SUBNETTING

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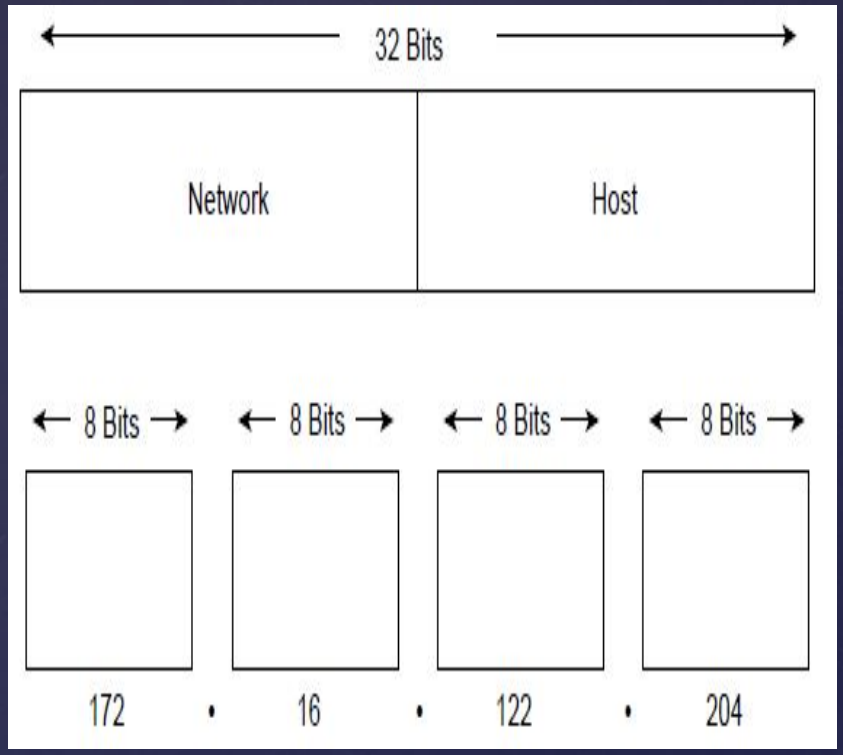
IP Address Format

- The **32-bit** IP address is grouped **eight bits** at a time, separated by dots, and represented in decimal format.
- Each bit in the octet has a binary weight (128, 64, 32,16, 8, 4, 2, 1).
- The minimum value for an **octet is 0**, and the maximum value for an **octet is 255.**



IP addressing supports five different address classes: A, B,C, D, and E. Only classes A, B, and C are available for commercial use

IP Address Class	Format	Purpose	Address Range	No. Bits Network/Host	Max. Hosts
A	N.H.H.H	Few large organizations	1.0.0.0 to 126.0.0.0	7/24	16,777, 214 ($2^{24} - 2$)
B	N.N.H.H	Medium-size organizations	128.1.0.0 to 191.254.0.0	14/16	65, 543 ($2^{16} - 2$)
C	N.N.N.H	Relatively small organizations	192.0.1.0 to 223.255.254.0	21/8	254 ($2^{8} - 2$)
D	N/A	Multicast groups	224.0.0.0 to 239.255.255.255	N/A (not for commercial use)	N/A
E	N/A	Experimental	240.0.0.0 to 254.255.255.255	N/A	N/A

N = Network number, H = Host number.

One address is reserved for the broadcast address, and one address is reserved for the network.

- IP networks can be divided into smaller networks called **subnetworks** (or subnets).

- **FOR EXAMPLE**

172.16.1.0, 172.16.2.0, 172.16.3.0, and 172.16.4.0 are all subnets within network 171.16.0.0. (All 0s in the host portion of an address specifies the entire network.)

Packet Tracer Tutorial

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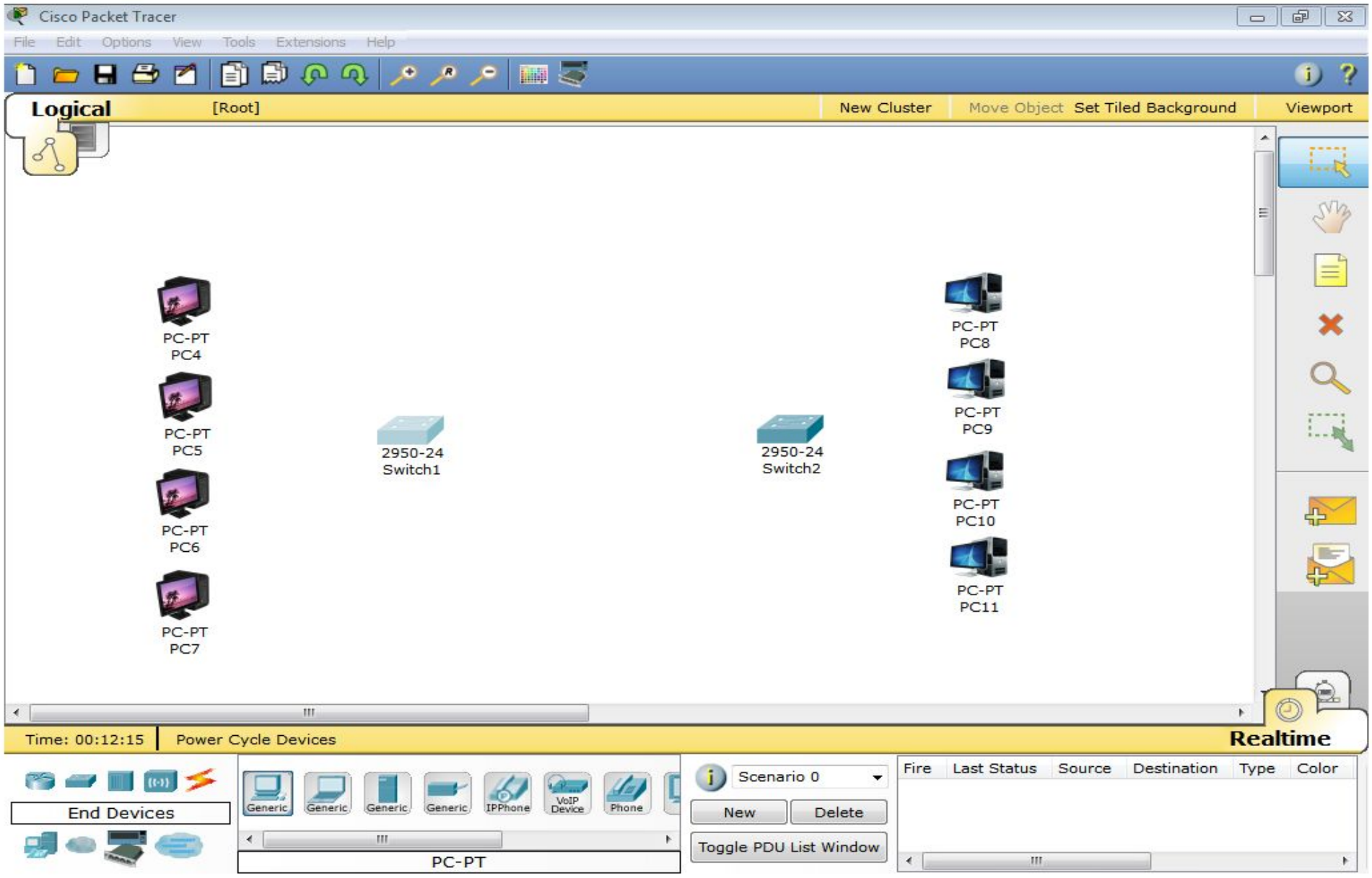
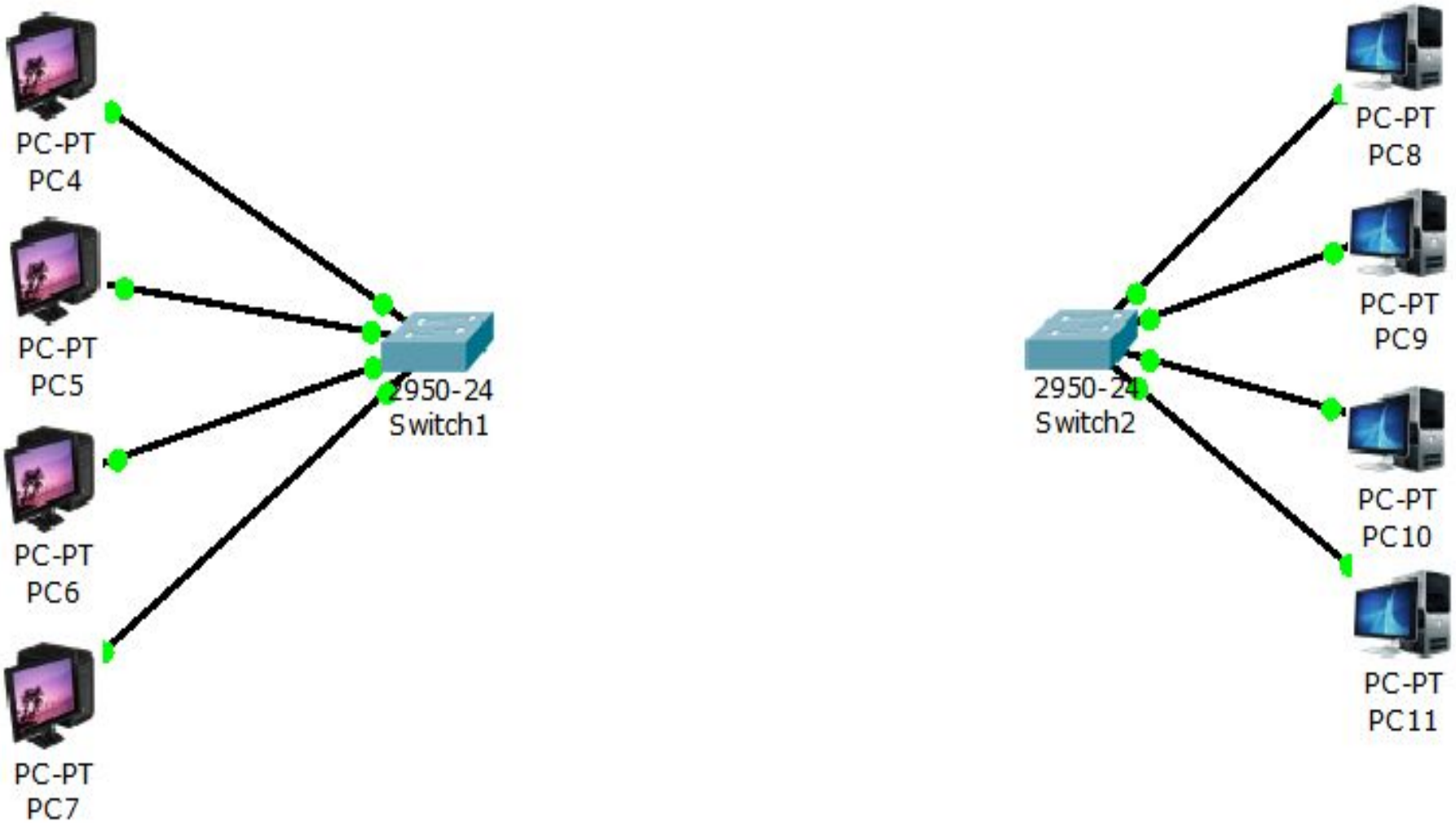
Take 4 pc's each side that will be connected by 2 switches 2950-24



