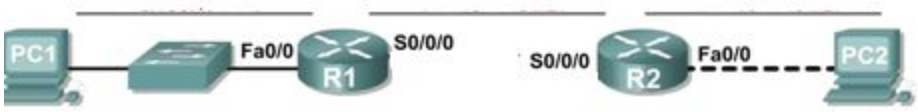
CEL 51, DCCN, Monsoon 2020
Lab 6: Subnet and Router Configuration

Topology Diagram



Addressing Table

Device	Interface	IP Address	Subnet Mask	Default Gateway
R1	Fa0/0			N/A
	S0/0/0			N/A
R2	Fa0/0			N/A
	S0/0/0			N/A
PC1	NIC			
PC2	NIC			

Learning Objectives

Upon completion of this lab, you will be able to:

- Subnet an address space given requirements.
- Assign appropriate addresses to interfaces and document.
- Configure and activate Serial and FastEthernet interfaces.
- Test and verify configurations.
- Reflect upon and document the network implementation.

Scenario

In this lab activity, you will design and apply an IP addressing scheme for the topology shown in the Topology Diagram. You will be given one address block that you must subnet to provide a logical addressing scheme for the network. The routers will then be ready for interface address configuration according to your IP addressing scheme. When the configuration is complete, verify that the network is working properly.

Task 1: Subnet the Address Space.

Step 1: Examine the network requirements.

You have been given the 192.168.1.0/24 address space to use in your network design. The network consists of the following segments:

- The network connected to router R1 will require enough IP addresses to support 15 hosts.
- The network connected to router R2 will require enough IP addresses to support 30 hosts.

- The link between router R1 and router R2 will require IP addresses at each end of the link.

Step 2: Consider the following questions when creating your network design.

How many subnets are needed for this network? **3**

Explanation:

3 subnets are needed for this network-

1. For network connected to router R1
2. For network connected to router R2
3. For link between router R1 and router R2

What is the subnet mask for this network in dotted decimal format? **255.255.255.224**

Explanation:

The network connected to R2 requires maximum number of hosts i.e. 30

So three bits from the host portion

So, the subnet mask becomes: **11111111.11111111.11111111.11100000000**

What is the subnet mask for the network in slash format? **/27**

Explanation: The number of 1's in binary form o subnet mask is 27

How many usable hosts are there per subnet? **30**

Explanation:

Number of 0's in binary form of subnet mask determines number of hosts it is 5 so 2^h - 2 = 30

Step 3: Assign sub-network addresses to the Topology Diagram.

1. Assign subnet 1 to the network attached to R1.
   Subnet 1: 192.168.1.0
2. Assign subnet 2 to the link between R1 and R2.
   Subnet 2: 192.168.1.32
3. Assign subnet 3 to the network attached to R2.
   Subnet 3: 192.168.1.64

Task 2: Determine Interface Addresses.

Step 1: Assign appropriate addresses to the device interfaces.

Assign the first valid host address in subnet 1 to the LAN interface on R1.

Ans: 192.168.1.1

Assign the last valid host address in subnet 1 to PC1.

Ans: 192.168.1.30

Assign the first valid host address in subnet 2 to the WAN interface on R1.

Ans: 192.168.1.33

Assign the last valid host address in subnet 2 to the WAN interface on R2.

Ans: 192.168.1.62

Assign the first valid host address in subnet 3 to the LAN interface of R2.

Ans: 192.168.1.65

Assign the last valid host address in subnet 3 to PC2.

Ans: 192.168.1.94

Step 2: Document the addresses to be used in the table provide under the Topology Diagram.

Device	Interface	IP Address	Subnet Mask	Default Gateway
R1	**Fa0/0**	192.168.1.1	255.255.255.224	**N/A**
	S0/0/0	192.168.1.33	255.255.255.224	**N/A**
R2	**Fa0/0**	192.168.1.65	255.255.255.224	**N/A**
	S0/0/0	192.168.1.62	255.255.255.224	**N/A**
PC1	**NIC**	192.168.1.30	255.255.255.224	192.168.1.1
PC2	**NIC**	192.168.1.94	255.255.255.224	192.168.1.65

Task 3: Configure the Serial and FastEthernet Addresses.

Step 1: Configure the router interfaces.

