**SYCS CN**

**PRACTICAL 7**

**AIM :**

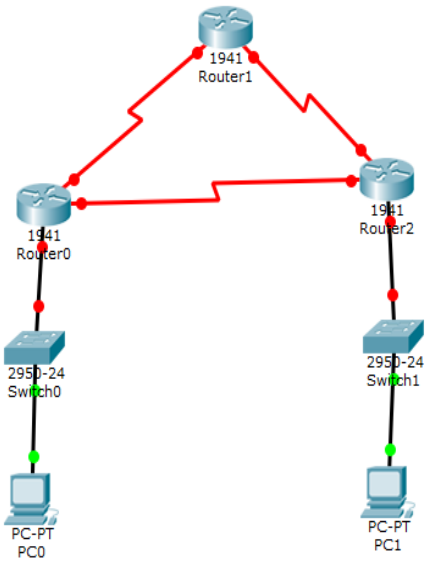
**Using Packet Tracer, create a network with three routers with OSPF and each router associated network will have a minimum of three PCs. Show Connectivity.**

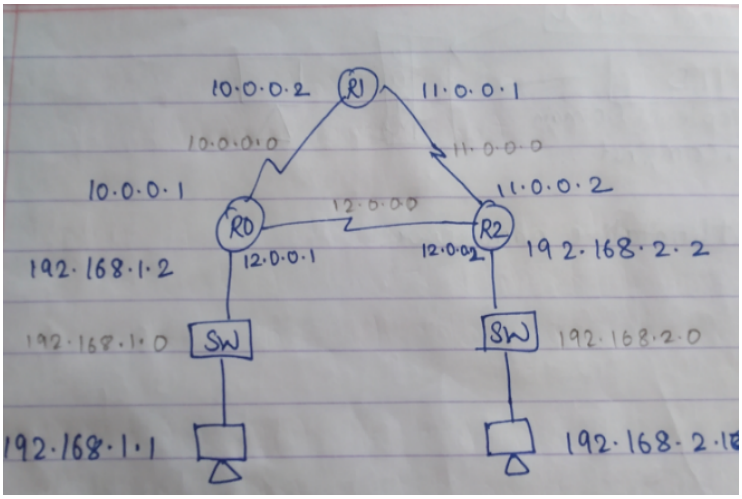
Open Shortest Path First (OSPF) is a routing protocol developed by Internet Engineering Task Force (IETF).

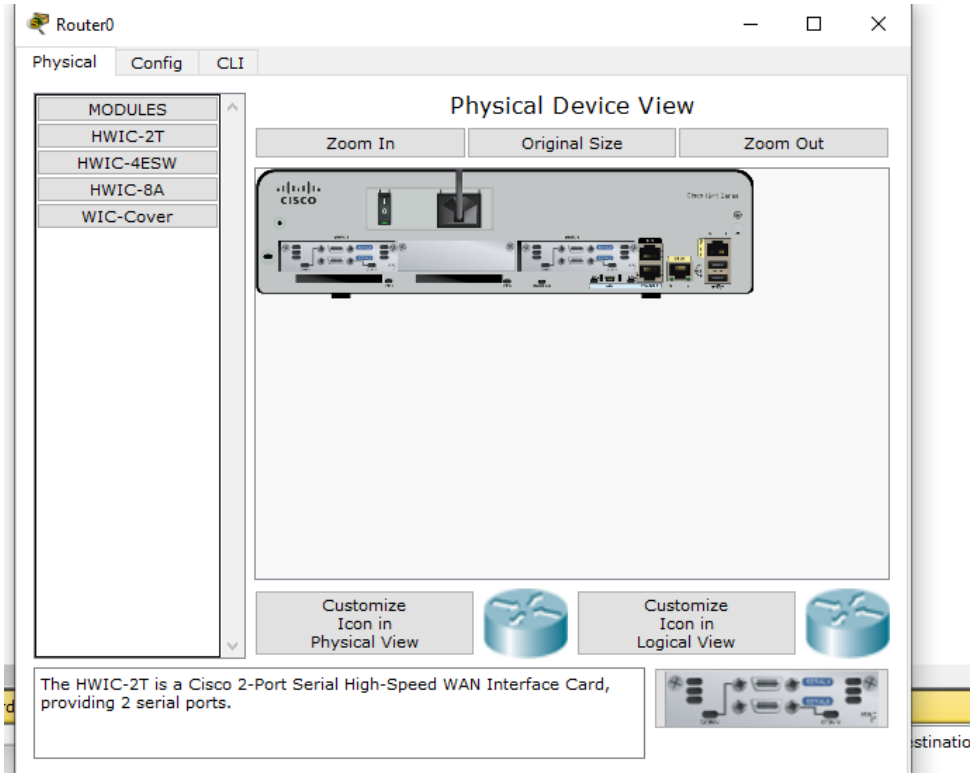
- OSPF is standards-based which means it is available on routers.
- OSPF divides its routing domain into smaller sub-divisions called areas. These OSPF areas are numbered and each may have several OSPF routers in it.
- OSPF area 0 is at the center of an OSPF domain and all other areas are connected to it. It is basically a star topology of OSPF areas, area 0 being at the center of the star.
- The advantage of OSPF areas is that most of the routing information is contained within an area and only summarized routing information is sent to routers in other areas.
- This makes OSPF very efficient in terms of usage of resources like processing power, memory, and bandwidth. The conservative resource usage in turn enables OSPF to scale well to very large topologies.
- The strength of the OSPF is that it is a hierarchical protocol using network areas. Routing information distribution becomes more structured and also simpler to troubleshoot.
- The first step done by the OSPF is to establish communications with the neighboring routers. The aim is to obtain all possible network devices and link information by the neighboring routers so as to build a complete picture of the whole network topology.
- Similarly, the neighboring routers will also receive information from other routers acting as neighbors. So that eventually all existing