Connect All of them With copper straight through cable



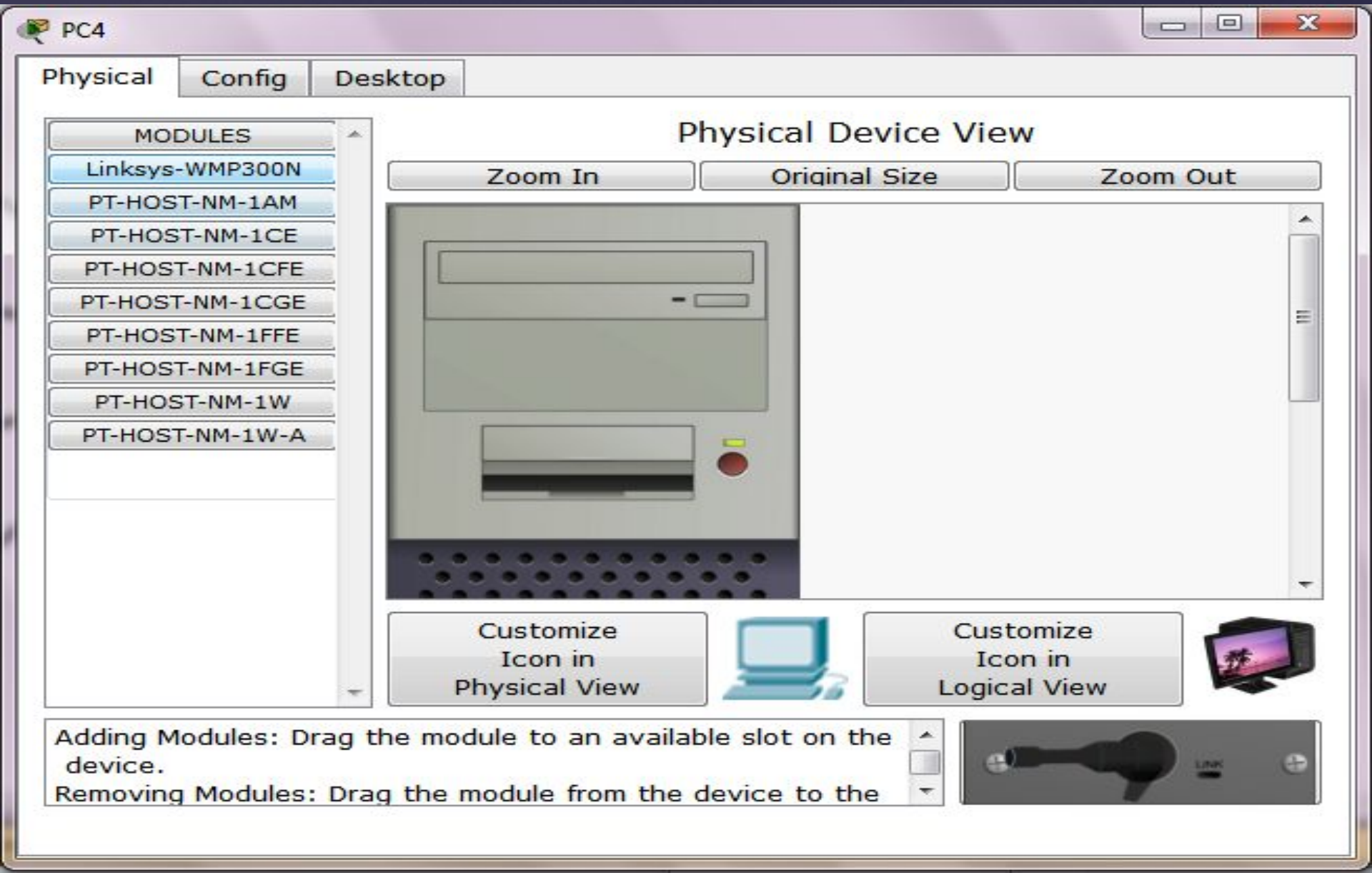
Assigning IP

10.0.0.1	To	10.255.255.254
172.16.0.1	To	172.31.255.254
192.168.0.1	To	192.168.255.254

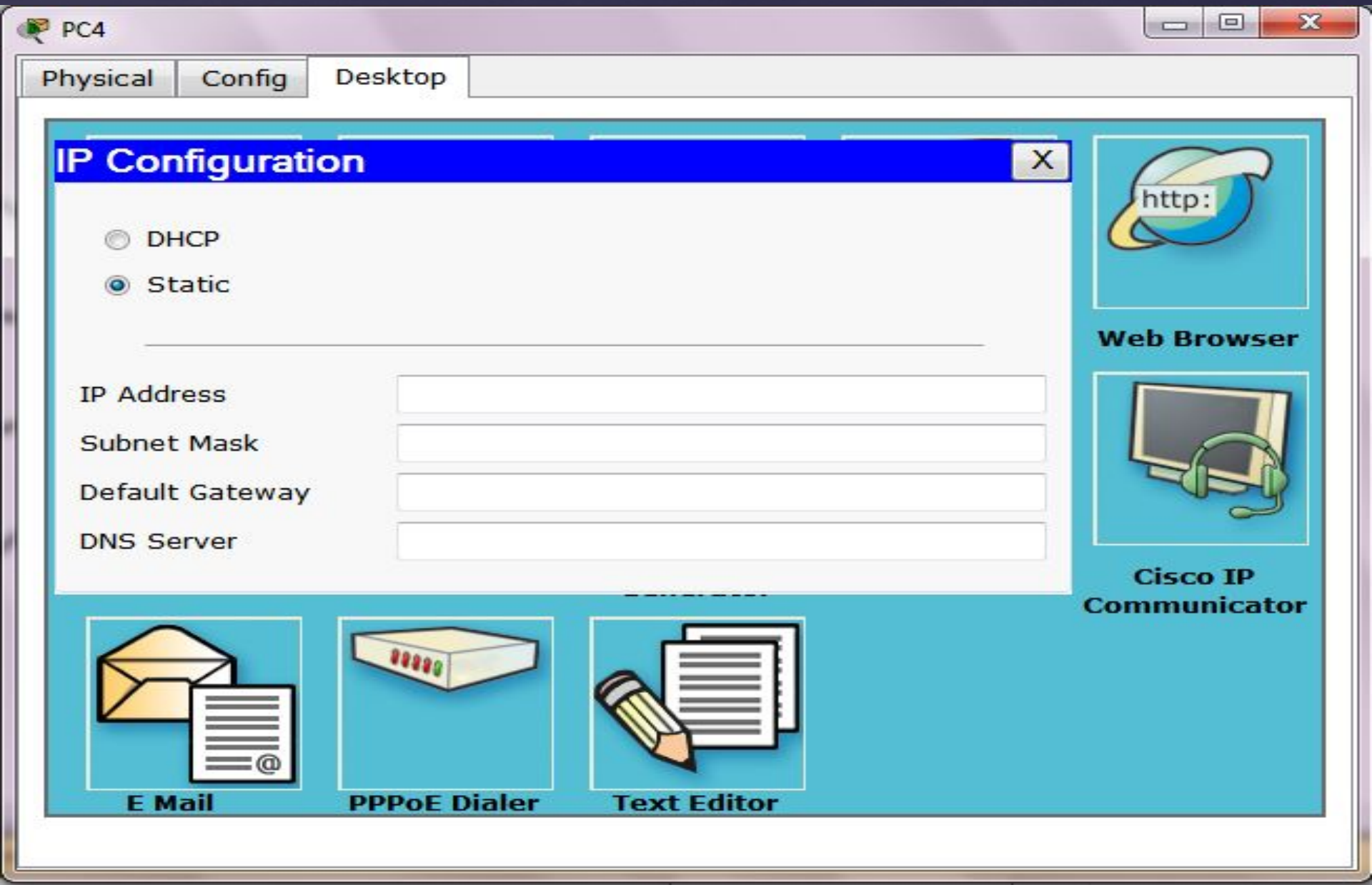
If 2 computers want to communicate in a network they must have same type of address

