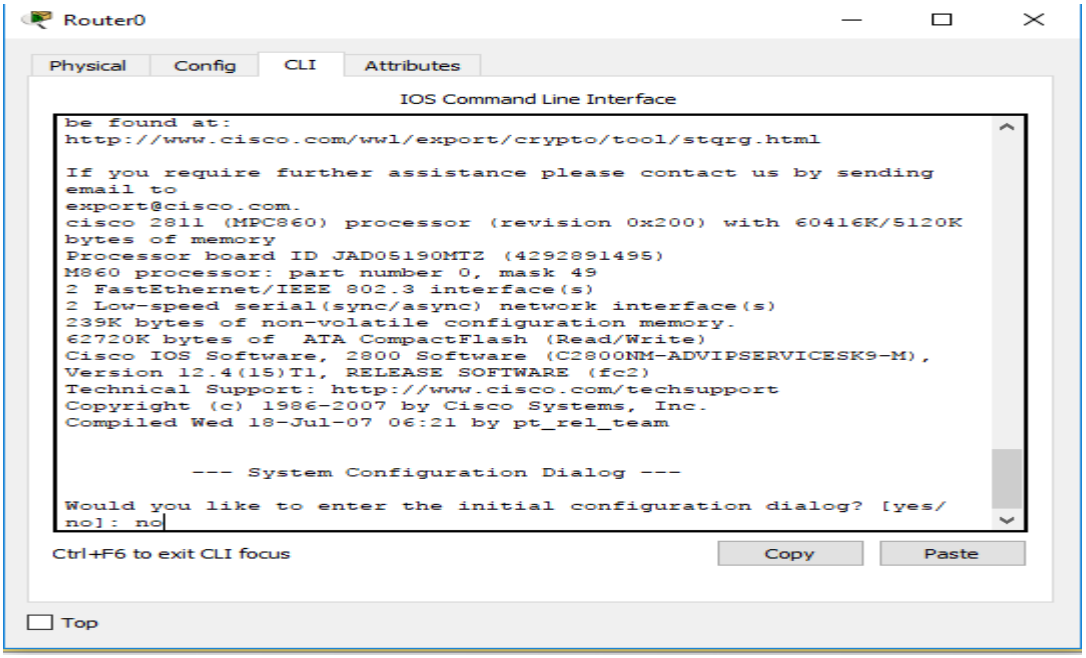


Before learning about the router configuration, we should know some basic information. There are 3 types of router modes.

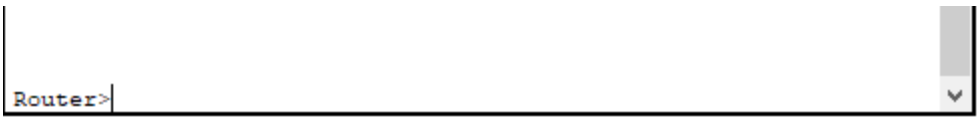
- User execution mode
- Privilege mode
- Global mode

To configure the router, always you have to be in global mode.

Now click the router again and enter into the CLI (Command Line Interface). And writhe the following commands.

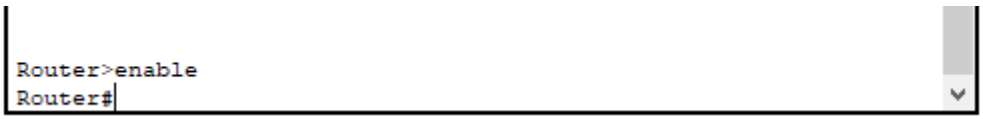


At first you will see a line asking permission yes/no. Write “no” and press enter. Then you will enter into User execution mode. See below:

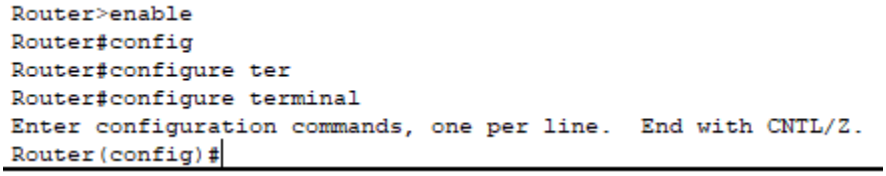


Then write enable. If you forget the commands, you can also write the initial letters of a command and press TAB. It will automatically fill up the full command.

Now to enter into the privilege mode , type > enable



Now , you are in privilege mode. In privilege mode, you can’t configure the router. Only can see the summary of configurations. To enter into global mode, Type # configuration terminal In short you can write config t **OR** conf t.



