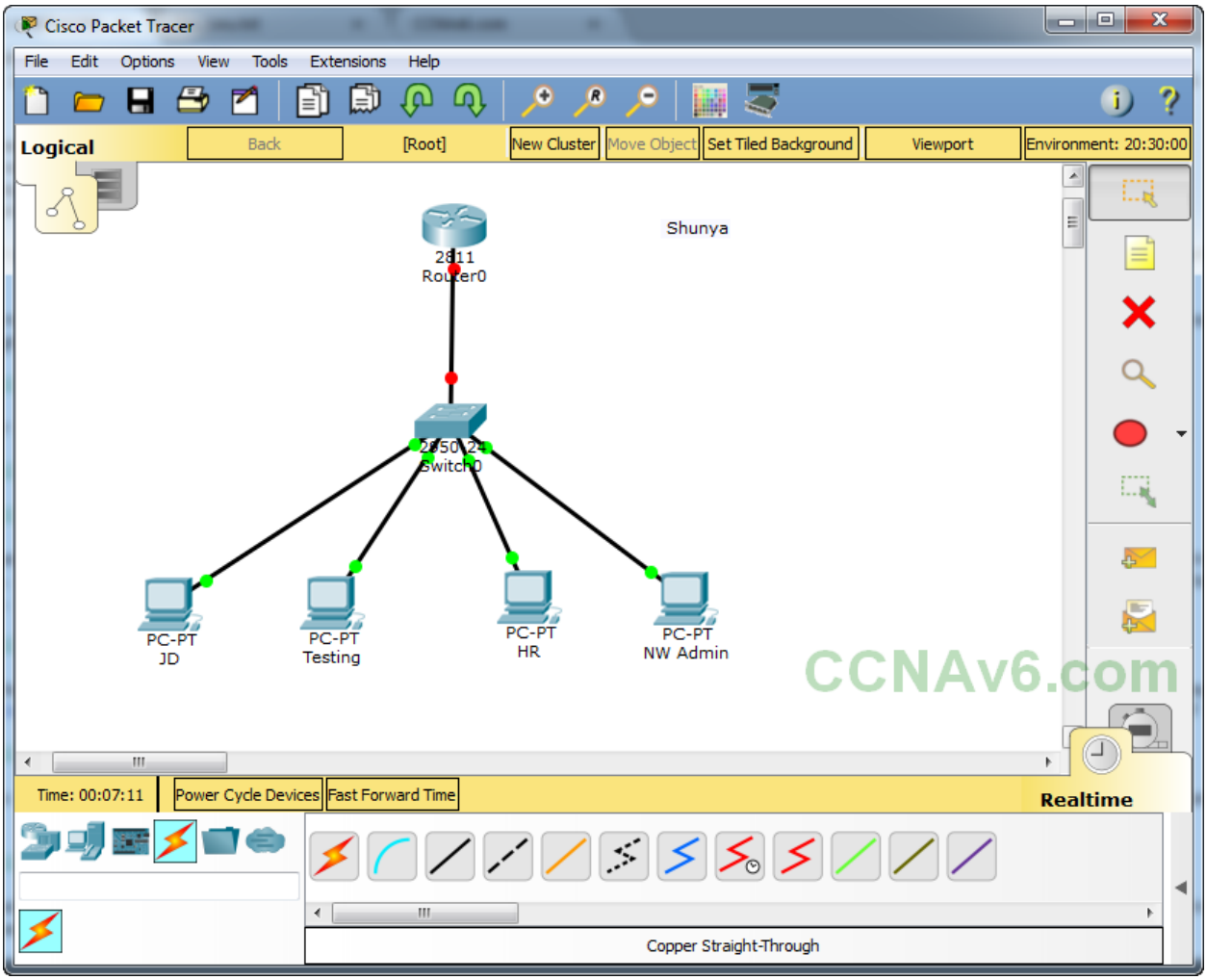
NB: This is a sample exercise. Go through the material and then create a subnetwork for another network environment using packet tracer.

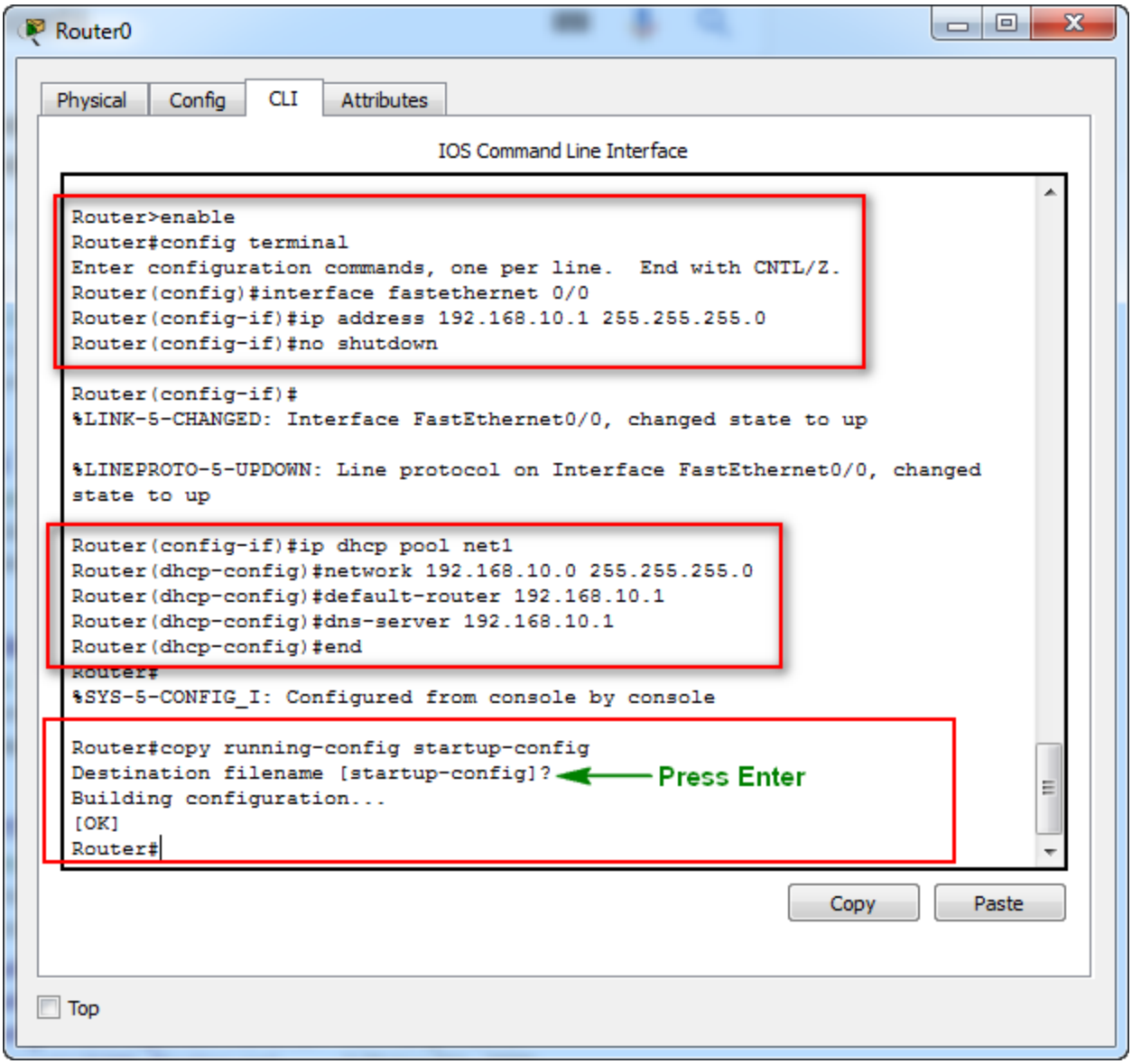
A sub network or subnet is a logical subdivision of an IP network. The practice of dividing a network into two or more networks is called sub netting.