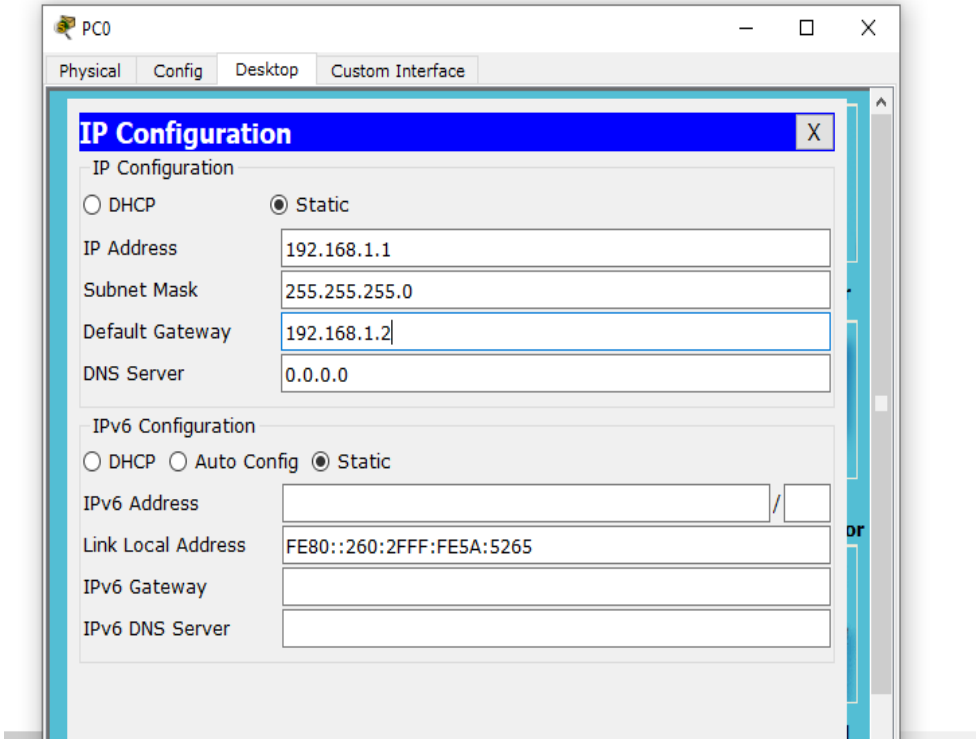
information in a network can be learned by all existing routers in the network (a topology table is built).

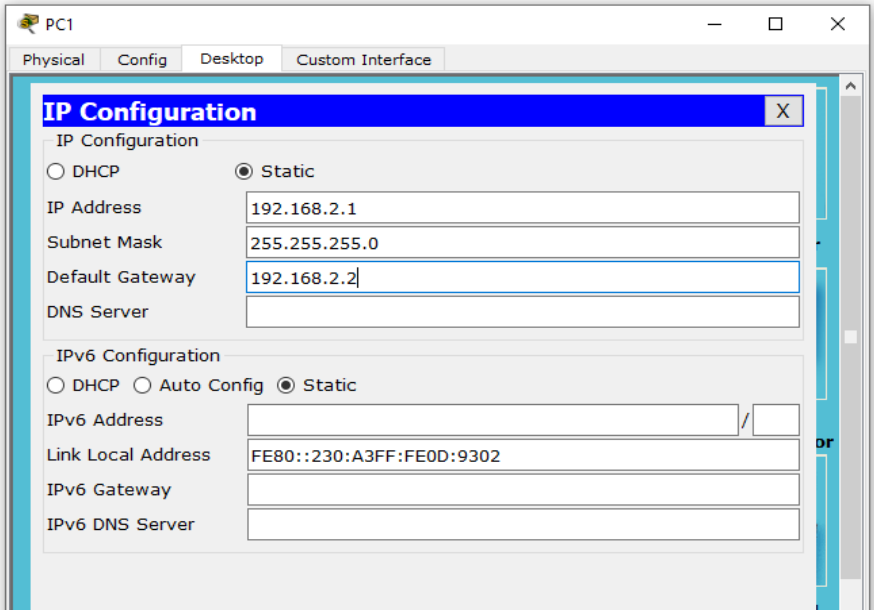
- The event of routers establishing full communication with their neighbors (adjacency) is often referred to as Convergence.
- After all routers establish communication with their neighbors (neighbor adjacency – Convergence), then the routing information exchange process takes place with the help of some special packets that are in charge of carrying routing information.
- These packets are often referred to as Link State Advertisements (LSA packets). Apart from the hello packets, the OSPF routing protocol is also dependent on the LSA packets to work properly.
- The algorithm used by OSPF to determine the shortest path to a specific destination is called Shortest Path First (SPF) and is very effective. Although stretching many paths to a specific destination, OSPF can determine which path is best with great precision.