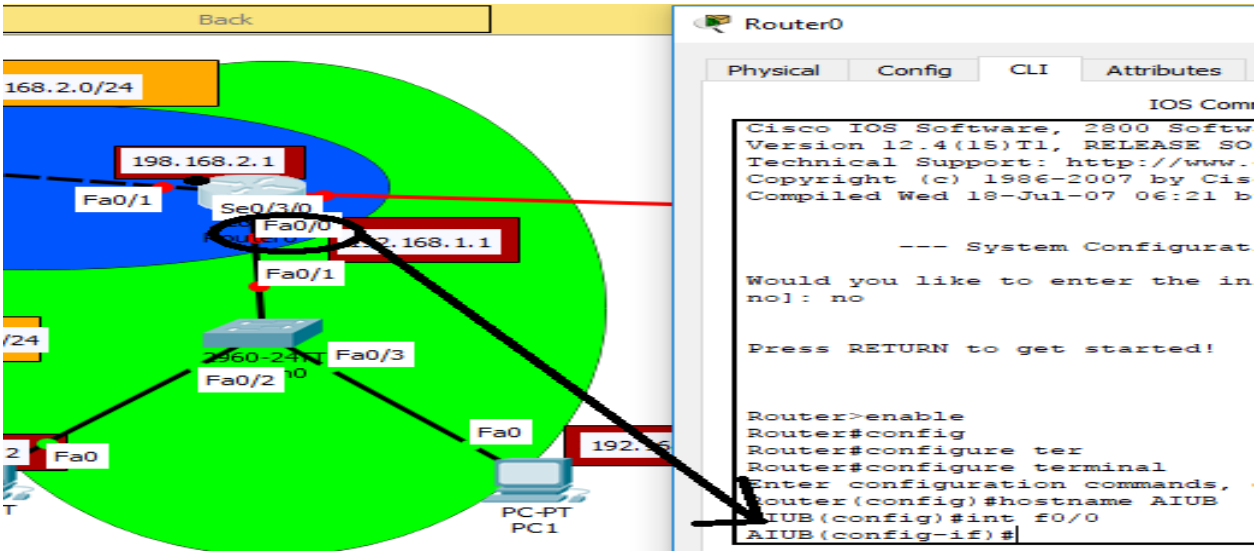
Set a user defined name to your router. Type:

#hostname AIUB

```
Router(config)#hostname AIUB
AIUB(config)#
```

Then set an ip address to the interface you want. We will set at first for the PC0 and PC1 connected via CST wire. The ip address will be the same as the default gateway ip address of the PCs. See the Picture below. We are setting for the green colored network topology.

Suppose Netwok ip is: 192.168.1.0/24




```
AIUB(config)#int f0/0
AIUB(config-if)#ip address 192.168.1.1 255.255.255.0
AIUB(config-if)#no shutd
AIUB(config-if)#no shutdown
```

Ctrl+F6 to exit CLI focus Copy Paste

See in the picture. The red dots in every wire indicates that the lines are down now. To up the line , TYPE# no shutdown

Then you will see the red lights are green. To upgrade the lines quickly after sending the command, you can click Fast Forward option .

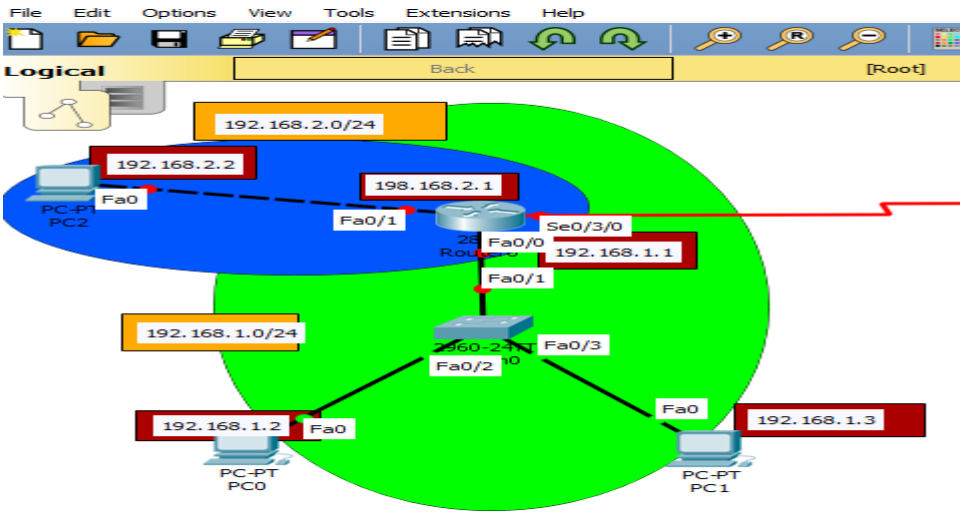
Sometimes , we put the wrong ip address. For that , just go to that interface and set ip address again like before. It will overwrite the previous one. But it is not possible to do if already you have assigned the correct ip address to another line mistakenly. Then you will need to enter to the interfaces one after one and type

#no ip address

#ip address 192.168.1.1 255.255.255.0

Now Configure the other networks. In the very first picture, we can see a blue colored network area also. For that , configure the same router as we were doing on.