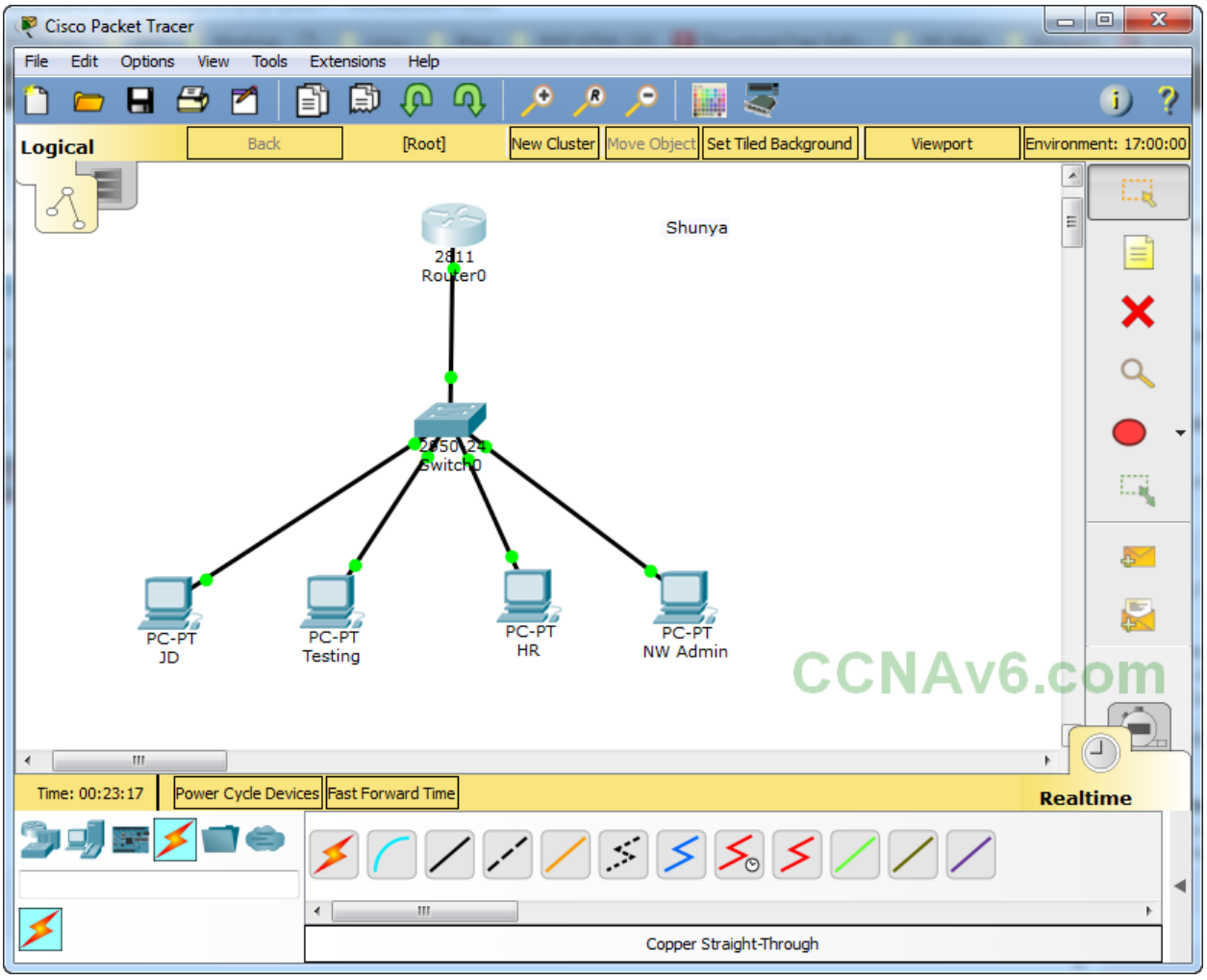
Sub netting offers many advantages. Some of them are.
1. It provides security to the network.
2. Speeds up the network thus improving the performance of the network.
3. It allows for better organization of the resources.

The IP addresses range from 192.168.10.1 to 192.168.10.255.