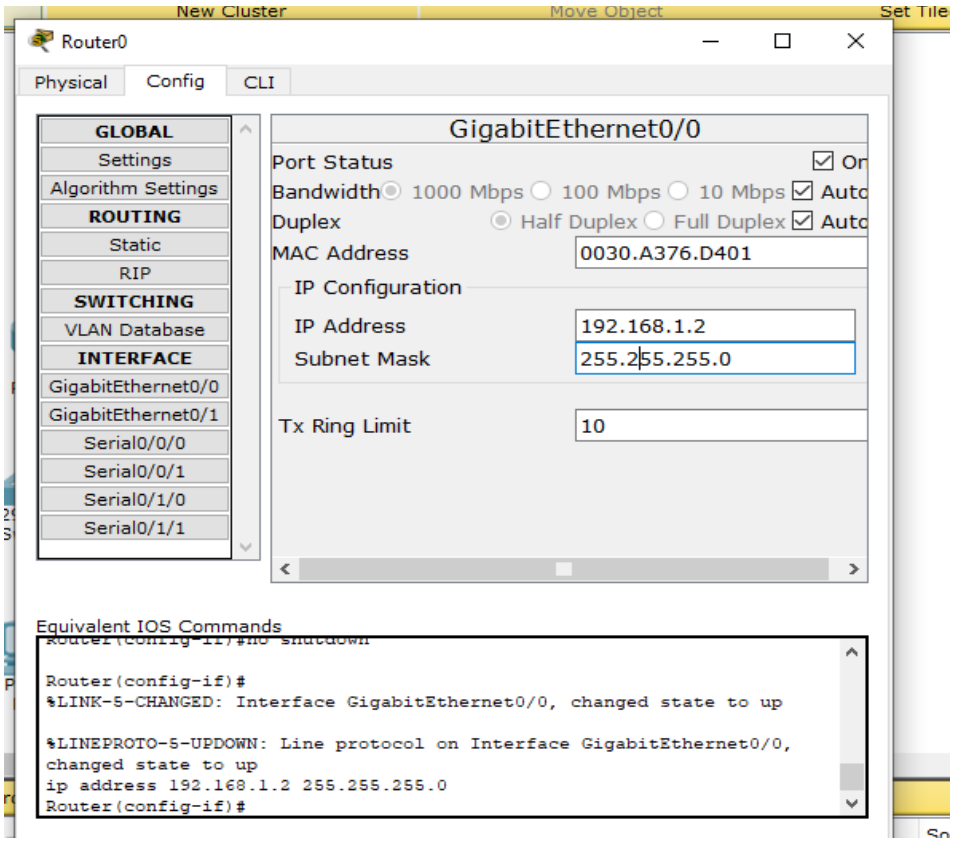


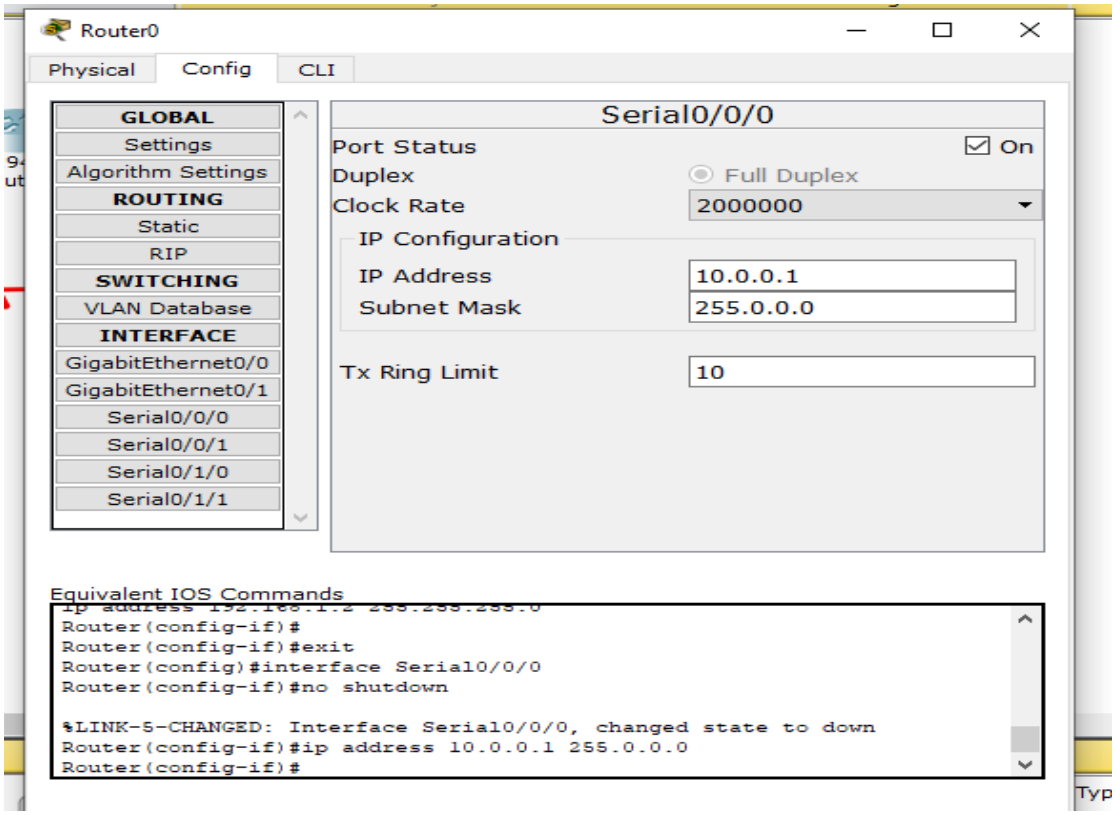



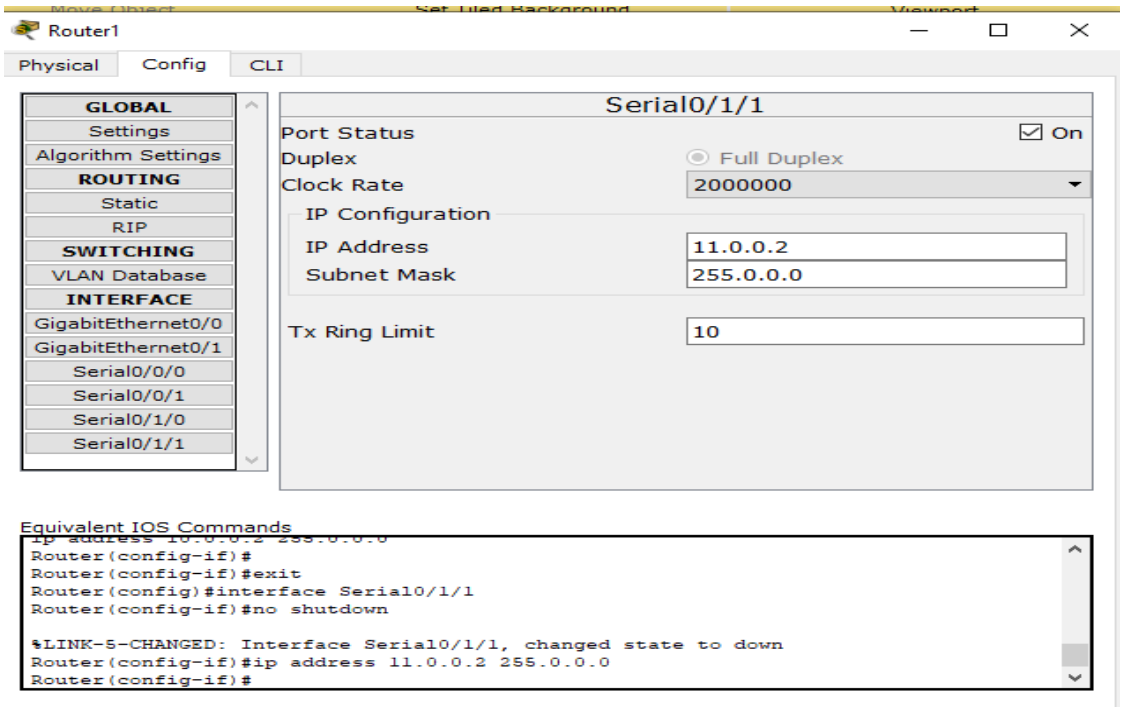

Router0
Physical
Config
CLI
MODULES
HWIC-2T
HWIC-4ESW
HWIC-8A
WIC-Cover
Physical Device View
Zoom In
Original Size
Zoom Out
Customize Icon in Physical View
Customize Icon in Logical View
The HWIC-2T is a Cisco 2-Port Serial High-Speed WAN Interface Card, providing 2 serial ports.