Assign ip To pc’s in 1st network

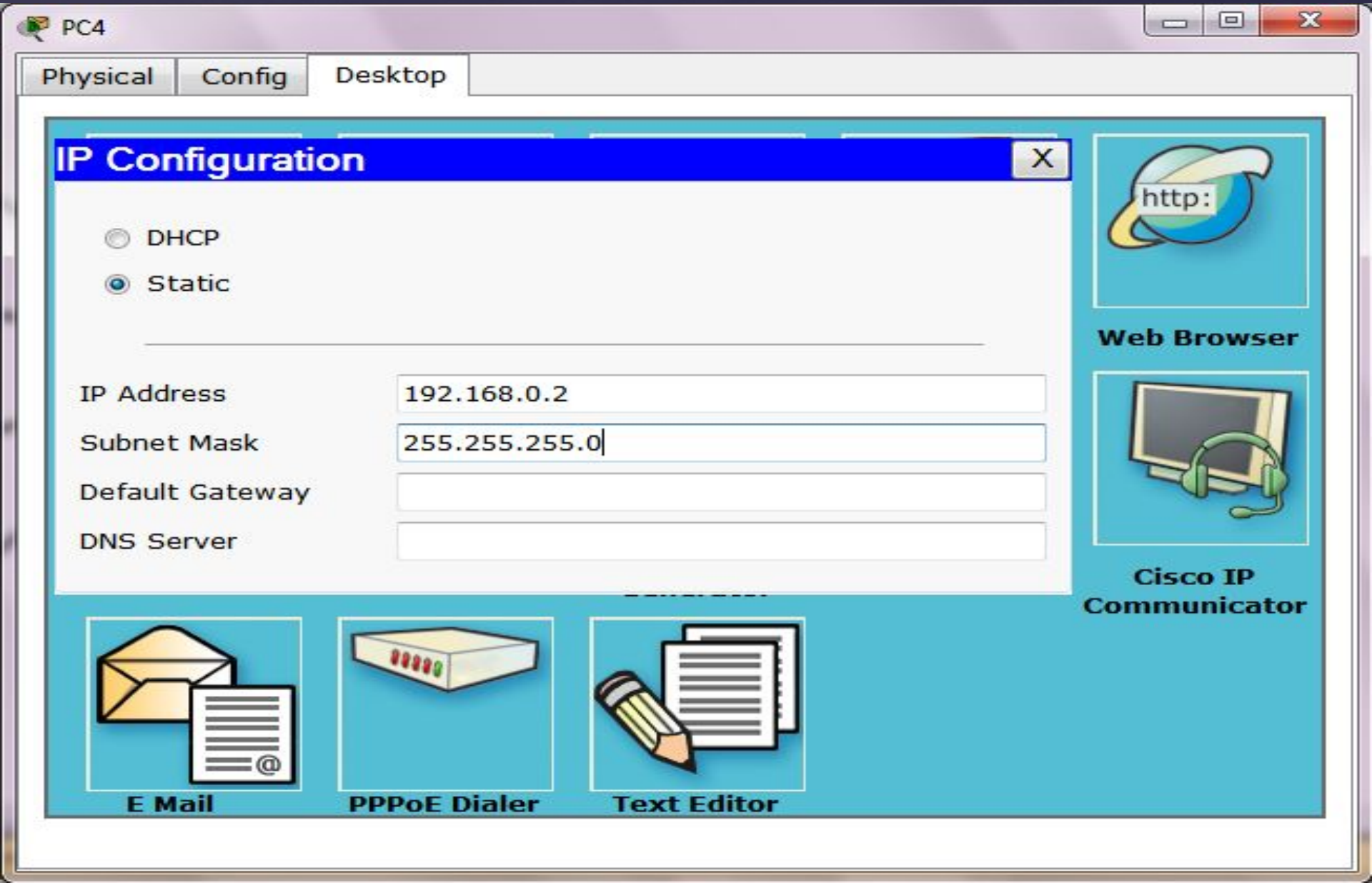
Double click on Pc



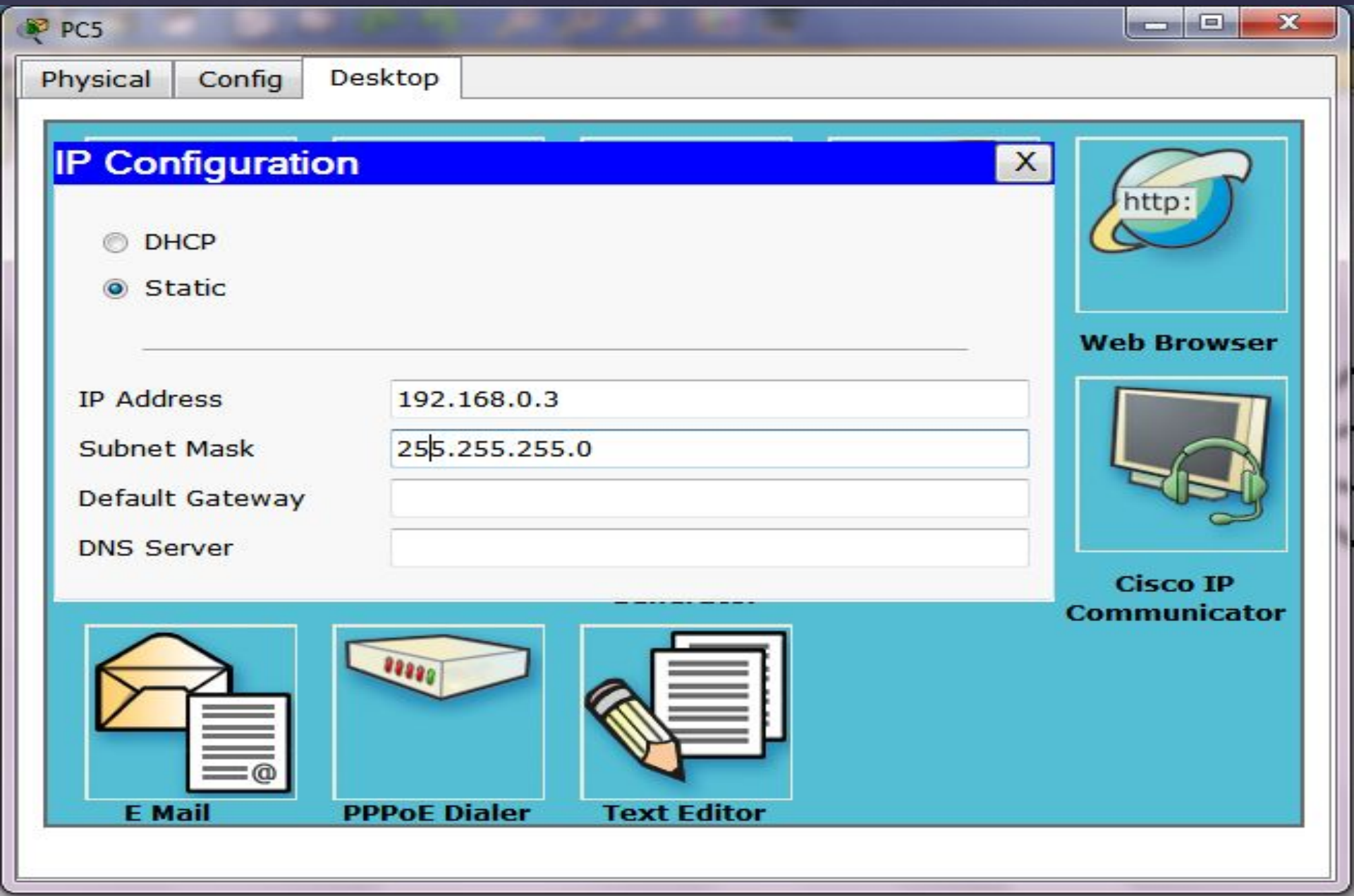
Goto desktop tab and click ip configuration