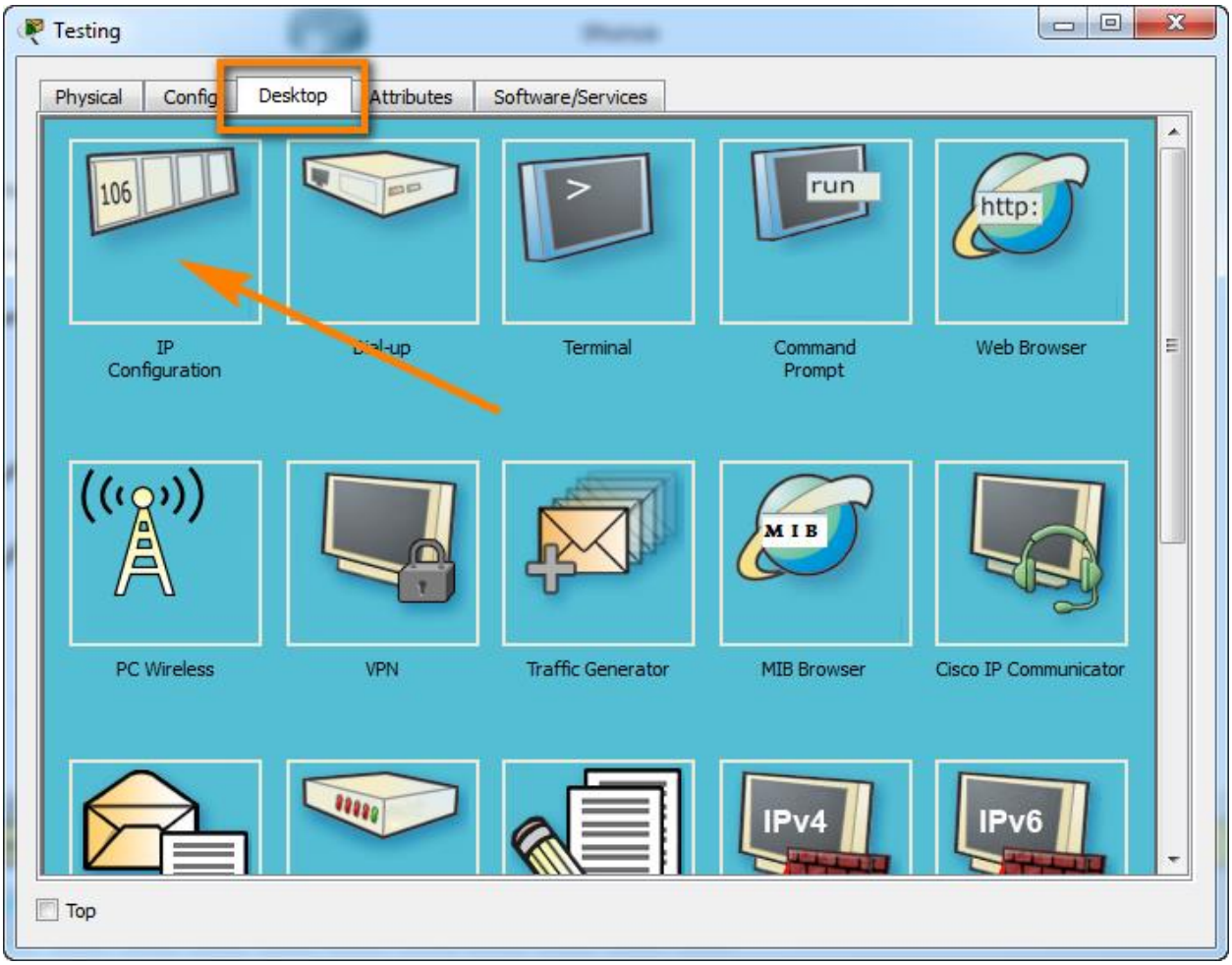


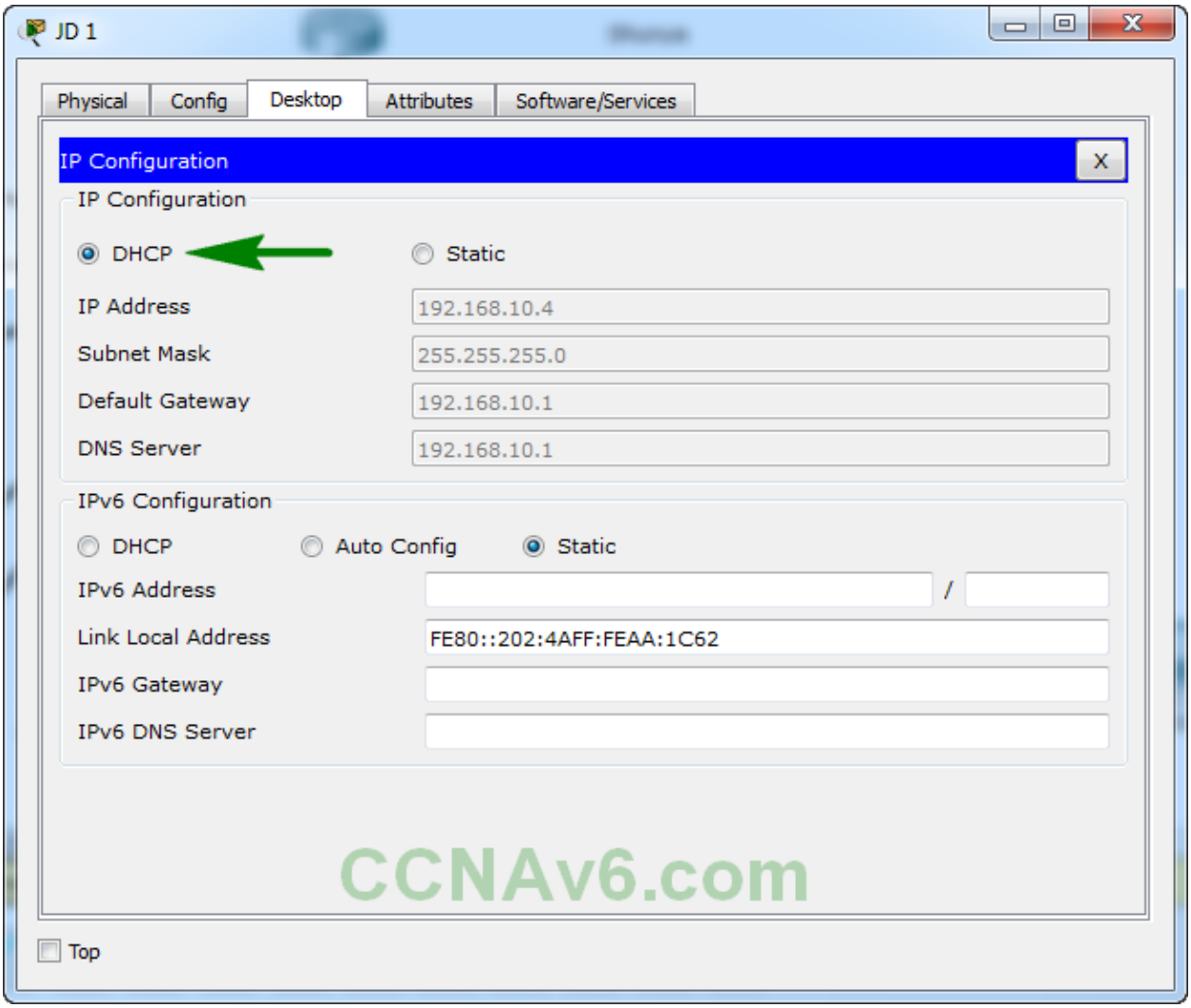
DHCP is enabled on the router.