Suppose for blue one, Network ip: 192.168.2.0/24




```
AIUB(config-if)#exit
AIUB(config)#int f0/1
AIUB(config-if)#ip address 192.168.2.1 255.255.255.0
```

Now what if, a second router is connected with the first one ?

In bigger scenerio, there are many routers connected with each other. So the second router will be connected with the first one via SERIAL DCE.

For router-router connection, a different network ip will be assigned always. Suppose it is 10.0.0.0/24

For the router AIUB , there is no clock sign along with it on the wire. So there is no exception in configuration. There are some additions where the clock sign appears.

We will see it.

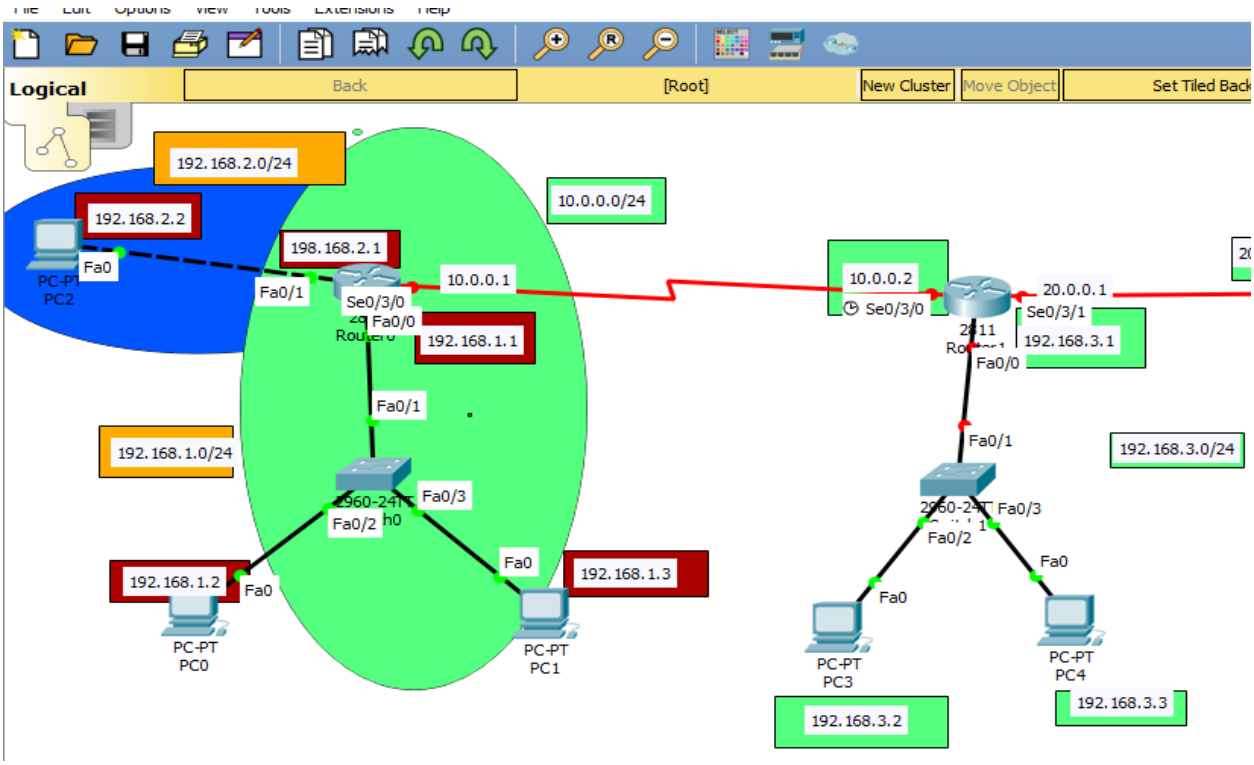
So now, configure the old router , AIUB . This time the interface will be , serial port. Assign the first host ip of 10.0.0.0/24 as gateway ip address.

```
AIUB(config-if)#exit
AIUB(config)#int ser
AIUB(config)#int serial 0/3/0
AIUB(config-if)#ip address 10.0.0.1 255.255.255.0
AIUB(config-if)#no shutdown
```