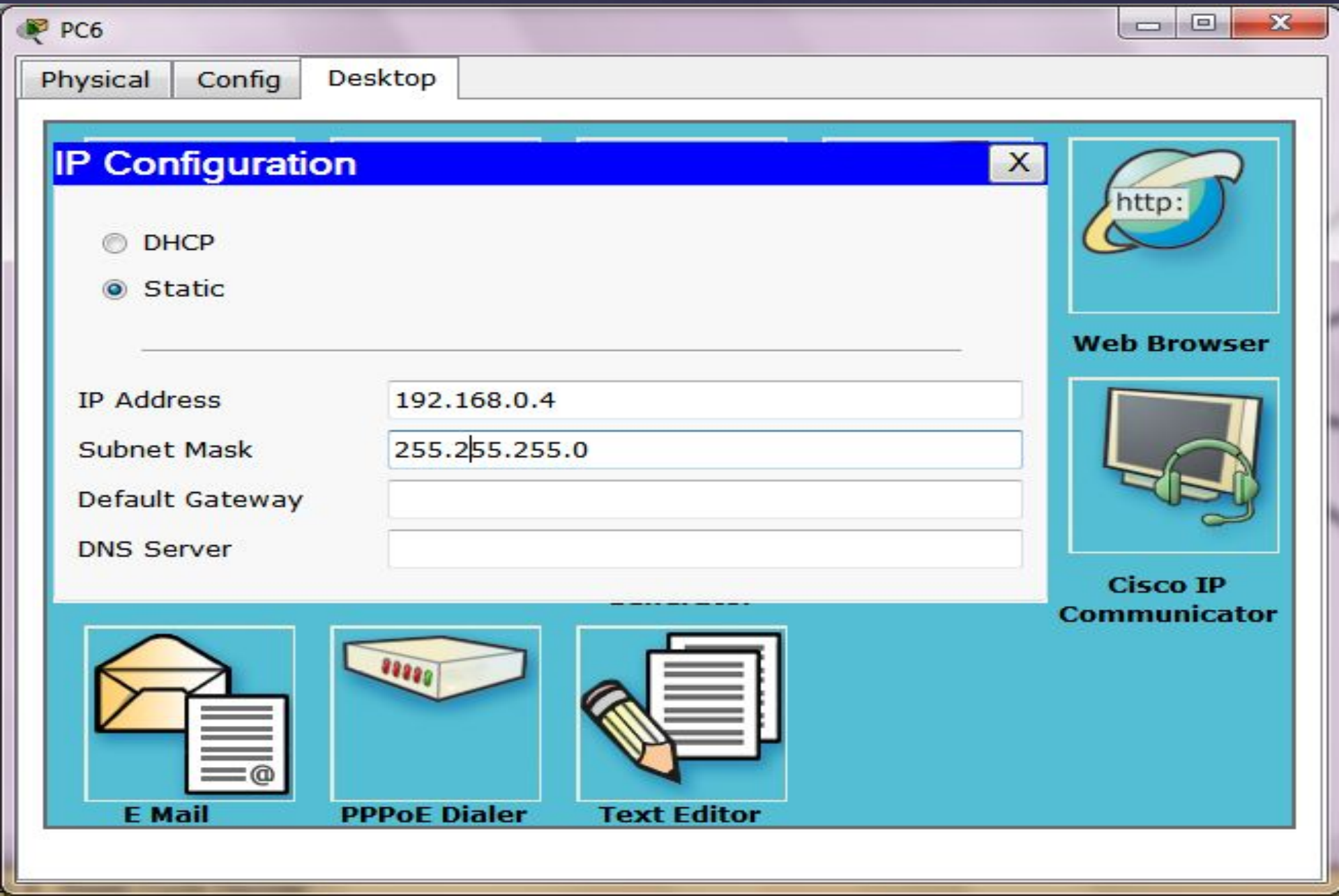
Insert ip of the 1st pc subnet will automatically generate and leave the gateway right now



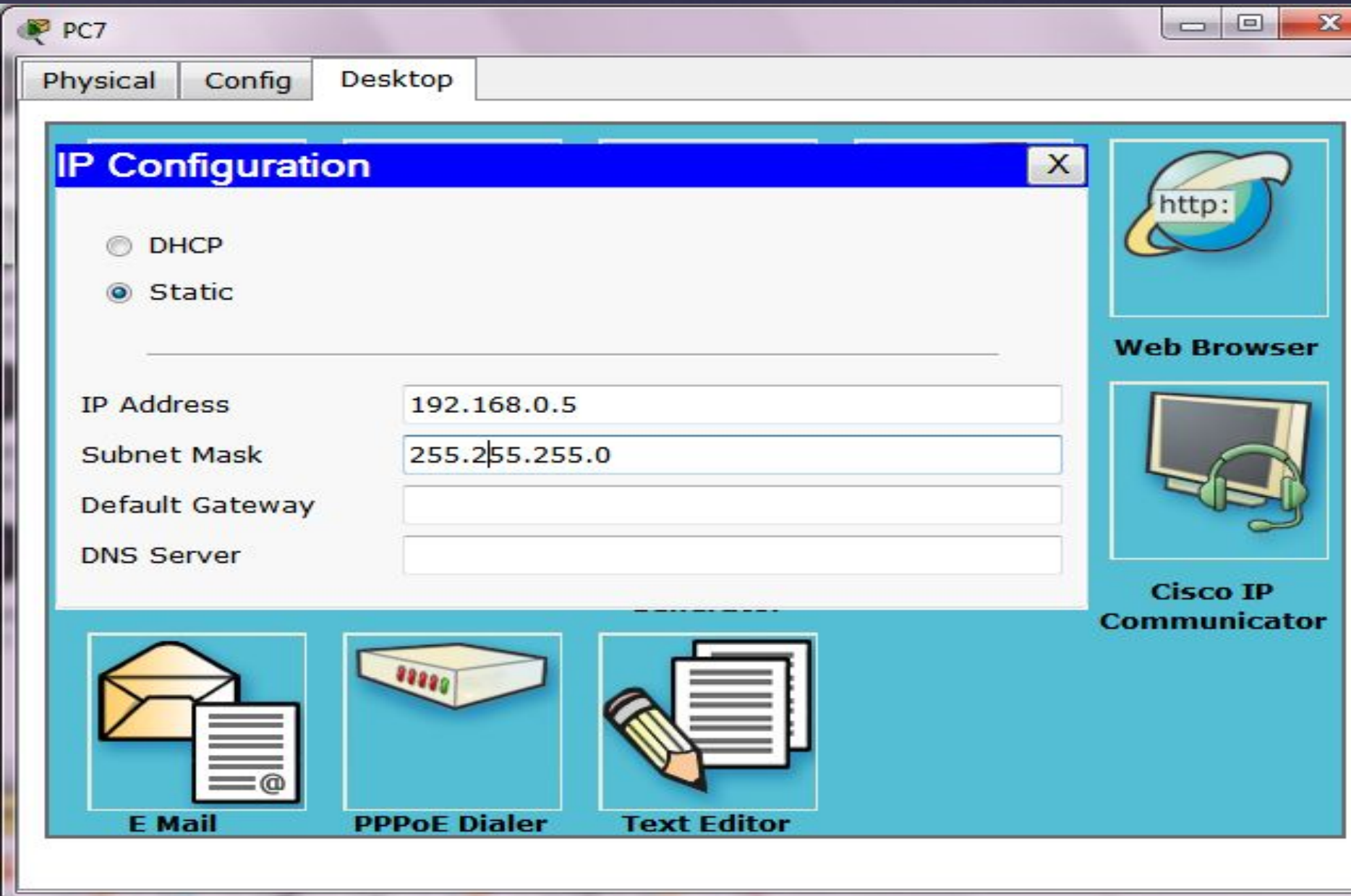
Ip of 2nd pc


PC5
Physical
Config
Desktop
IP Configuration
DHCP
Static
IP Address
192.168.0.3
Subnet Mask
255.255.255.0
Default Gateway
DNS Server
http:
Web Browser
Cisco IP Communicator
E Mail
PPPoE Dialer
Text Editor

IP of 3rd PC


PC6
Physical
Config
Desktop
IP Configuration
X
DHCP
Static
IP Address
192.168.0.4
Subnet Mask
255.255.255.0
Default Gateway
DNS Server
http:
Web Browser
Cisco IP Communicator
E Mail
PPPoE Dialer
Text Editor

IP of 4th PC

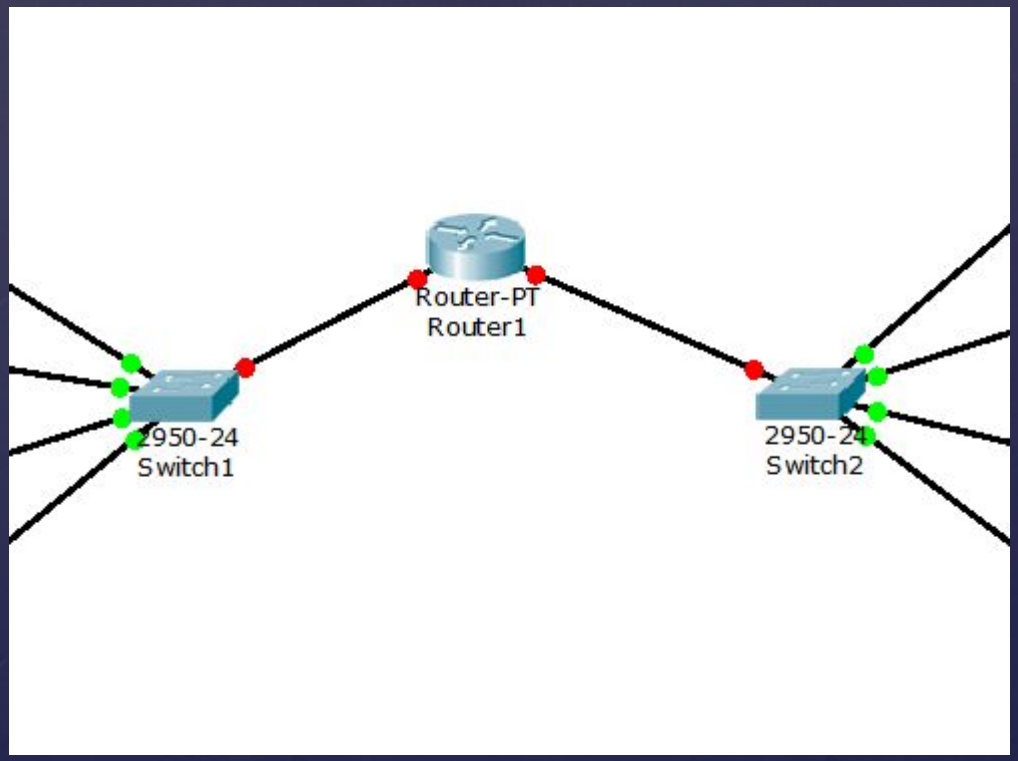

PC7
Physical
Config
Desktop
IP Configuration
DHCP
Static
IP Address
192.168.0.5
Subnet Mask
255.255.255.0
Default Gateway
DNS Server
http:
Web Browser
Cisco IP Communicator
E Mail
PPPoE Dialer
Text Editor

Remember i have inserted ip's in all computer of same class 192.168.0._
"you need to limit yourself to one class of private addresses, if you want to computers to talk with each other"
(joe-habraken)