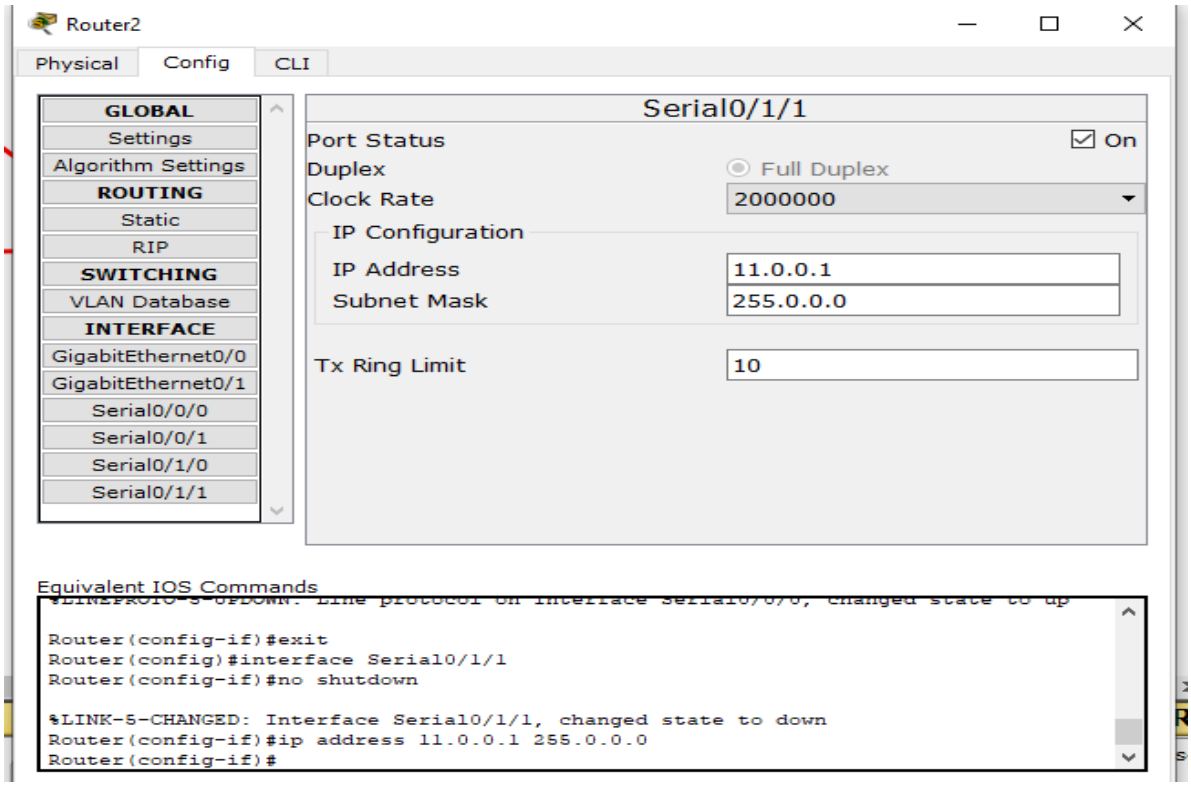

PC0
Physical
Config
Desktop
Custom Interface
IP Configuration
X
IP Configuration
DHCP
Static
IP Address
192.168.1.1
Subnet Mask
255.255.255.0
Default Gateway
192.168.1.2
DNS Server
0.0.0.0
IPv6 Configuration
DHCP
Auto Config
Static
IPv6 Address
Link Local Address
FE80::260:2FFF:FE5A:5265
IPv6 Gateway
IPv6 DNS Server

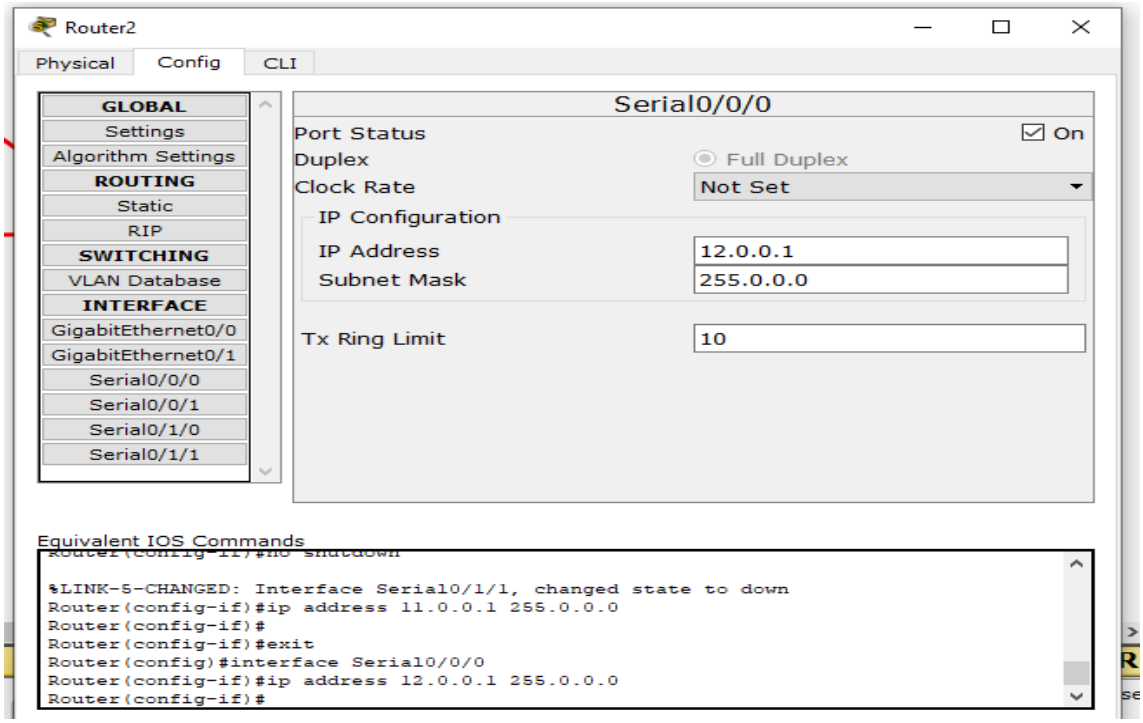

PC1
Physical
Config
Desktop
Custom Interface
IP Configuration
X
IP Configuration
DHCP
Static
IP Address
192.168.2.1
Subnet Mask
255.255.255.0
Default Gateway
192.168.2.2
DNS Server
IPv6 Configuration
DHCP
Auto Config
Static
IPv6 Address
Link Local Address
FE80::230:A3FF:FE0D:9302
IPv6 Gateway
IPv6 DNS Server