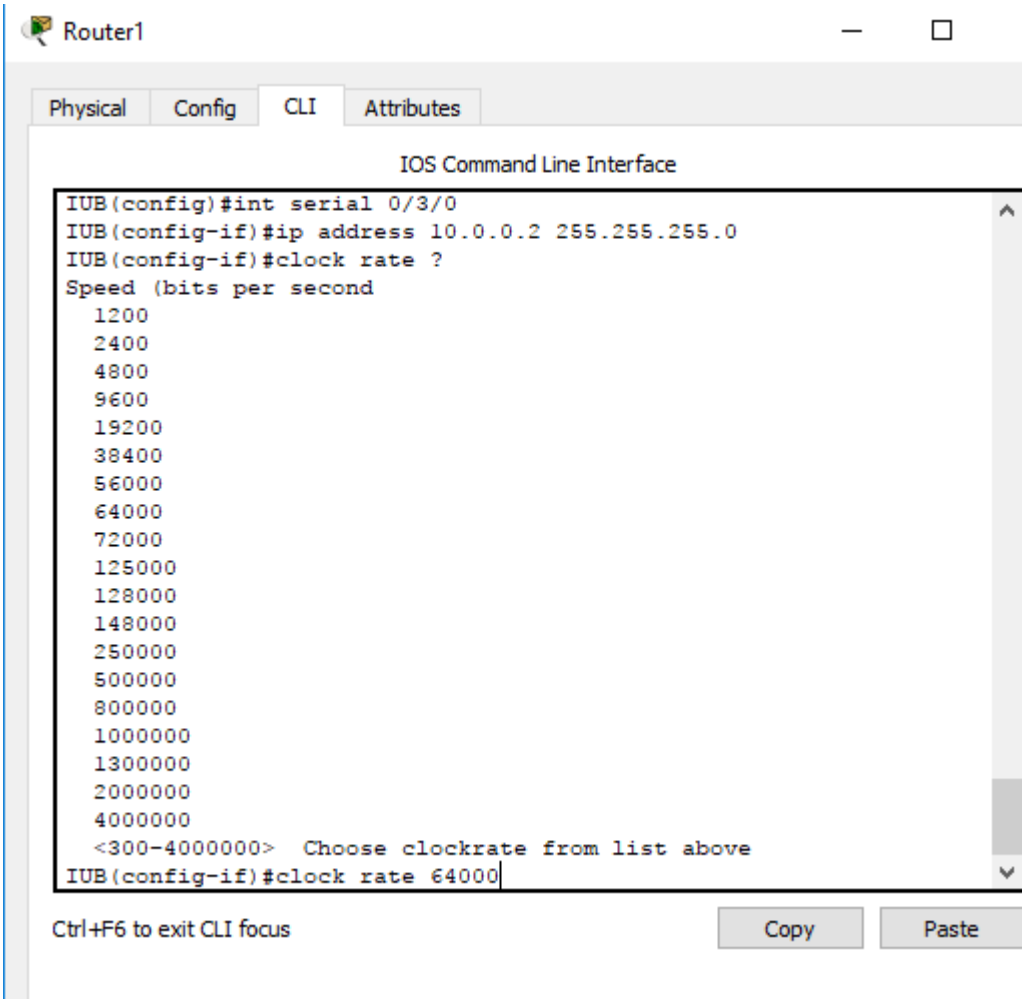
Then, for second router,set hostname IUB like before you did for AIUB. You can set the name as you like.

Then configure the IUB router like the AIUB one assigning ip addresses for PCs and gateway. Suppose the network ip: 192.168.3.0/24

As we know how to configure a router, so we are skipping this part. But the additional part of the second router IUB is it's clock rate and bandwidth as there is a clock sign on the interface serial 0/3/0.