Assign IP's to the PC's In the 2nd network
like
192.168.10.2
192.168.10.3
192.168.10.4
192.168.10.5

Connecting Network With One Router

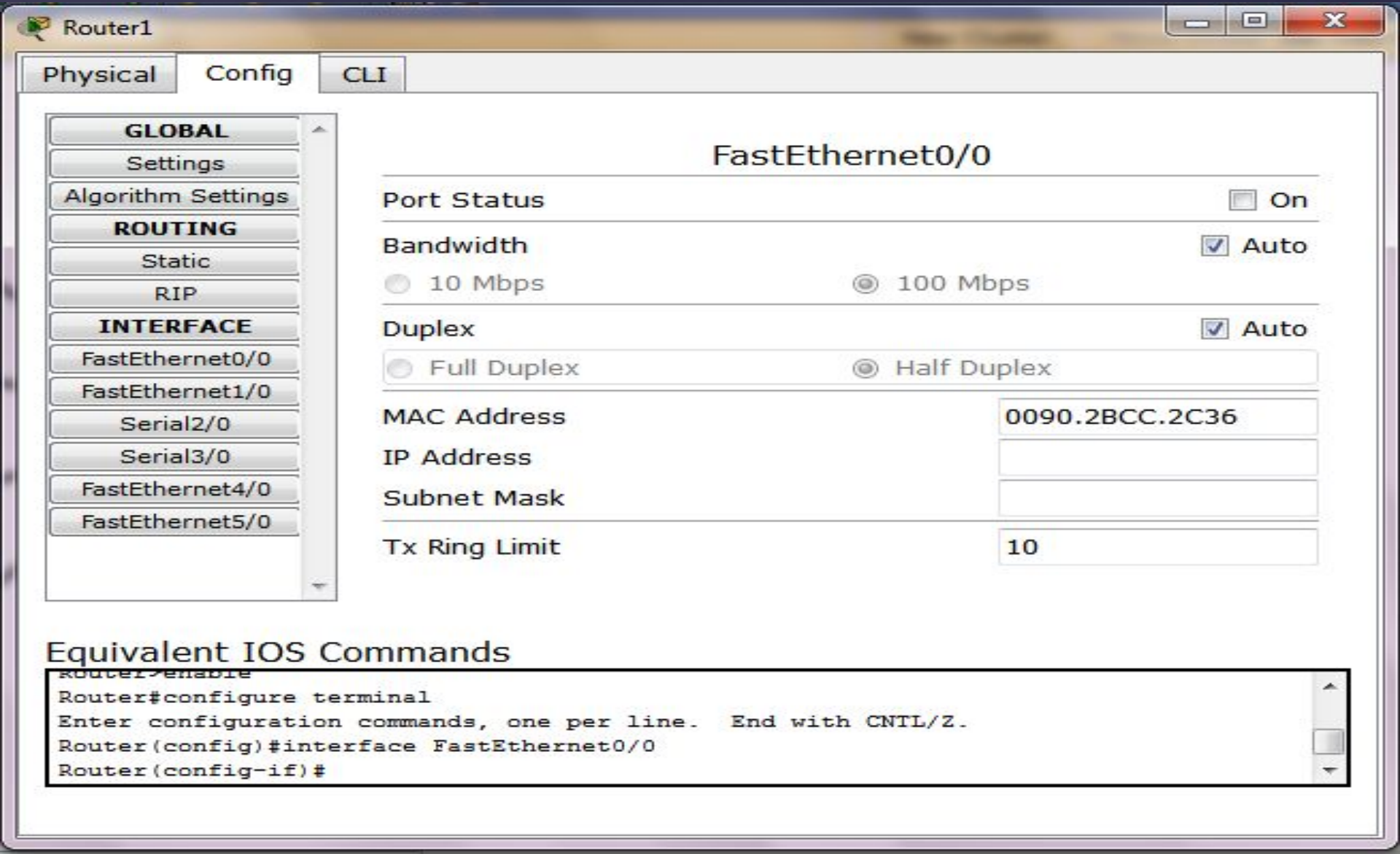
Connect One Generic Router
Connect It With Swith 0 from fast ethernet 0/0,
Connect It With Swith 1 from fast ethernet 1/0
With Copper straight through cabble