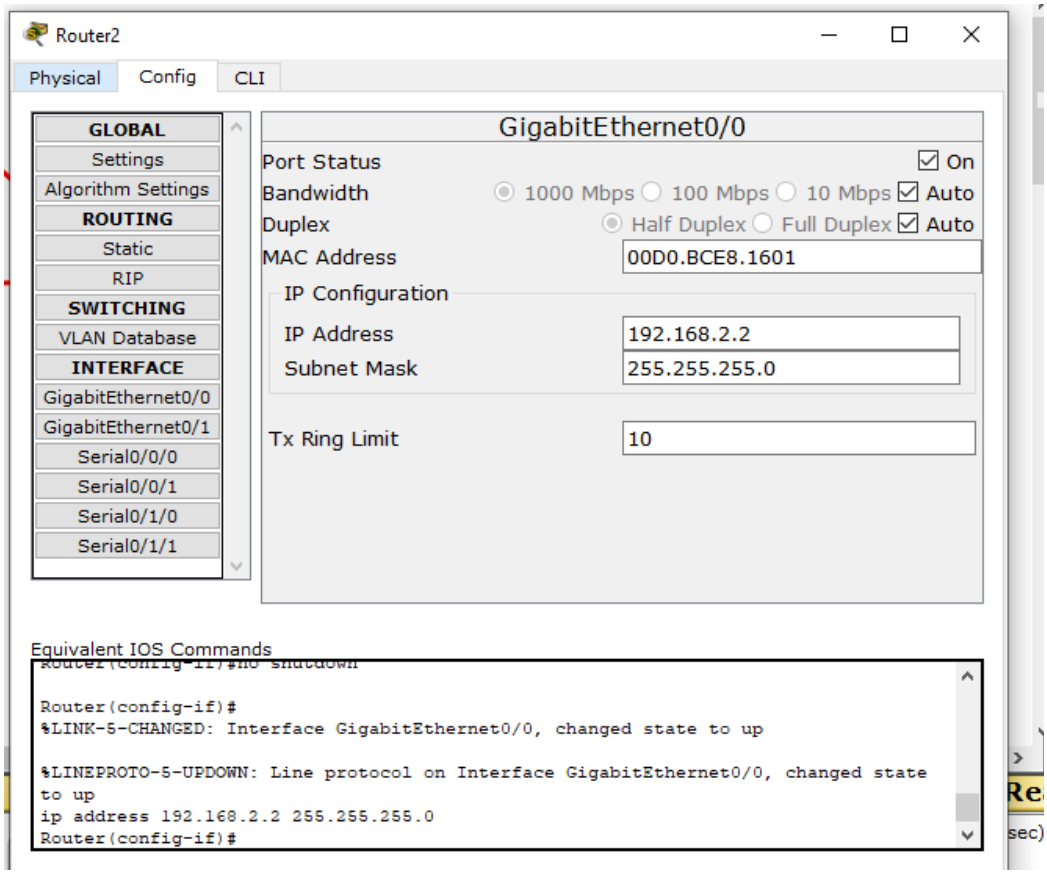

New Cluster
Move Object
Set Tile
Router0
Physical
Config
CLI
GLOBAL
Settings
Algorithm Settings
ROUTING
Static
RIP
SWITCHING
VLAN Database
INTERFACE
GigabitEthernet0/0
GigabitEthernet0/1
Serial0/0/0
Serial0/0/1
Serial0/1/0
Serial0/1/1
GigabitEthernet0/0
Port Status
Bandwidth
1000 Mbps
100 Mbps
10 Mbps
Duplex
Half Duplex
Full Duplex
MAC Address
0030.A376.D401
IP Configuration
IP Address
192.168.1.2
Subnet Mask
255.255.255.0
Tx Ring Limit
10
Equivalent IOS Commands
Router(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0,
changed state to up
ip address 192.168.1.2 255.255.255.0
Router(config-if)#