Router0
Physical
Config
CLI
Attributes
IOS Command Line Interface
Router>enable
Router#config terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface fastethernet 0/0
Router(config-if)#ip address 192.168.10.1 255.255.255.0
Router(config-if)#no shutdown
Router(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up
Router(config-if)#ip dhcp pool net1
Router(dhcp-config)#network 192.168.10.0 255.255.255.0
Router(dhcp-config)#default-router 192.168.10.1
Router(dhcp-config)#dns-server 192.168.10.1
Router(dhcp-config)#end
Router#
%SYS-5-CONFIG_I: Configured from console by console
Router#copy running-config startup-config
Destination filename [startup-config]?
Press Enter
Building configuration...
[OK]
Router#
Copy
Paste
Top

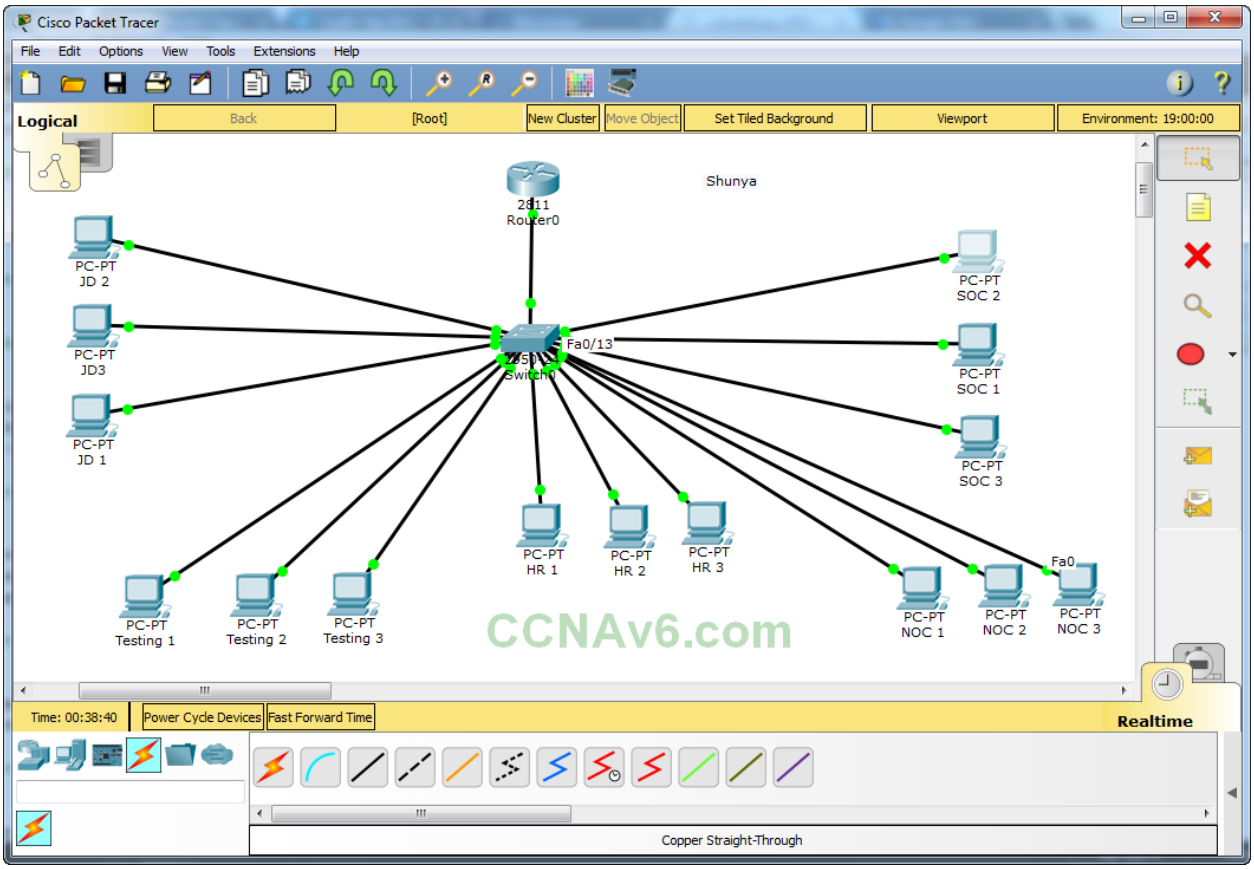

Cisco Packet Tracer
File Edit Options View Tools Extensions Help
Logical
Back
[Root]
New Cluster
Move Object
Set Tiled Background
Viewport
Environment: 17:00:00
Shunya
2811
Router0
2950-24
Switch0
PC-PT
JD
PC-PT
Testing
PC-PT
HR
PC-PT
NW Admin
CCNAv6.com
Time: 00:23:17
Power Cycle Devices
Fast Forward Time
Realtime
Copper Straight-Through

Enable DHCP on all PCs:

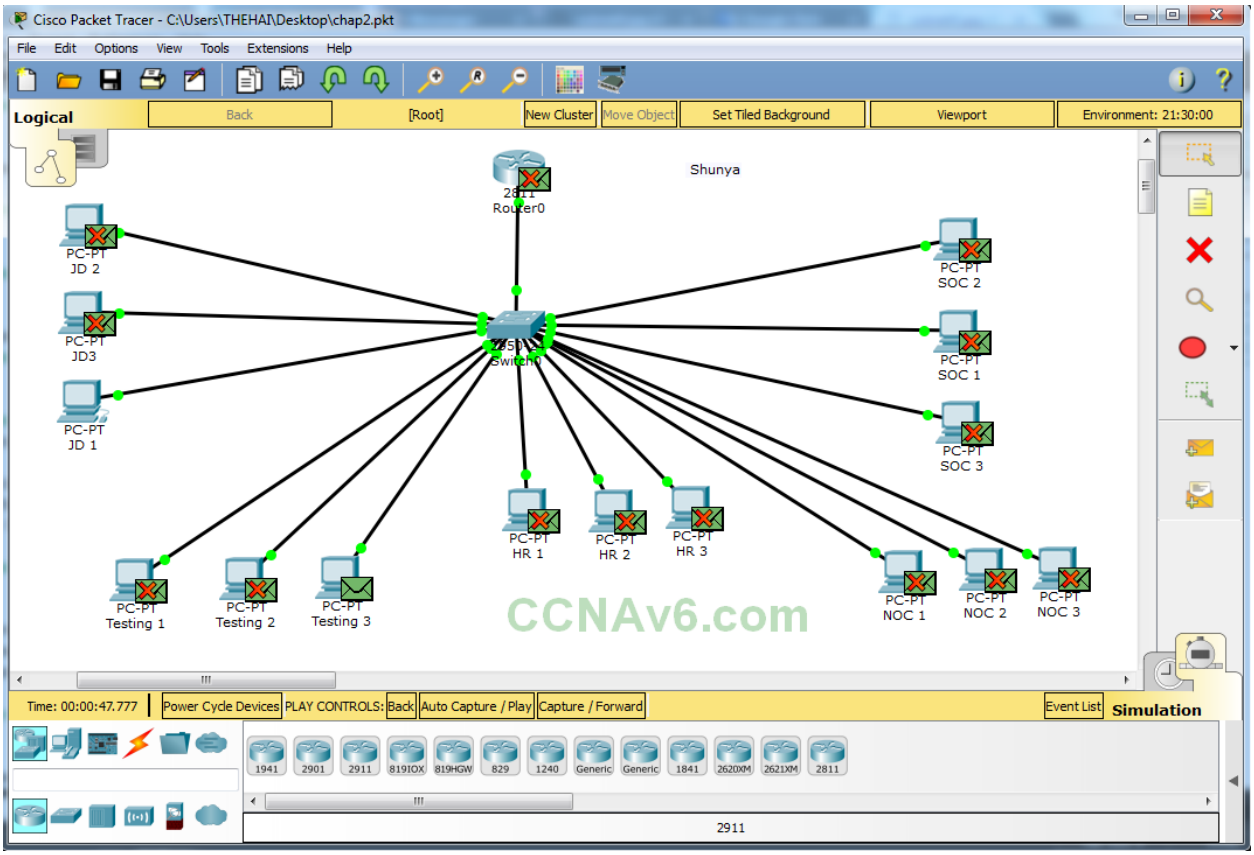




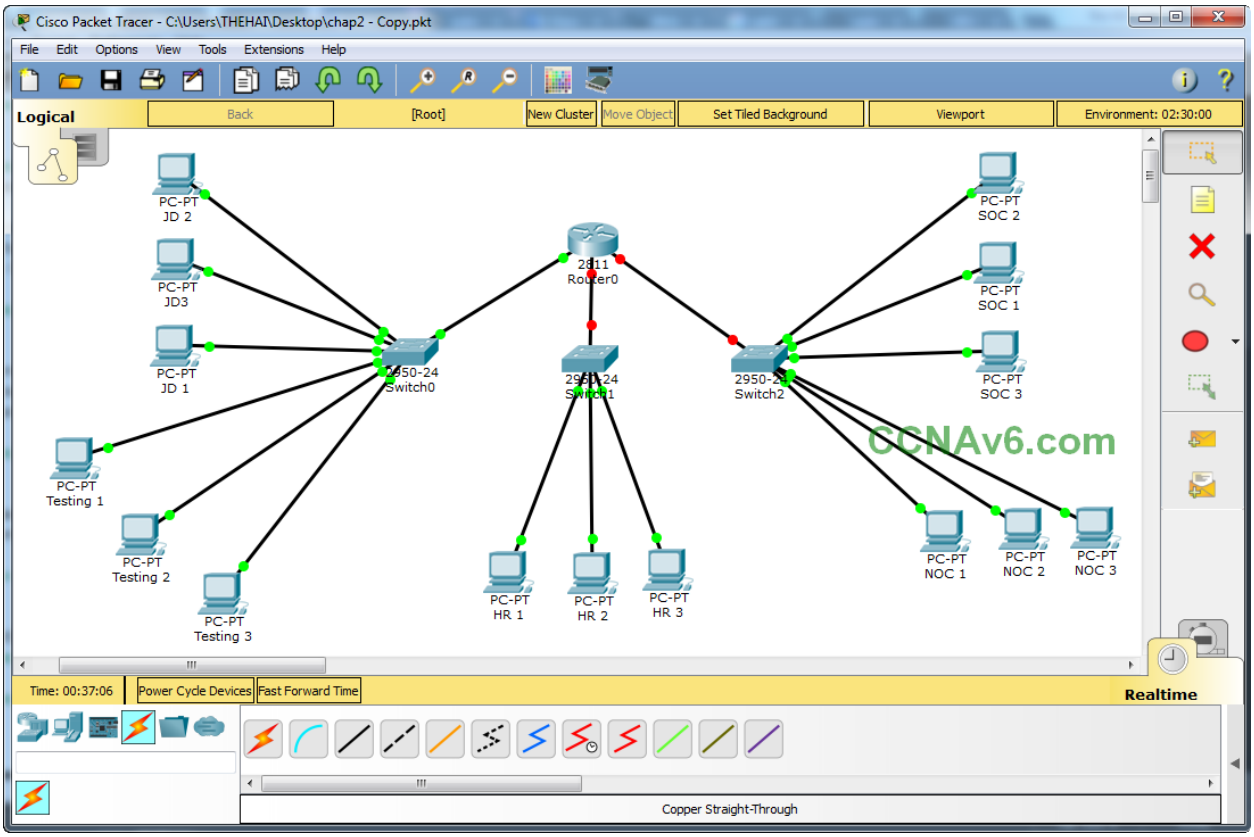
After a while the number of systems are increased to 15 in the network.



Here the machine **“JD1”** sends a packet to machine “Testing3”. The communication between machines **“JD1:** and **“Testing3”** will disturb other machines too and this will affect the performance of the network.