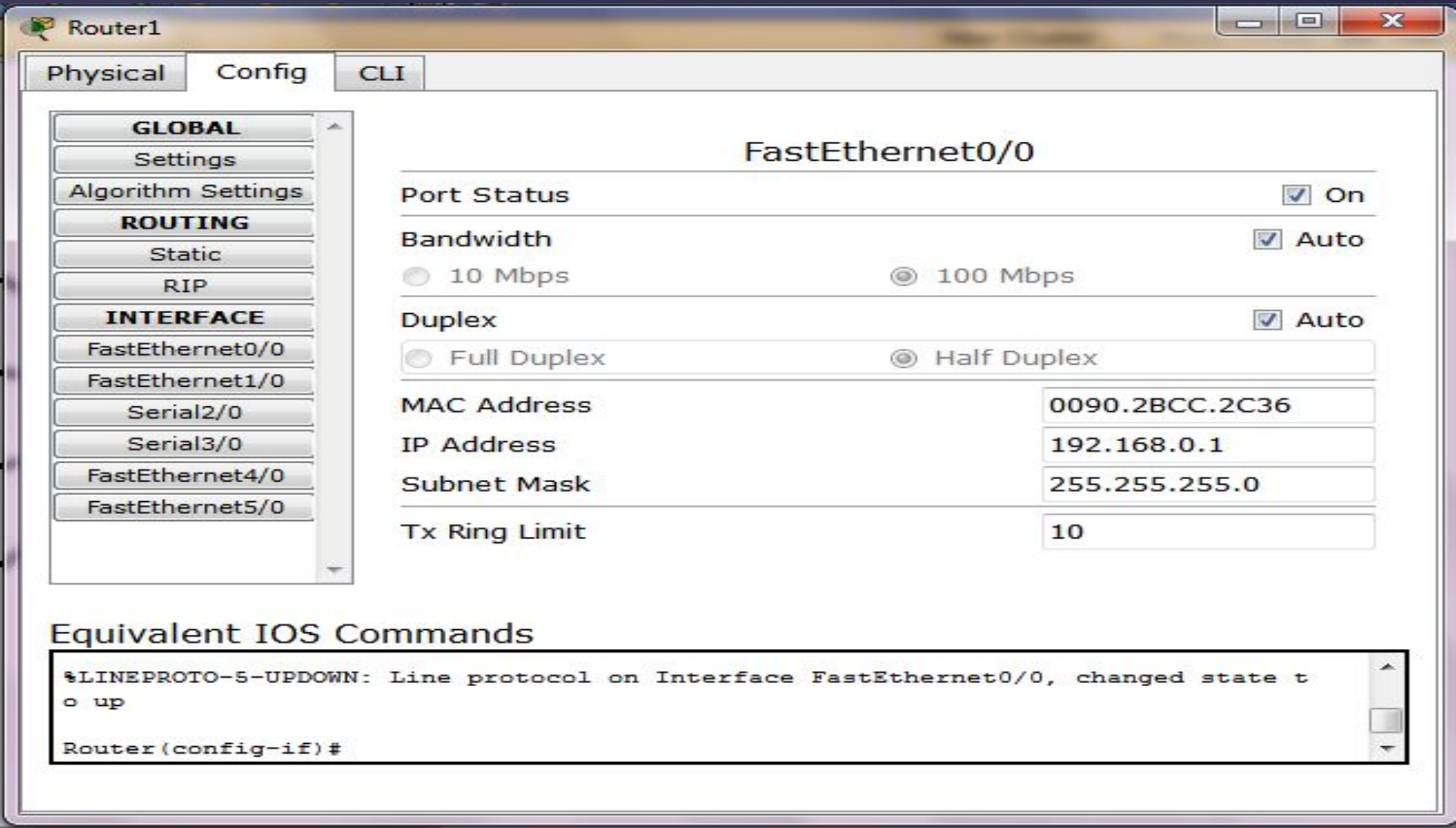
Configuring router

Router connectted with the network one from fast ethernet 0/0

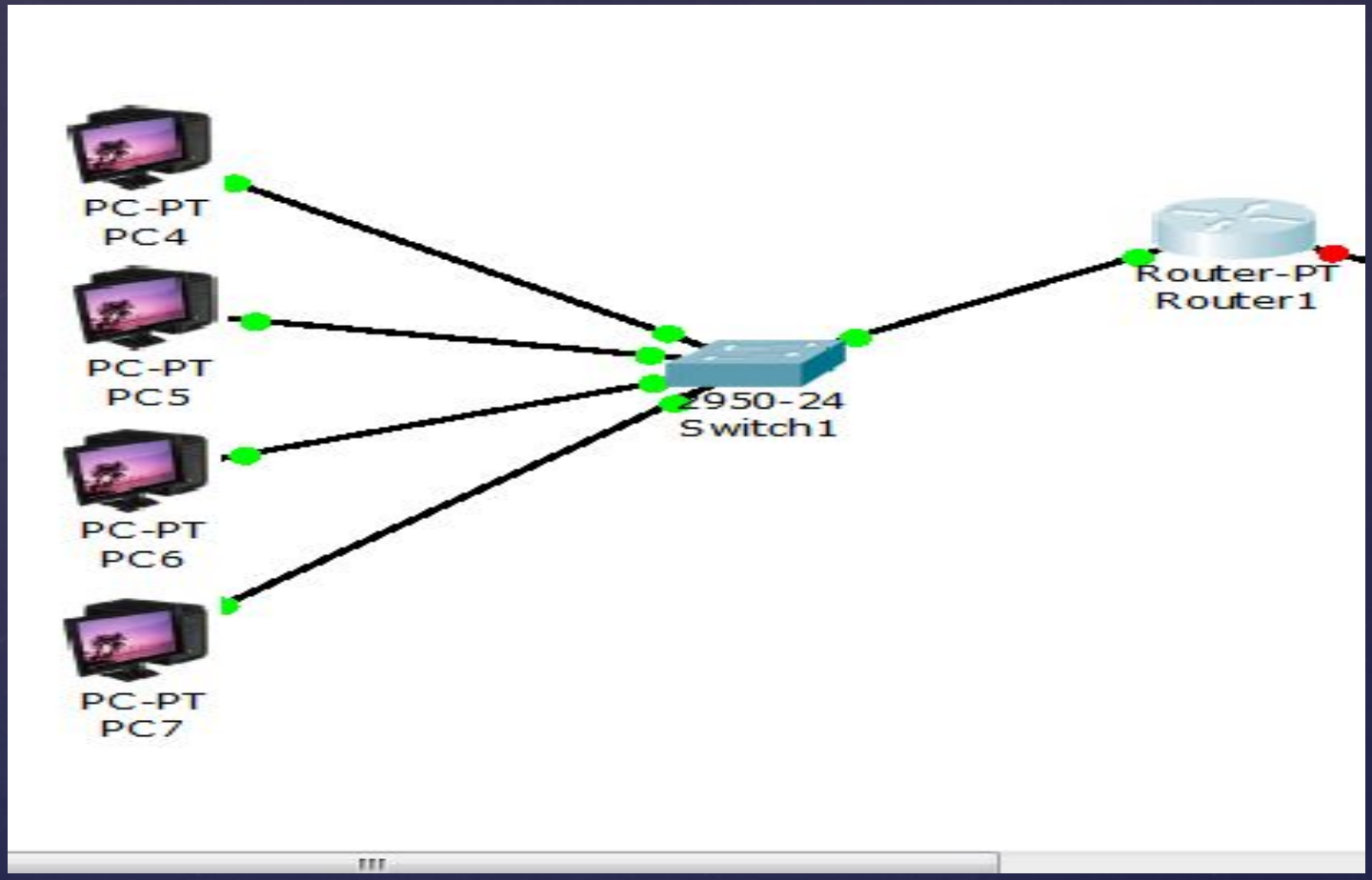
1) double click on router 2) goto config tab 3) click fast ethernet 0/0



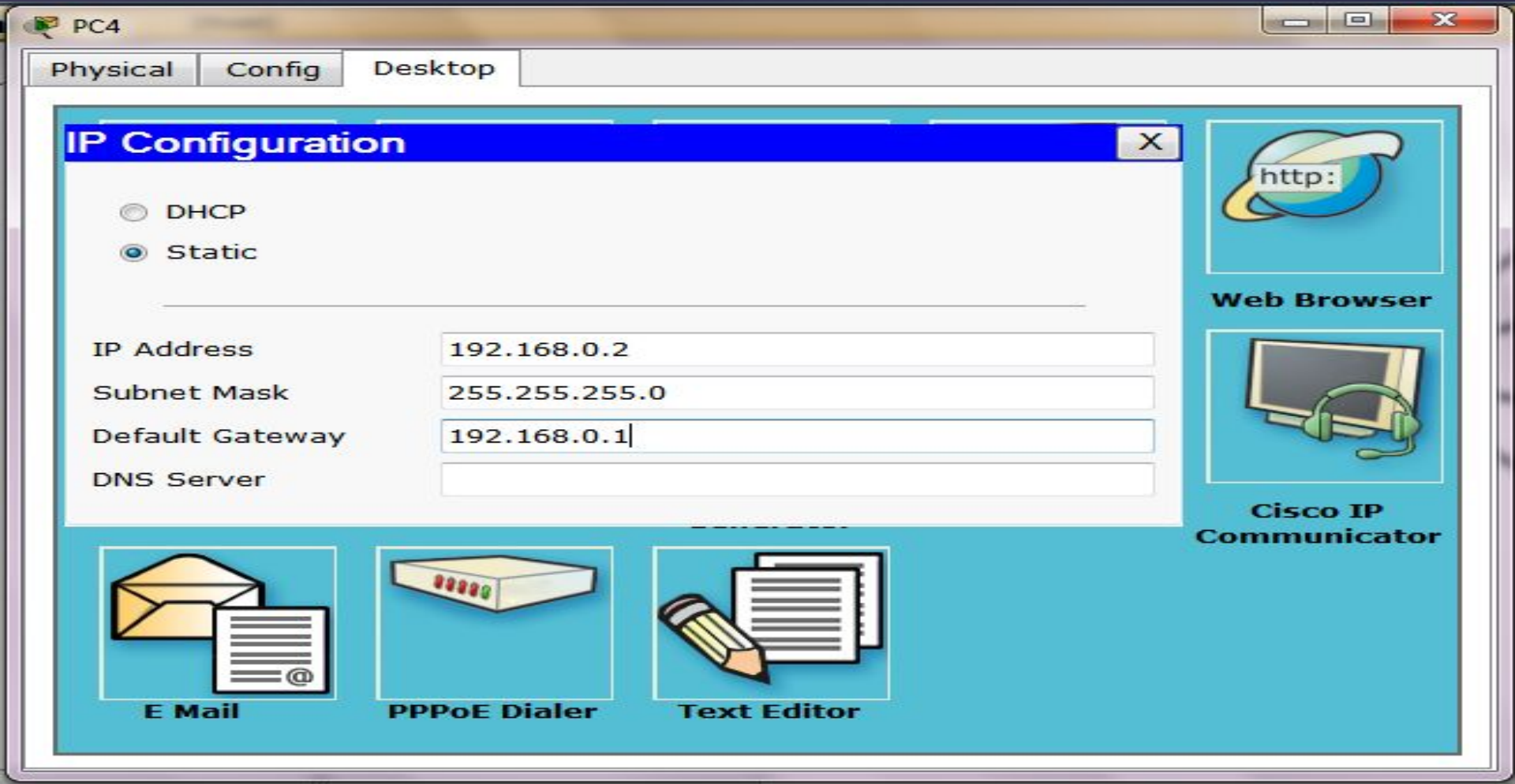
Insert ip of the class as the network 1 have
So i inserts the ip 192.168.0.1
subnet will automatically generate
make sue port status on



Router is configured with network 1

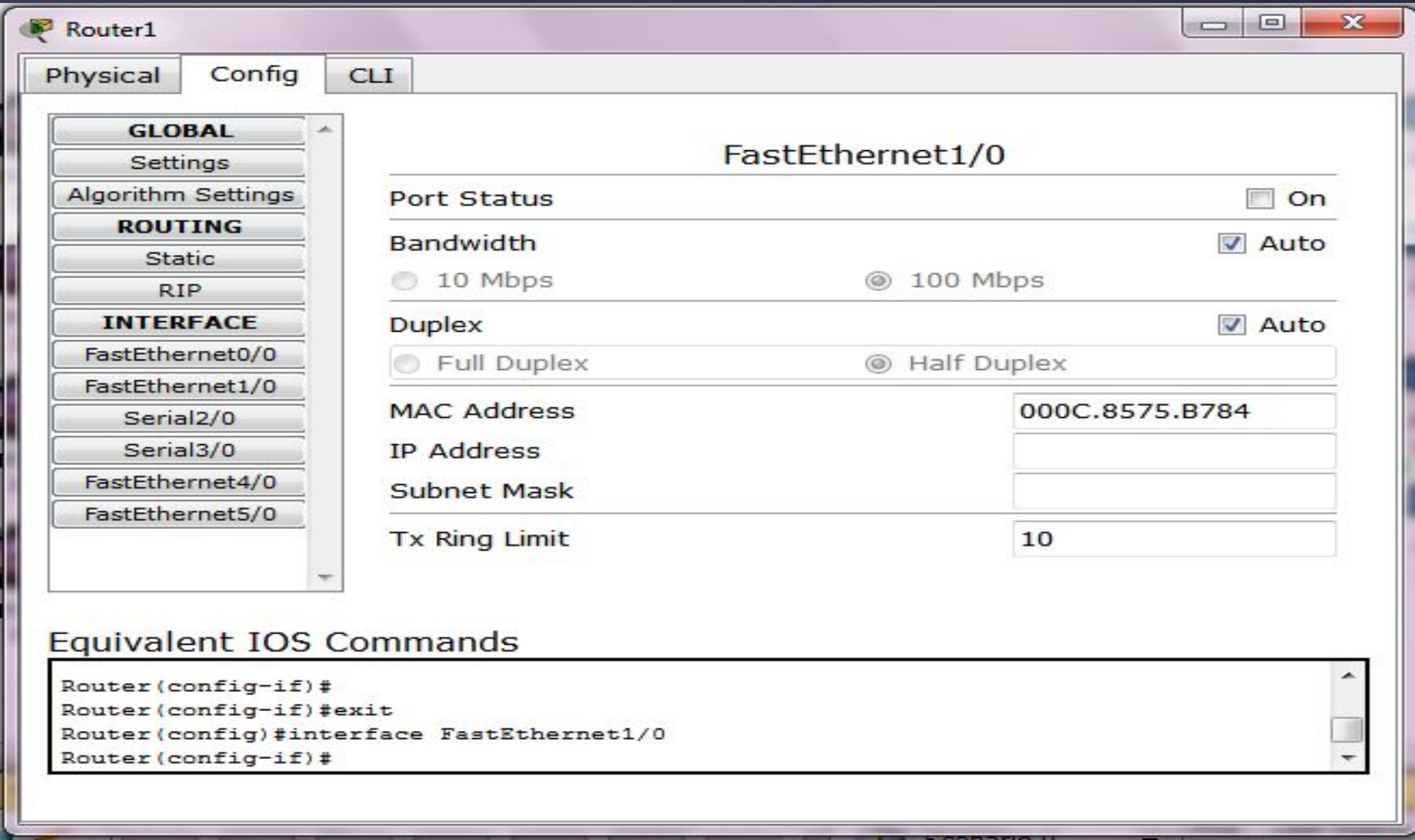


Insert getway of all pc's in network one , the ip of router through which they are connected 192.168.0.1