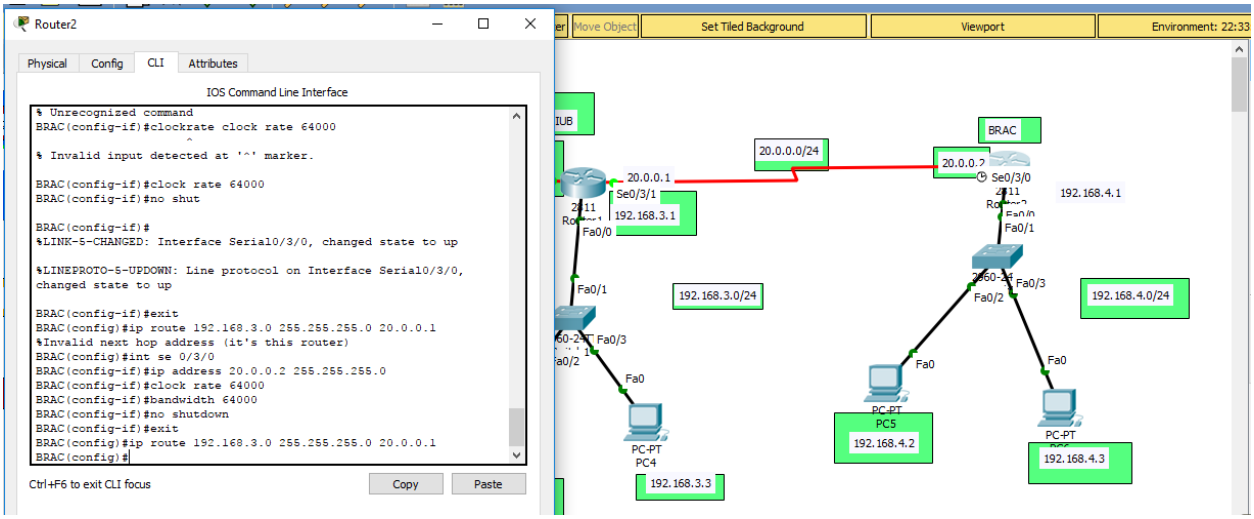


```
AIUB(config-if)#exit
AIUB(config)#int ser
AIUB(config)#int serial 0/3/0
AIUB(config-if)#ip address 10.0.0.1 255.255.255.0
AIUB(config-if)#no shutdown
```




```
IUB(config-if)#bandwidth ?
  <1-10000000>  Bandwidth in kilobits
IUB(config-if)#bandwidth 64000
```

Now, configure the third router giving it a name- BRAC.



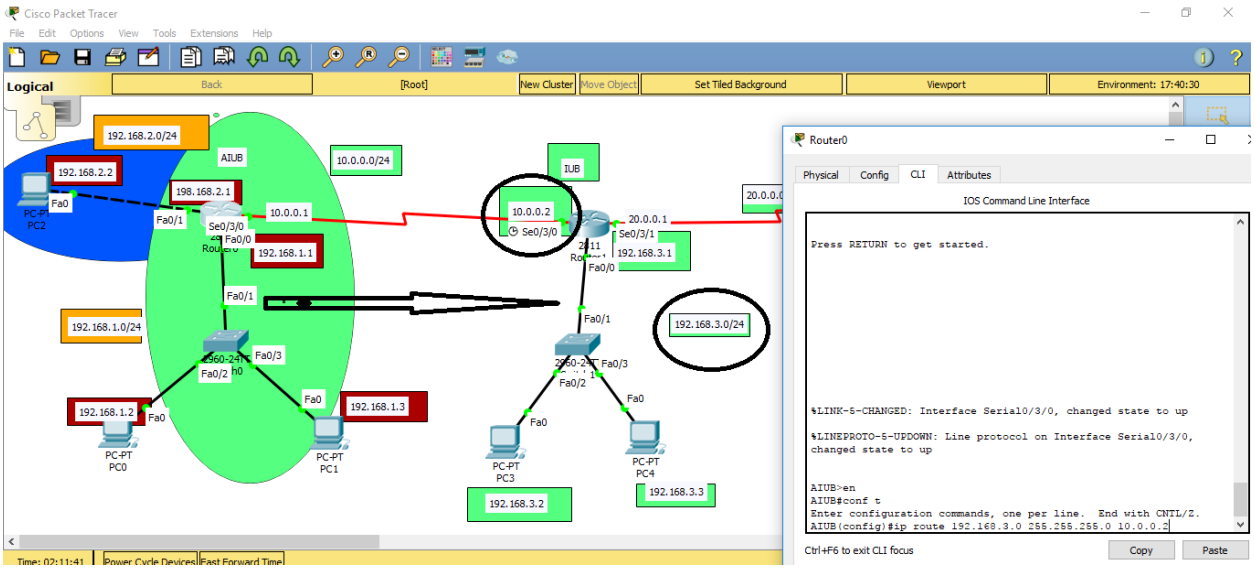
Now the main part is routing. Message will not reach from one network to another until ip route is done. To do that, for every router, you need to introduce them with other networks which are not directly connected with them. Type