Because of this subnetting is used and here the network is divided into three subnets.



Add more FastEthernet 1/0 port for Router 0

To create a subnet, first we need to have proper planning as to how many subnets we need and how many we may need in the future. Presently, I need three subnets. The number of subnets should always be calculated in the powers of 2.

2 to the power of 1 = 2

This doesn't satisfy our requirement as we need three subnets.

2 to the power of 2 = 4

This satisfies our requirement. So we need to take two bits from the host portion of the IP address. 192.168.10.1 to 192.168.10.255 is the address range available to us with subnet mask 255.255.255.0, Writing the subnet mask in the binary notation, it is

11111111 11111111 11111111 00000000

255 255 255 0

The first 24 bits are network bits and the last eight bits are host bits. To create three subnets, we need to take two bits from the host portion of the address as explained above.

11111111 111111111 11111111 11000000

255 255 255 192

Four subnets which can be created from the above subnet mask are,

192.168.10.0 to 192.168.10.63 (with host bits 00000000)

192.168.10.64 to 192.168.10.127 (with host bits 01000000)

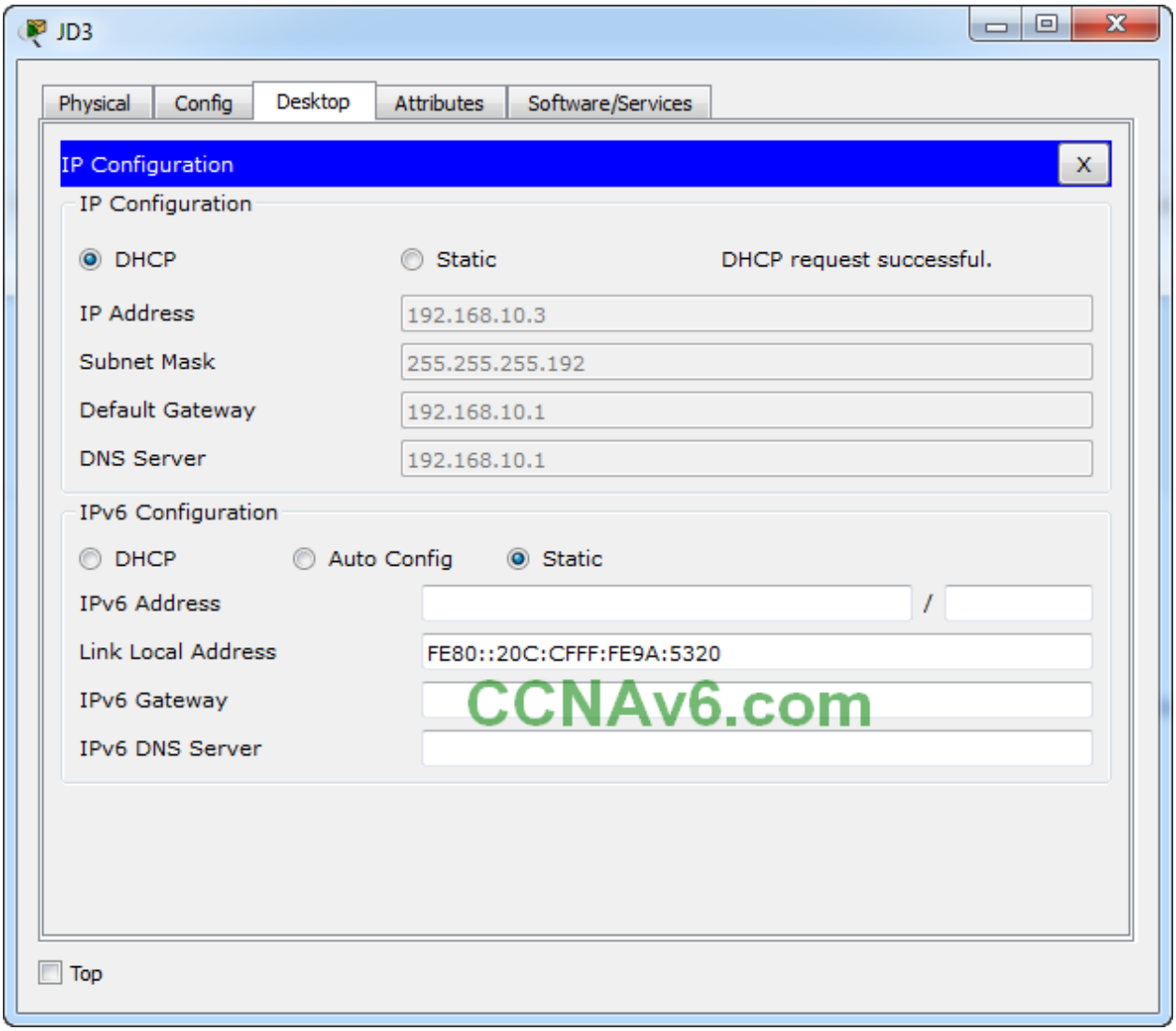
192.168.10.128 to 192.168.10.191 (with host bits 10000000)

192.168.10.192 to 192.168.10.255 (with host bits 11000000)

Since we require only three subnets, we will create the first three subnets. The first subnet (192.168.10.1 to 192.168.10.63) . The commands are as shown below on the interface.

```
Router(config)#int fa 0/0
Router(config-if)#ip add 192.168.10.1 255.255.255.192
Router(config-if)#no shut
Router(config-if)#ip dhcp pool net1
Router(dhcp-config)#network 192.168.10.0 255.255.255.192Router(dhcp-
config)#dns-server 192.168.10.1
Router(dhcp-config)#default-router 192.168.10.1
Router(dhcp-config)#exit
```