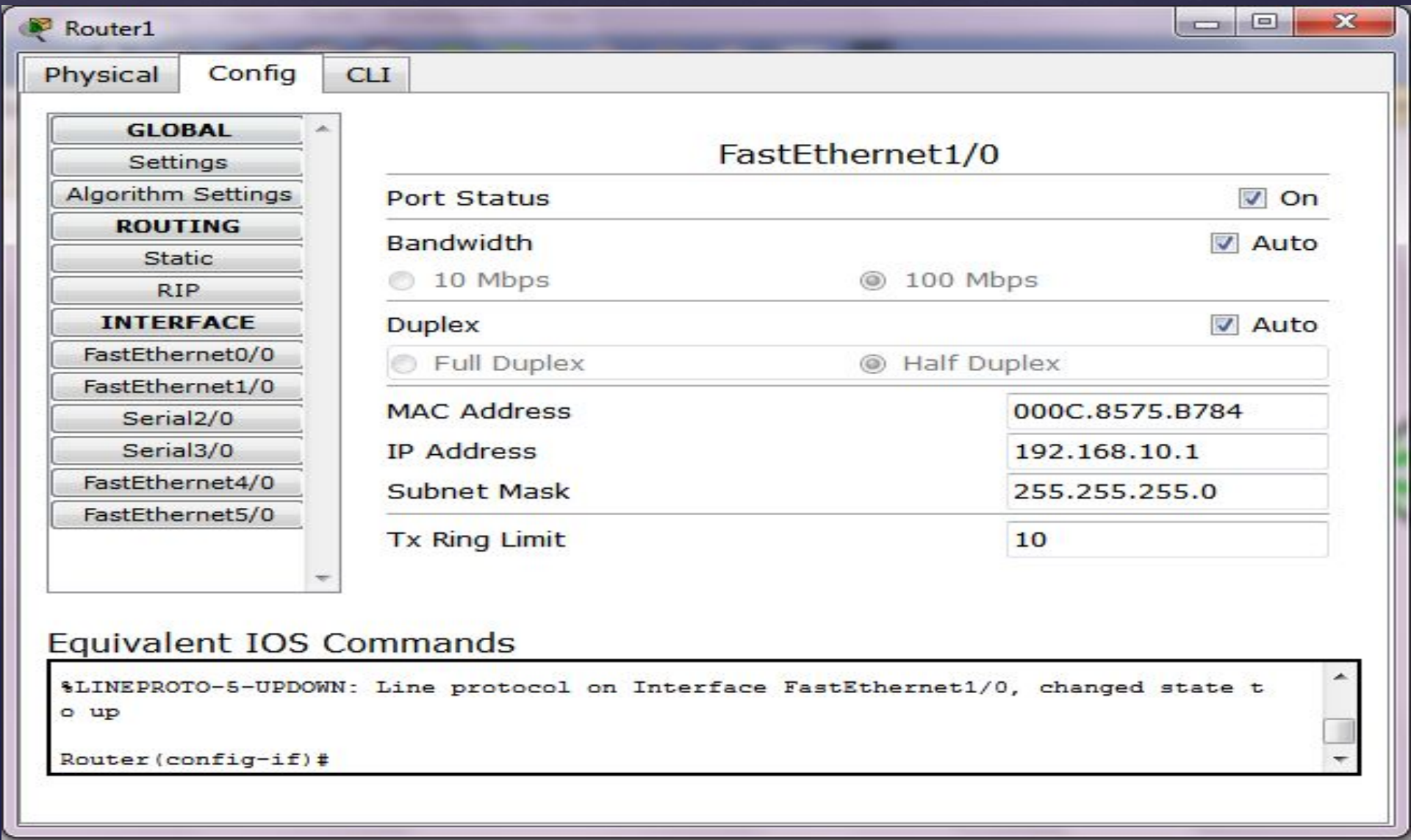


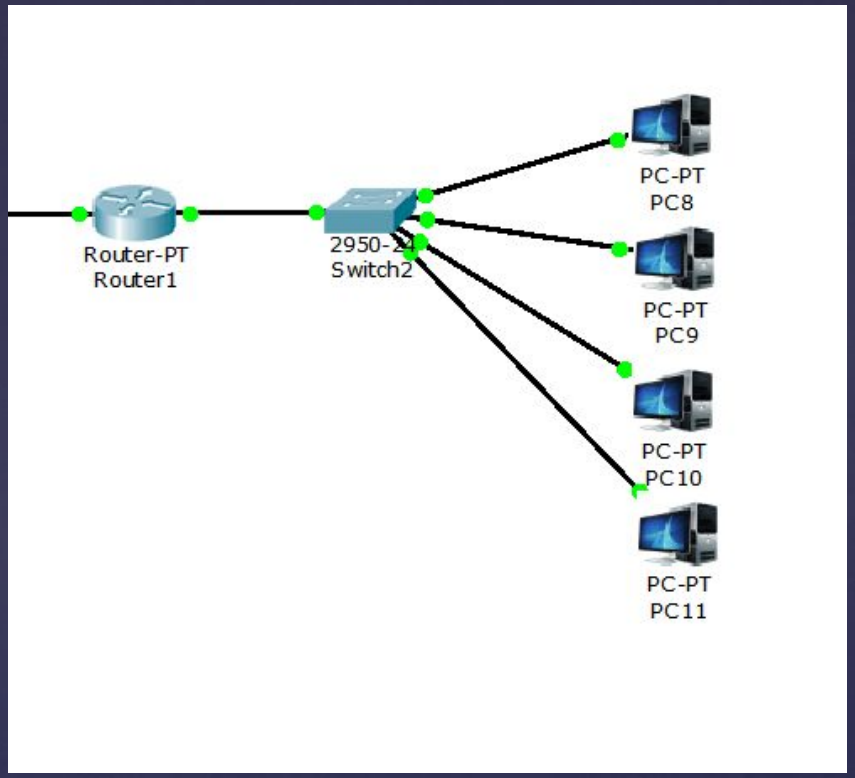
Router connectted with the network 2 from fast ethernet 1/0

1) double click on router 2) goto config tab 3) click fast ethernet 1/0



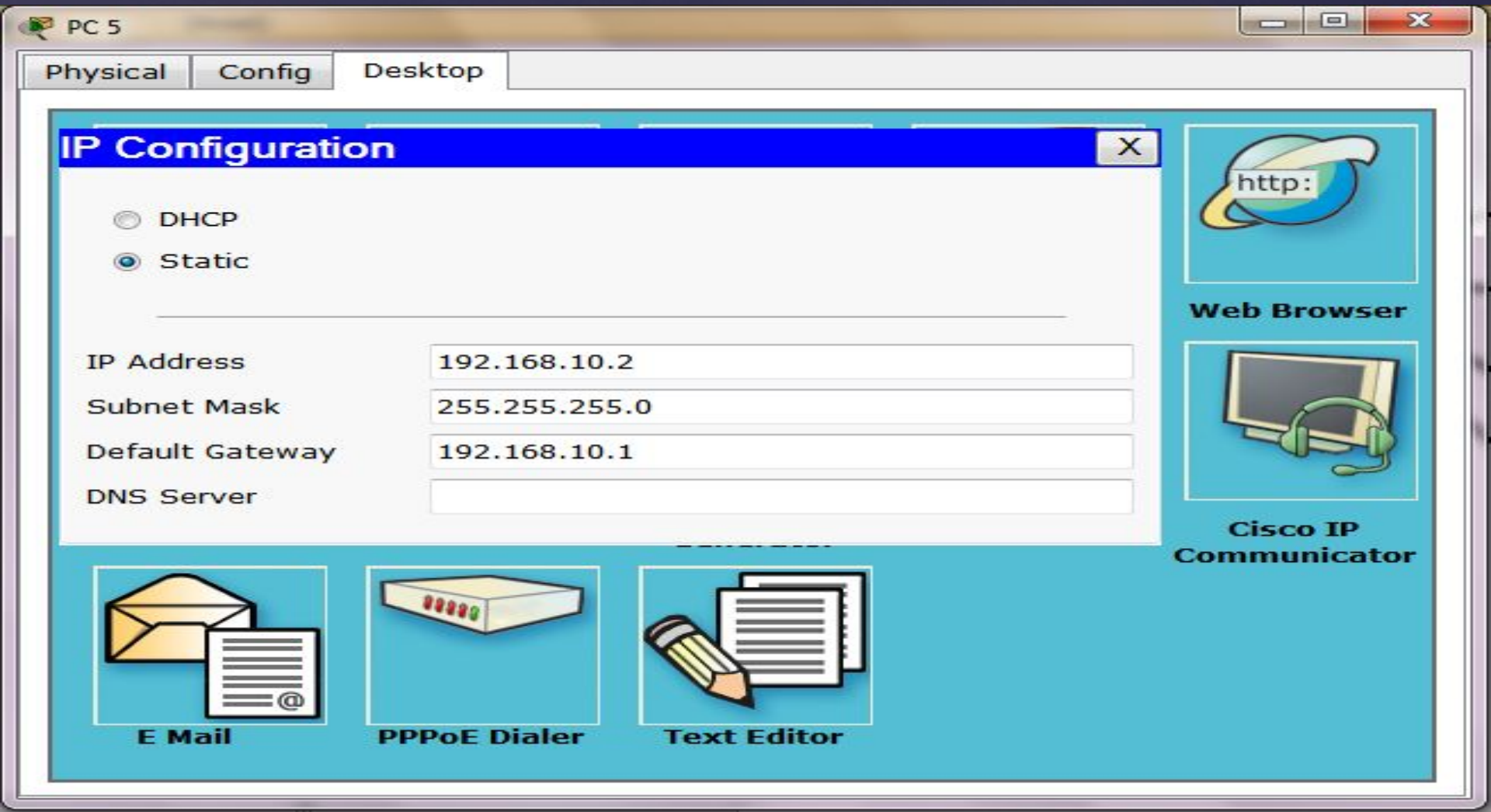
Insert ip of the class as the network 2 have
So i inserts the ip 192.168.10.1
subnet will automatically generate
make sue port status on