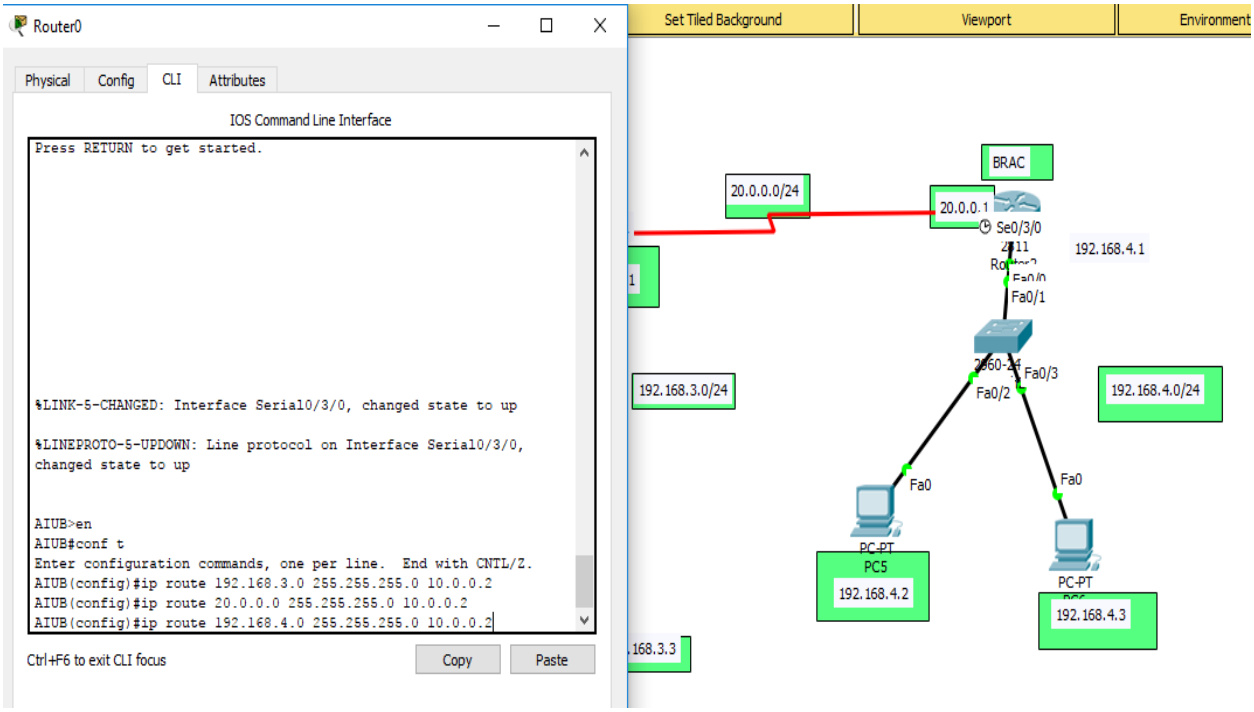
#ip route destination network subnet mask Next Hop.

Here, next hop is the very first hop via which the message will pass to the next network.

For a router, Destination network may change but next hop address is same.

For AIUB Router, at first destination is 192.168.3.0, second destination 20.0.0.0, third destination is 192.168.4.0 and it's next hop is 10.0.0.2.