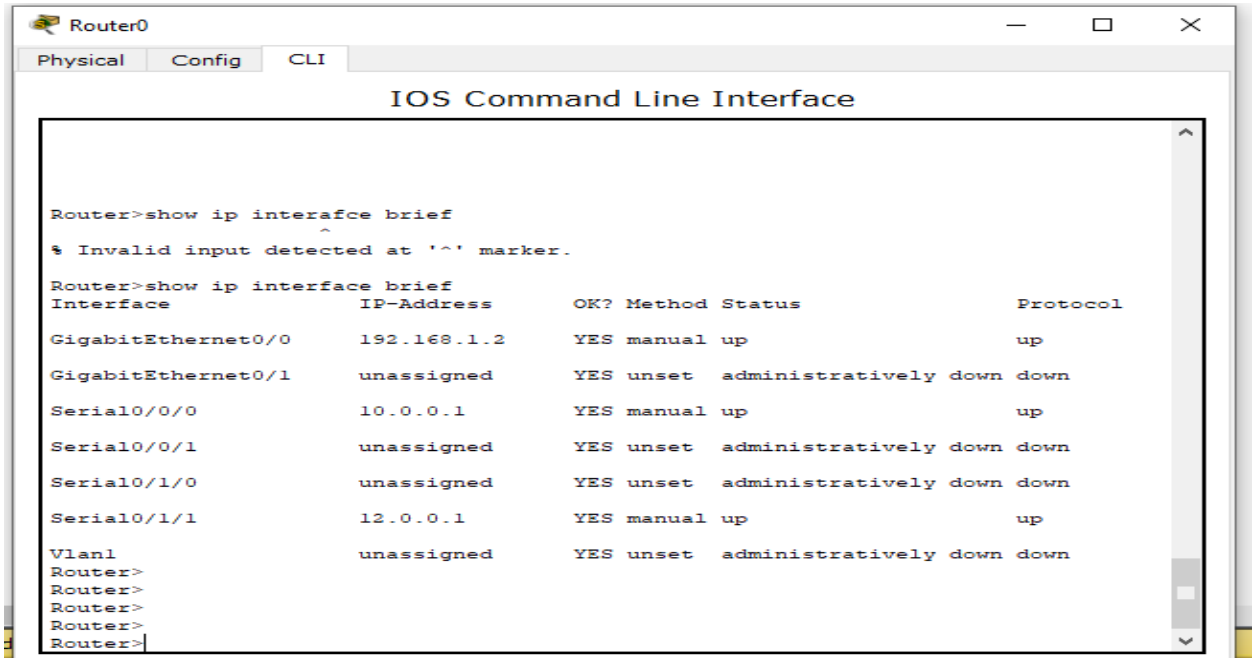

Router0
Physical
Config
CLI
GLOBAL
Settings
Algorithm Settings
ROUTING
Static
RIP
SWITCHING
VLAN Database
INTERFACE
GigabitEthernet0/0
GigabitEthernet0/1
Serial0/0/0
Serial0/0/1
Serial0/1/0
Serial0/1/1
Serial0/0/0
Port Status
On
Duplex
Full Duplex
Clock Rate
2000000
IP Configuration
IP Address
10.0.0.1
Subnet Mask
255.0.0.0
Tx Ring Limit
10
Equivalent IOS Commands
Router(config-if)#
Router(config-if)#exit
Router(config)#interface Serial0/0/0
Router(config-if)#no shutdown
%LINK-5-CHANGED: Interface Serial0/0/0, changed state to down
Router(config-if)#ip address 10.0.0.1 255.0.0.0
Router(config-if)#

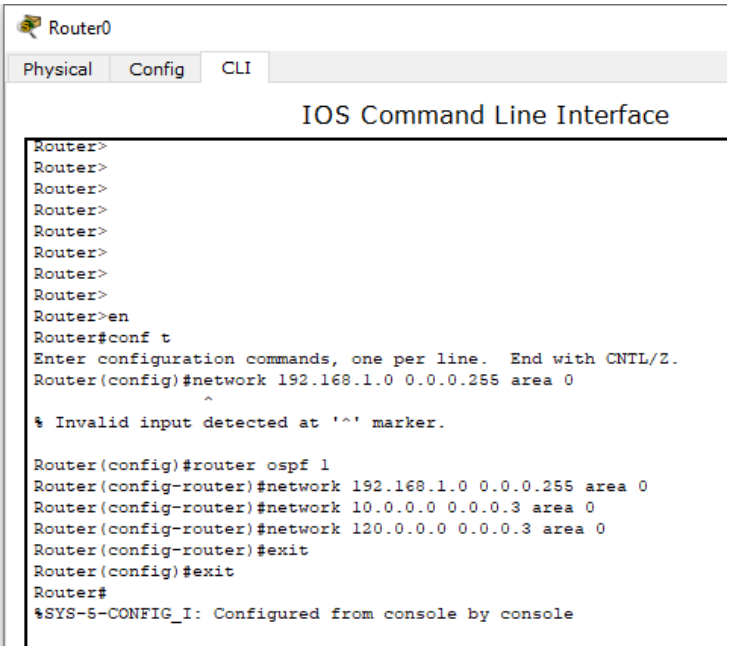

Router1
Physical
Config
CLI
GLOBAL
Settings
Algorithm Settings
ROUTING
Static
RIP
SWITCHING
VLAN Database
INTERFACE
GigabitEthernet0/0
GigabitEthernet0/1
Serial0/0/0
Serial0/0/1
Serial0/1/0
Serial0/1/1
Serial0/1/1
Port Status
On
Duplex
Full Duplex
Clock Rate
2000000
IP Configuration
IP Address
11.0.0.2
Subnet Mask
255.0.0.0
Tx Ring Limit
10
Equivalent IOS Commands
Router(config-if)#
Router(config-if)#exit
Router(config)#interface Serial0/1/1
Router(config-if)#no shutdown
%LINK-5-CHANGED: Interface Serial0/1/1, changed state to down
Router(config-if)#ip address 11.0.0.2 255.0.0.0
Router(config-if)#

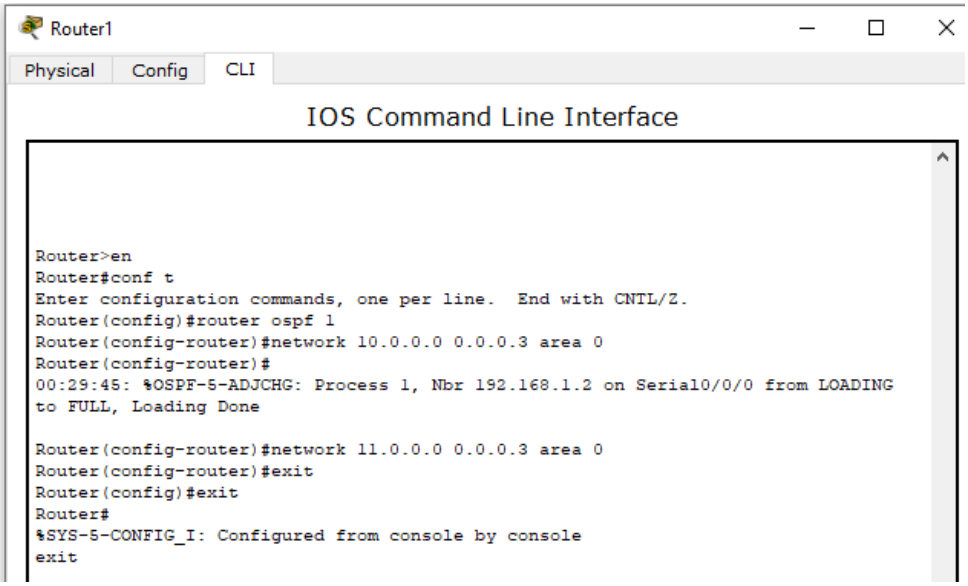

Router2
Physical
Config
CLI
GLOBAL
Settings
Algorithm Settings
ROUTING
Static
RIP
SWITCHING
VLAN Database
INTERFACE
GigabitEthernet0/0
GigabitEthernet0/1
Serial0/0/0
Serial0/0/1
Serial0/1/0
Serial0/1/1
Serial0/1/1
Port Status
On
Duplex
Full Duplex
Clock Rate
2000000
IP Configuration
IP Address
11.0.0.1
Subnet Mask
255.0.0.0
Tx Ring Limit
10
Equivalent IOS Commands
Router(config-if)#exit
Router(config)#interface Serial0/1/1
Router(config-if)#no shutdown
%LINK-5-CHANGED: Interface Serial0/1/1, changed state to down
Router(config-if)#ip address 11.0.0.1 255.0.0.0
Router(config-if)#