Router is configured with network 1

Insert getway of all pc’s in network one , the ip of router through which they are connected
192.168.0.1



- 1st network is
  192.168.0.1
  192.168.0.2
  192.168.0.3
  192.168.0.4
  192.168.0.4

So add the rip address 192.168.0.0
And click add
Add the rip address 192.168.10.0
For the 2nd network

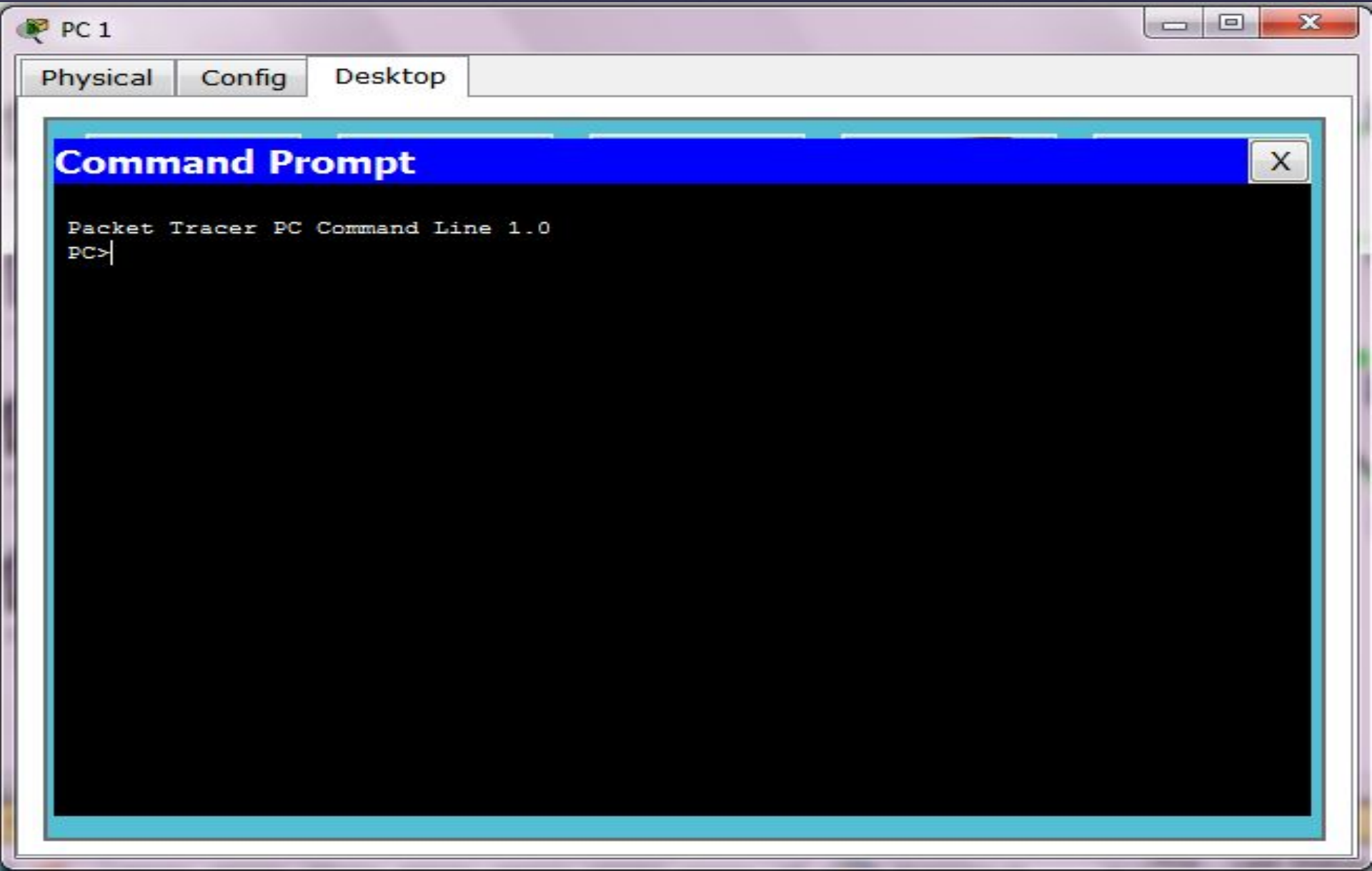
Add Router Information Protocol

Double click on router Click config Tab

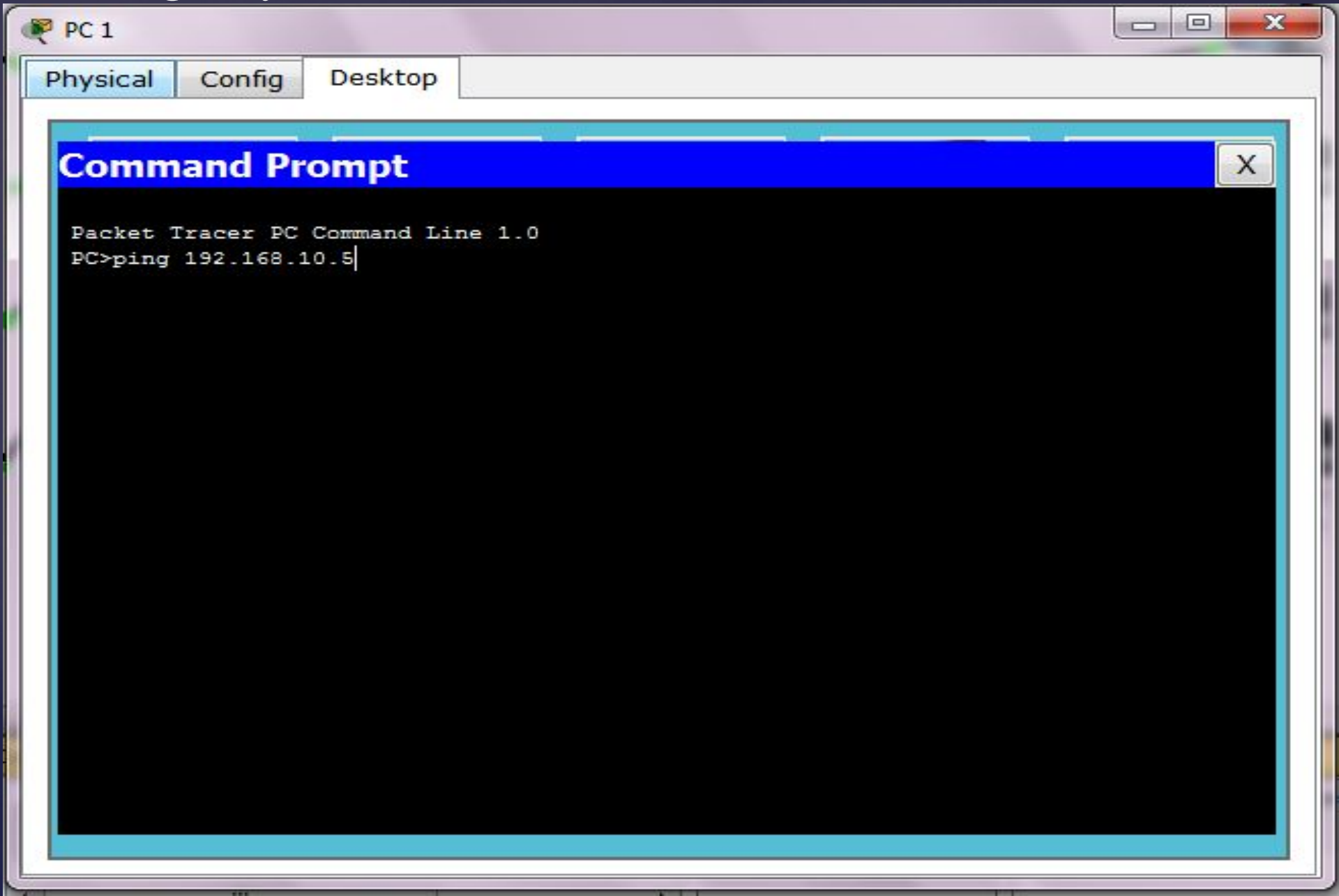
Click rip

Pinging

Goto the command promt of any pc



Ping any IP of the network



Now what you see is

```
PC>ping 192.168.10.5

Pinging 192.168.10.5 with 32 bytes of data:

Reply from 192.168.10.5: bytes=32 time=16ms TTL=127
Reply from 192.168.10.5: bytes=32 time=18ms TTL=127
Reply from 192.168.10.5: bytes=32 time=18ms TTL=127
Reply from 192.168.10.5: bytes=32 time=20ms TTL=127

Ping statistics for 192.168.10.5:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 16ms, Maximum = 20ms, Average = 18ms

PC>
```

Thank You