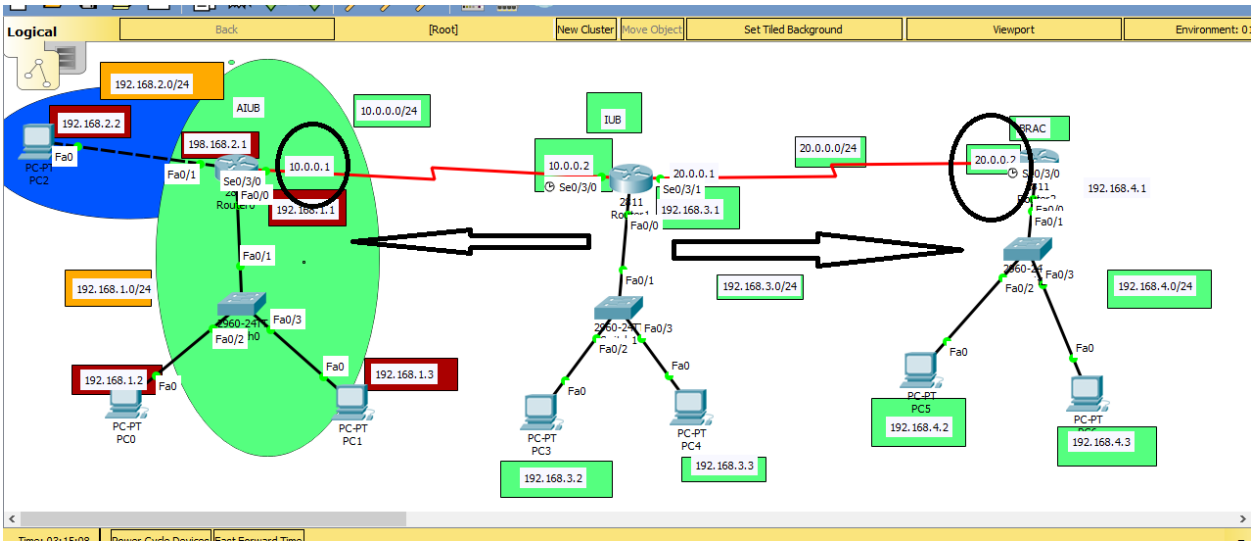




Similarly,

For router2 IUB, Destination networks are 192.168.1.0, 198.168.2.0, 192.168.4.0 and next hop is 10.0.0.1 and 20.0.0.2

```
IUB(config)#
IUB(config)#ip route 192.168.1.0 255.255.255.0 10.0.0.1
IUB(config)#ip route 192.168.2.0 255.255.255.0 10.0.0.1
IUB(config)#ip route 192.168.4.0 255.255.255.0 20.0.0.2
IUB(config)#
```



And for router 3, BRAC

```
BRAC(config)#ip route 192.168.3.0 255.255.255.0 20.0.0.1
BRAC(config)#ip route 10.0.0.0 255.255.255.0 20.0.0.1
BRAC(config)#ip route 192.168.2.0 255.255.255.0 20.0.0.1
BRAC(config)#ip route 192.168.1.0 255.255.255.0 20.0.0.1
BRAC(config)#
```

IP routing is done.

You can see summary of the routing by going to User execution mode. To exit from Global mode and Privilege mode, type #exit until you reach to User Exec mode.

Then, Type > show ip route

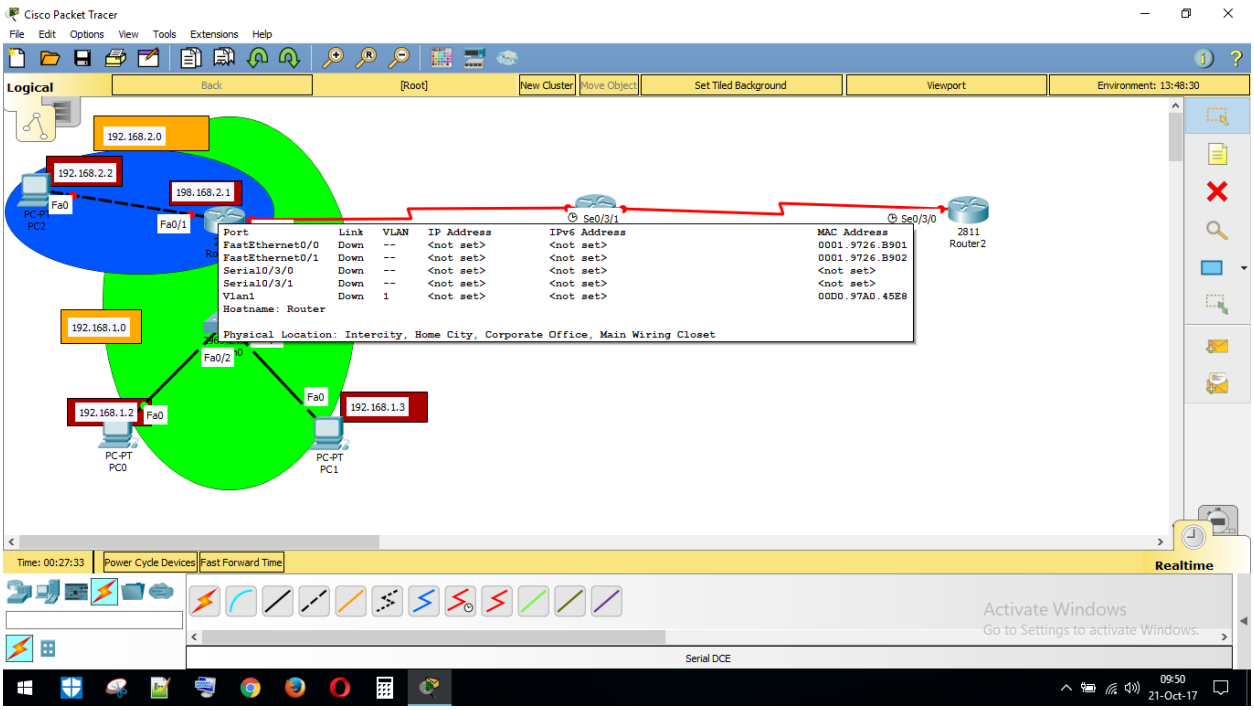
You will see the details. Here, in the picture, we can see for router 1 –AIUB.

```
AIUB>show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile,
B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter
area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external
type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2, E -
EGP
       i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia -
IS-IS inter area
       * - candidate default, U - per-user static route, o - ODR
       P - periodic downloaded static route

Gateway of last resort is not set

     10.0.0.0/24 is subnetted, 1 subnets
C       10.0.0.0 is directly connected, Serial0/3/0
     20.0.0.0/24 is subnetted, 1 subnets
S       20.0.0.0 [1/0] via 10.0.0.2
C    192.168.1.0/24 is directly connected, FastEthernet0/0
C    192.168.2.0/24 is directly connected, FastEthernet0/1
```