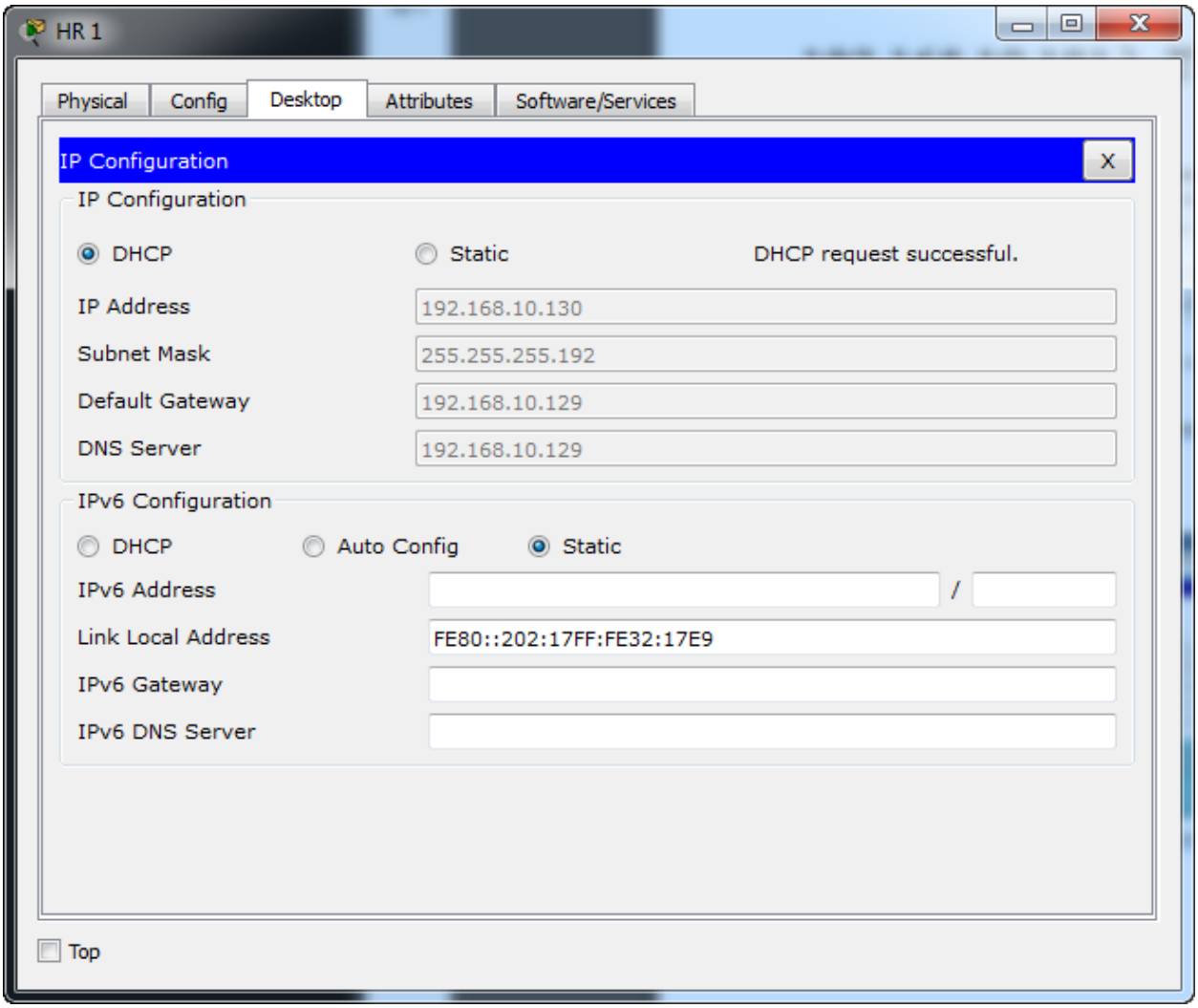
The IP address will be displayed as follows.



Now the second subnet will be(192.168.10.128 to 192.168.10.191) .

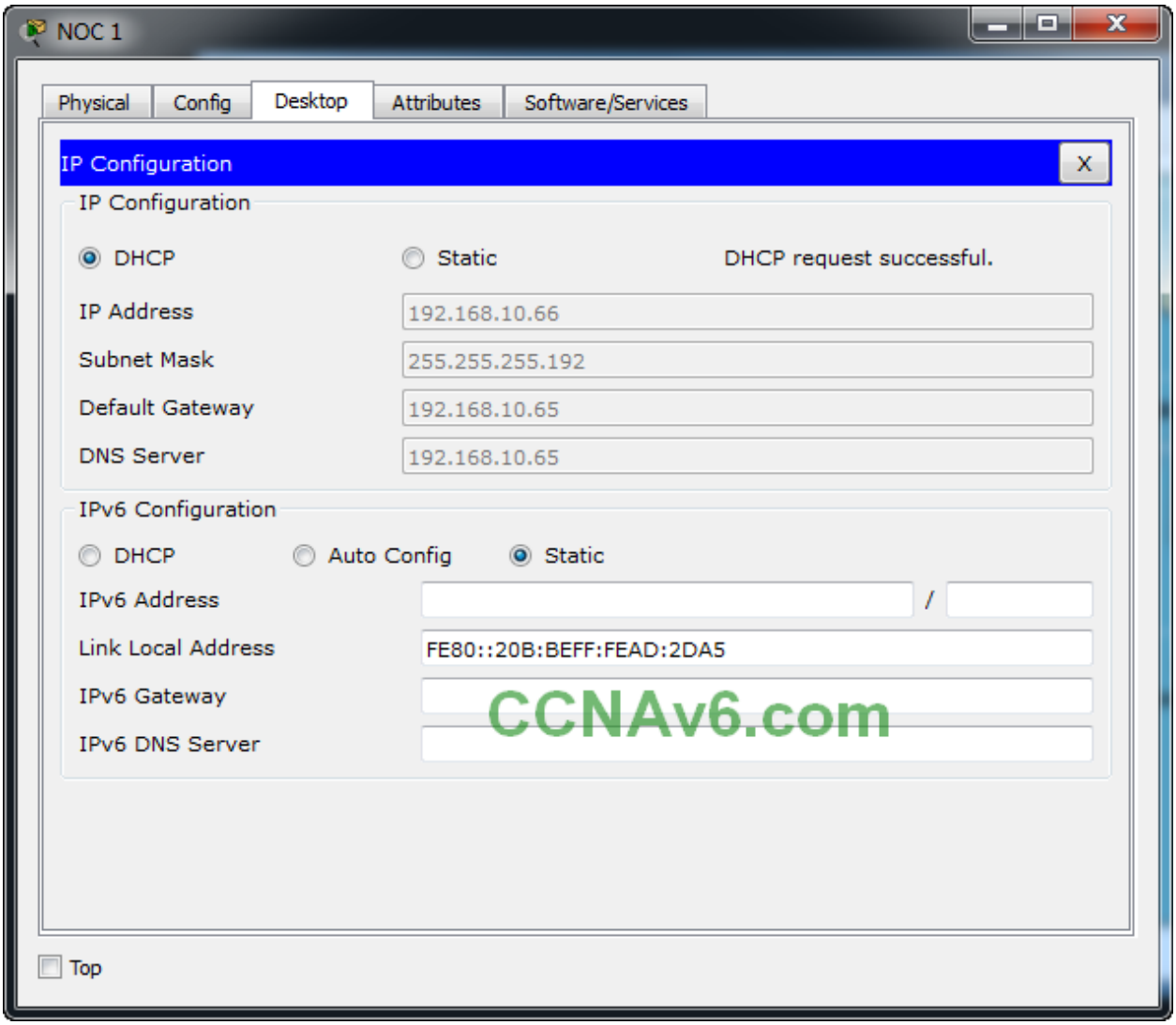
```
Router(config)#int fa 1/0

Router(config-if)#ip add 192.168.10.129
255.255.255.192Router(config-if)#no shut
Router(config-if)#ip dhcp pool net2
Router(dhcp-config)#network 192.168.10.128
255.255.255.192Router(dhcp-config)#dns-server 192.168.10.129
Router(dhcp-config)#default-router 192.168.10.129
Router(dhcp-config)#exit
```