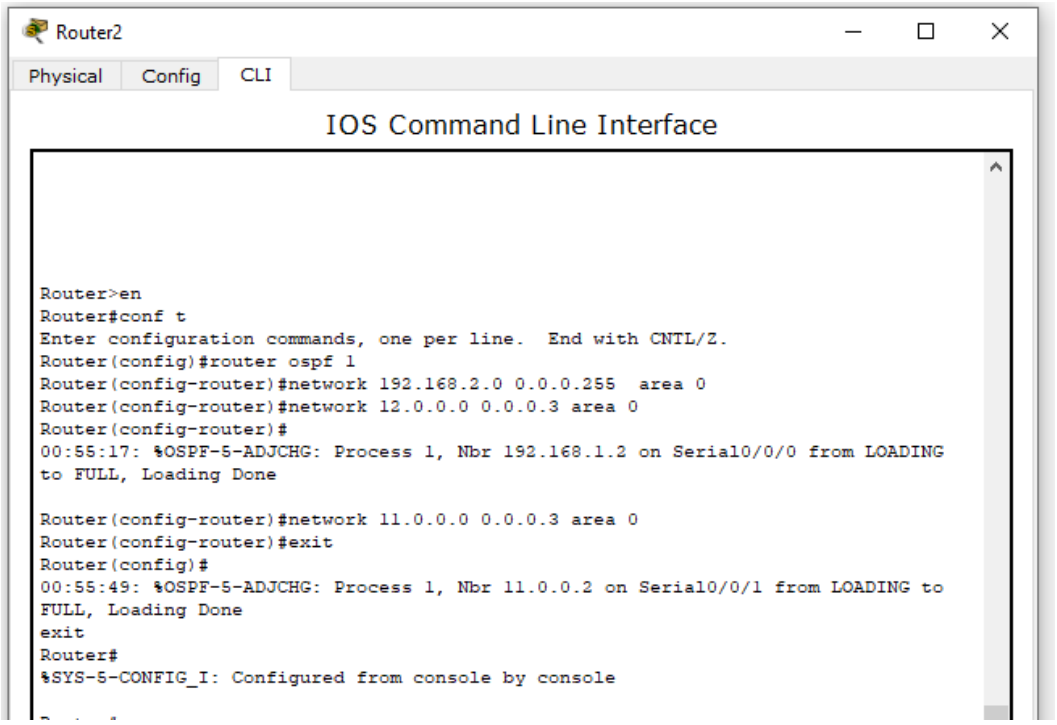

Router2
Physical
Config
CLI
GLOBAL
Settings
Algorithm Settings
ROUTING
Static
RIP
SWITCHING
VLAN Database
INTERFACE
GigabitEthernet0/0
GigabitEthernet0/1
Serial0/0/0
Serial0/0/1
Serial0/1/0
Serial0/1/1
Serial0/0/0
Port Status
On
Duplex
Full Duplex
Clock Rate
Not Set
IP Configuration
IP Address
12.0.0.1
Subnet Mask
255.0.0.0
Tx Ring Limit
10
Equivalent IOS Commands
%LINK-5-CHANGED: Interface Serial0/1/1, changed state to down
Router(config-if)#ip address 11.0.0.1 255.0.0.0
Router(config-if)#
Router(config-if)#exit
Router(config)#interface Serial0/0/0
Router(config-if)#ip address 12.0.0.1 255.0.0.0
Router(config-if)#

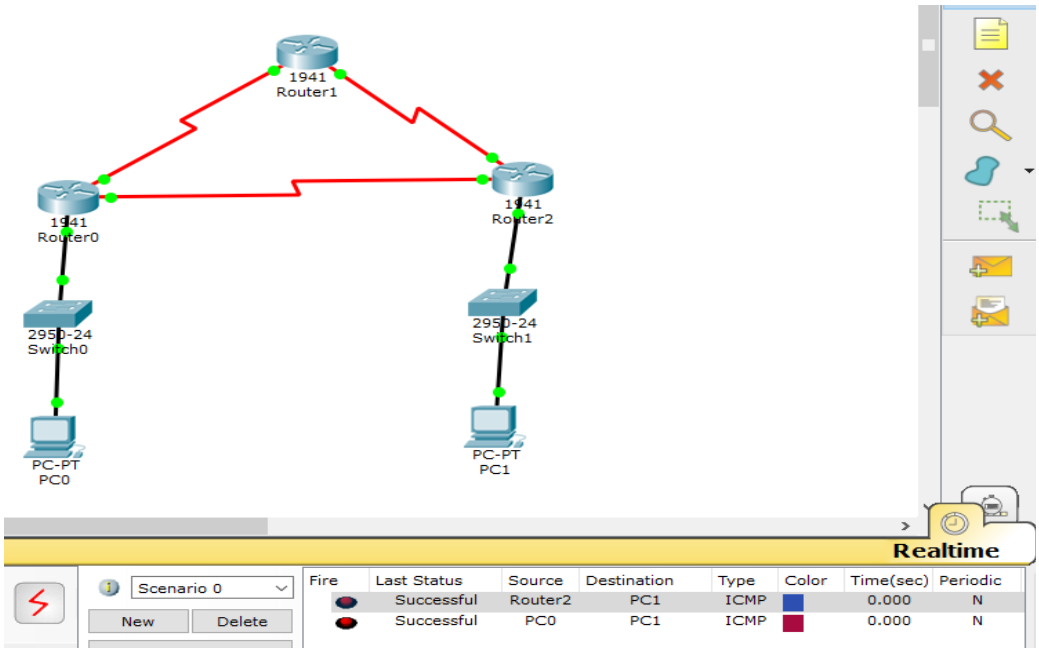

Router2
Physical
Config
CLI
GLOBAL
Settings
Algorithm Settings
ROUTING
Static
RIP
SWITCHING
VLAN Database
INTERFACE
GigabitEthernet0/0
GigabitEthernet0/1
Serial0/0/0
Serial0/0/1
Serial0/1/0
Serial0/1/1
GigabitEthernet0/0
Port Status
On
Bandwidth
1000 Mbps
100 Mbps
10 Mbps
Auto
Duplex
Half Duplex
Full Duplex
Auto
MAC Address
00D0.BCE8.1601
IP Configuration
IP Address
192.168.2.2
Subnet Mask
255.255.255.0
Tx Ring Limit
10
Equivalent IOS Commands
Router(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0, changed state to up
ip address 192.168.2.2 255.255.255.0
Router(config-if)#