Also, if you wish to see which line occupies which ip addresses, simply put the cursor on that router and see.



For Your Convenience,
All the commands for every router are given one by one.

For Router Configuration:

For first router,
Would you like to enter the initial configuration dialog? [yes/no]:no
Router>enable
Router#configure terminal
Router(config)#hostname AIUB
AIUB(config)#interface f0/0
AIUB(config-if)#ip address 192.168.1.1 255.255.255.0
AIUB(config-if)#no shutdown
AIUB(config-if)#exit
AIUB(config)#interface fa0/1
AIUB(config-if)#ip address 192.168.2.1 255.255.255.0
AIUB(config-if)#no shutdown
AIUB(config-if)#exit
AIUB(config)#interface Serial0/3/0

```
AIUB(config-if)#ip address 10.0.0.1 255.255.255.0
AIUB(config-if)#no shutdown
```

For Second Router,

```
Would you like to enter the initial configuration dialog? [yes/no]:no
Router>enable
Router#configure terminal
Router(config)#hostname IUB
IUB(config)#interface f0/0
IUB(config-if)#ip address 192.168.3.1 255.255.255.0
IUB(config-if)#no shutdown
IUB(config-if)#exit
IUB(config)#interface Serial0/3/0
IUB(config-if)#ip address 10.0.0.2 255.255.255.0
IUB(config-if)#clock rate 64000
IUB(config-if)#bandwidth 64000
IUB(config-if)#no shutdown
IUB(config-if)#exit
IUB(config)#interface Serial0/3/1
IUB(config-if)#ip address 20.0.0.1 255.255.255.0
IUB(config-if)#no shutdown
```

For Third Router ,

```
Would you like to enter the initial configuration dialog? [yes/no]:no
Router>enable
Router#configure terminal
Router(config)#hostname BRAC
BRAC(config)#interface f0/0
BRAC(config-if)#ip address 192.168.4.1 255.255.255.0
BRAC(config-if)#no shutdown
BRAC(config-if)#exit
BRAC(config)#interface Serial0/3/0
BRAC(config-if)#ip address 20.0.0.2 255.255.255.0
BRAC(config-if)#clock rate 64000
BRAC(config-if)#bandwidth 64000
BRAC(config-if)#no shutdown
```

FOR Routing:

1st Router,
AIUB(config)#ip route 192.168.3.0 255.255.255.0 10.0.0.2
AIUB(config)#ip route 20.0.0.0 255.255.255.0 10.0.0.2
AIUB(config)#ip route 192.168.4.0 255.255.255.0 10.0.0.2

2nd Router,
IUB(config)#ip route 192.168.1.0 255.255.255.0 10.0.0.1
IUB(config)#ip route 192.168.2.0 255.255.255.0 10.0.0.1
IUB(config)#ip route 192.168.4.0 255.255.255.0 10.0.0.1
IUB(config)#ip route 192.168.4.0 255.255.255.0 20.0.0.2

3rd Router,
BRAC(config)#ip route 192.168.3.0 255.255.255.0 20.0.0.1
BRAC(config)#ip route 10.0.0.0 255.255.255.0 20.0.0.1
BRAC(config)#ip route 192.168.2.0 255.255.255.0 20.0.0.1
BRAC(config)#ip route 192.168.1.0 255.255.255.0 20.0.0.1