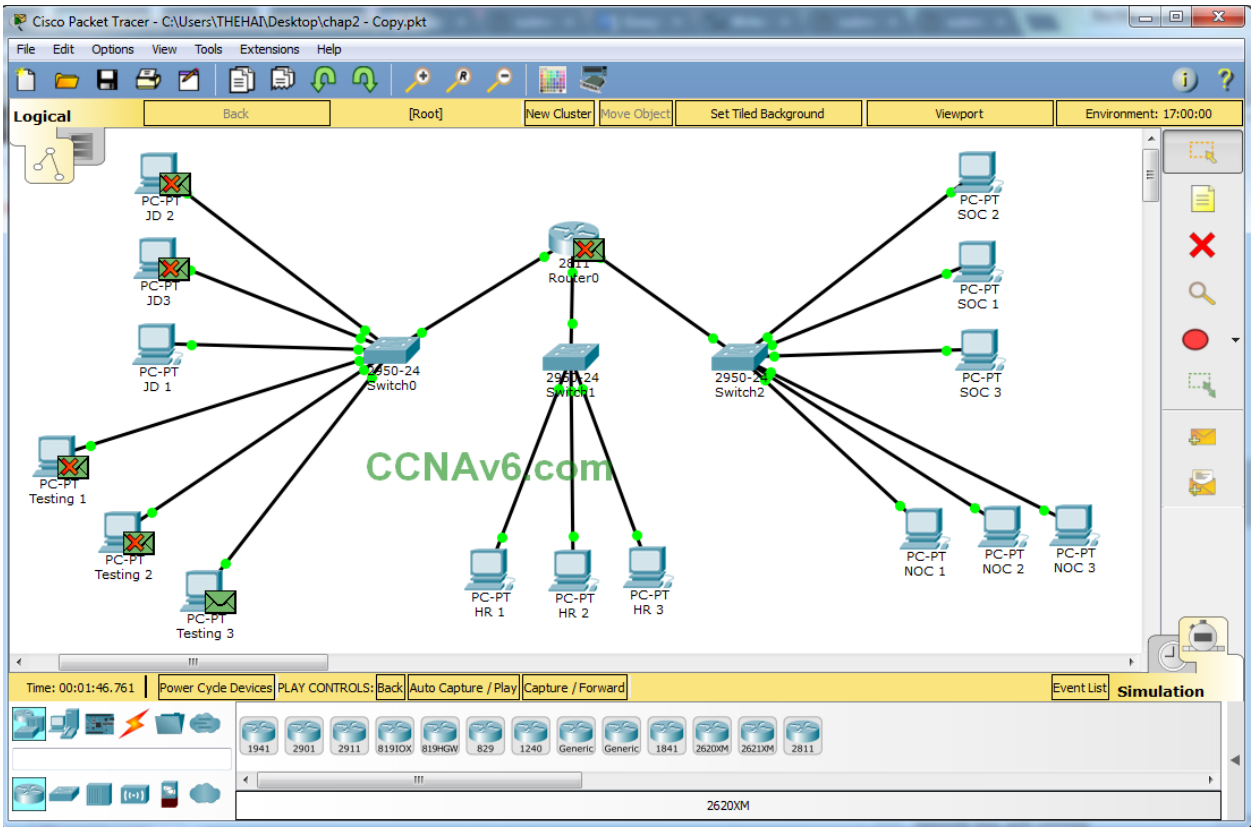


The third subnet will be(192.168.10.64 to 192.168.10.127) .

```
Router(config)#int fa 0/1
Router(config-if)#ip add 192.168.10.65 255.255.255.192Router(config-
if)#no shut
Router(config-if)#ip dhcp pool net3
Router(dhcp-config)#network 192.168.10.64
255.255.255.192Router(dhcp-config)#dns-server 192.168.10.65
Router(dhcp-config)#default-router 192.168.10.65
Router(dhcp-config)#exit
```



Now our network has been successfully subnetted into three subnets and we still have another subnet to use for future use.


Cisco Packet Tracer - C:\Users\THEHAI\Desktop\chap2 - Copy.pkt
File Edit Options View Tools Extensions Help
Logical
Back
[Root]
New Cluster
Move Object
Set Tiled Background
Viewport
Environment: 17:00:00
PC-PT JD 2
PC-PT JD3
PC-PT JD 1
2811 Router0
2950-24 Switch0
2950-24 Switch1
2950-24 Switch2
PC-PT SOC 2
PC-PT SOC 1
PC-PT SOC 3
PC-PT Testing 1
PC-PT Testing 2
PC-PT Testing 3
PC-PT HR 1
PC-PT HR 2
PC-PT HR 3
PC-PT NOC 1
PC-PT NOC 2
PC-PT NOC 3
CCNAv6.com
Time: 00:01:46.761
Power Cycle Devices
PLAY CONTROLS:
Back
Auto Capture / Play
Capture / Forward
Event List
Simulation
1941
2901
2911
819IOX
819HGW
829
1240
Generic
Generic
1841
2620XM
2621XM
2811
2620XM