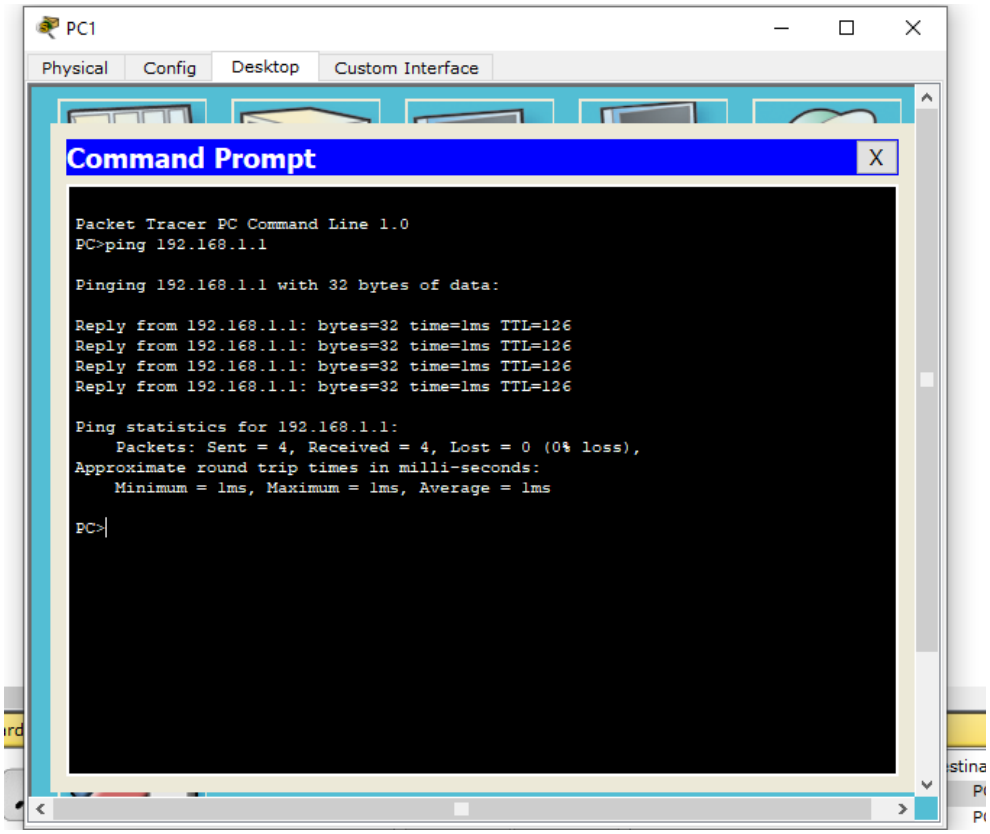

Router0
Physical
Config
CLI
IOS Command Line Interface
Router>show ip interafce brief
% Invalid input detected at '^' marker.
Router>show ip interface brief
Interface IP-Address OK? Method Status Protocol
GigabitEthernet0/0 192.168.1.2 YES manual up up
GigabitEthernet0/1 unassigned YES unset administratively down down
Serial0/0/0 10.0.0.1 YES manual up up
Serial0/0/1 unassigned YES unset administratively down down
Serial0/1/0 unassigned YES unset administratively down down
Serial0/1/1 12.0.0.1 YES manual up up
Vlan1 unassigned YES unset administratively down down
Router>
Router>
Router>
Router>
Router>


Router0
Physical
Config
CLI
IOS Command Line Interface
Router>
Router>
Router>
Router>
Router>
Router>
Router>
Router>
Router>en
Router#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#network 192.168.1.0 0.0.0.255 area 0
                 ^
% Invalid input detected at '^' marker.
Router(config)#router ospf 1
Router(config-router)#network 192.168.1.0 0.0.0.255 area 0
Router(config-router)#network 10.0.0.0 0.0.0.3 area 0
Router(config-router)#network 120.0.0.0 0.0.0.3 area 0
Router(config-router)#exit
Router(config)#exit
Router#
%SYS-5-CONFIG_I: Configured from console by console


Router1
Physical
Config
CLI
IOS Command Line Interface
Router>en
Router#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#router ospf 1
Router(config-router)#network 10.0.0.0 0.0.0.3 area 0
Router(config-router)#
00:29:45: %OSPF-5-ADJCHG: Process 1, Nbr 192.168.1.2 on Serial0/0/0 from LOADING
to FULL, Loading Done
Router(config-router)#network 11.0.0.0 0.0.0.3 area 0
Router(config-router)#exit
Router(config)#exit
Router#
%SYS-5-CONFIG_I: Configured from console by console
exit


Router2
Physical
Config
CLI
IOS Command Line Interface
Router>en
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#router ospf 1
Router(config-router)#network 192.168.2.0 0.0.0.255 area 0
Router(config-router)#network 12.0.0.0 0.0.0.3 area 0
Router(config-router)#
00:55:17: %OSPF-5-ADJCHG: Process 1, Nbr 192.168.1.2 on Serial0/0/0 from LOADING to FULL, Loading Done
Router(config-router)#network 11.0.0.0 0.0.0.3 area 0
Router(config-router)#exit
Router(config)#
00:55:49: %OSPF-5-ADJCHG: Process 1, Nbr 11.0.0.2 on Serial0/0/1 from LOADING to FULL, Loading Done
exit
Router#
%SYS-5-CONFIG_I: Configured from console by console


1941
Router1
1941
Router0
1941
Router2
2950-24
Switch0
2950-24
Switch1
PC-PT
PC0
PC-PT
PC1
Realtime
Scenario 0
New
Delete
Fire
Last Status
Source
Destination
Type
Color
Time(sec)
Periodic
Successful
Router2
PC1
ICMP
0.000
N
Successful
PC0
PC1
ICMP
0.000
N


PC1
Physical
Config
Desktop
Custom Interface
Command Prompt
X
Packet Tracer PC Command Line 1.0
PC>ping 192.168.1.1
Pinging 192.168.1.1 with 32 bytes of data:
Reply from 192.168.1.1: bytes=32 time=1ms TTL=126
Reply from 192.168.1.1: bytes=32 time=1ms TTL=126
Reply from 192.168.1.1: bytes=32 time=1ms TTL=126
Reply from 192.168.1.1: bytes=32 time=1ms TTL=126
Ping statistics for 192.168.1.1:
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
Minimum = 1ms, Maximum = 1ms, Average = 1ms
PC>