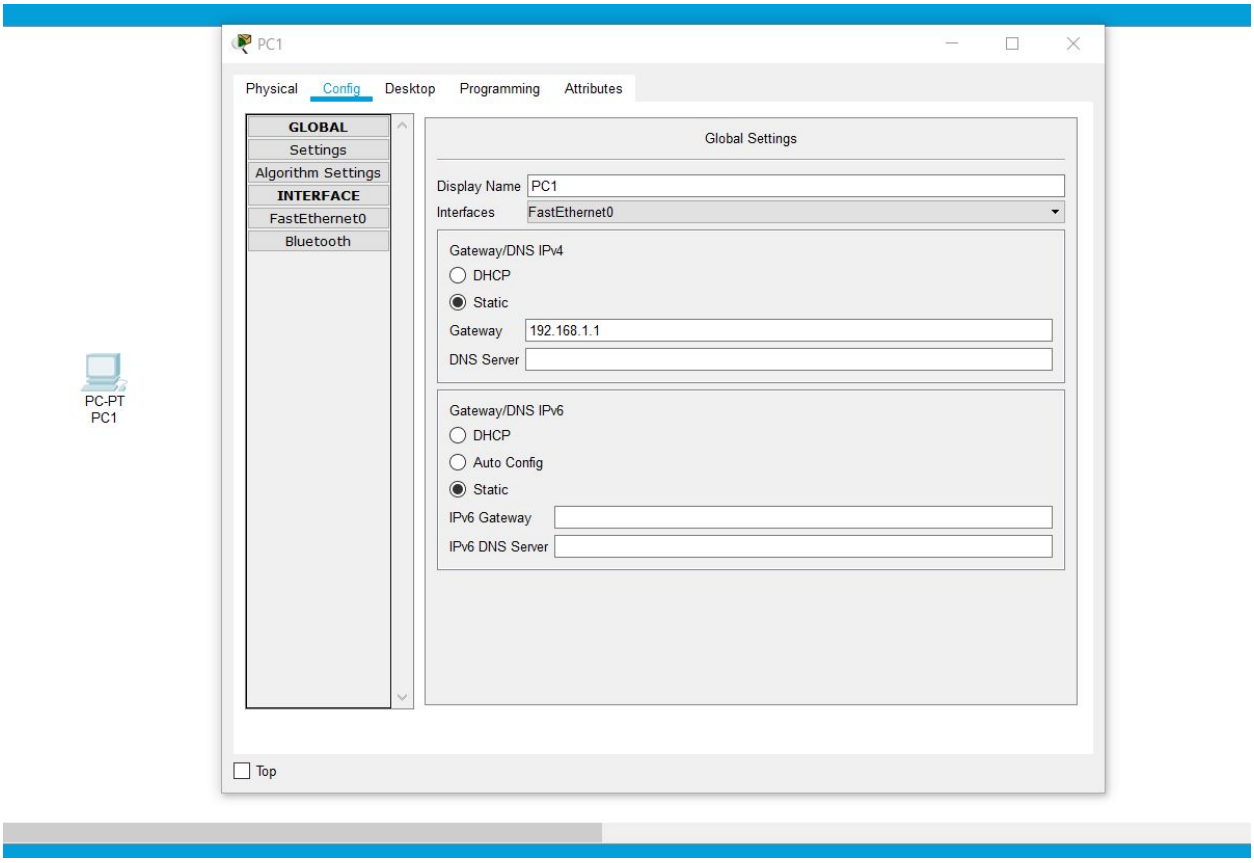
Configure the interfaces on the R1 and R2 routers with the IP addresses from your network design. Please note, to complete the activity in Packet Tracer you will be using the Config Tab. When you have finished, be sure to save the running configuration to the NVRAM of the router.

Step 2: Configure the PC interfaces.

Configure the Ethernet interfaces of PC1 and PC2 with the IP addresses and default gateways from your network design.


PC-PT
PC0


PC-PT
PC1


PC-PT
PC1
PC1
Physical
Config
Desktop
Programming
Attributes
GLOBAL
Settings
Algorithm Settings
INTERFACE
FastEthernet0
Bluetooth
Global Settings
Display Name
PC1
Interfaces
FastEthernet0
Gateway/DNS IPv4
DHCP
Static
Gateway
192.168.1.1
DNS Server
Gateway/DNS IPv6
DHCP
Auto Config
Static
IPv6 Gateway
IPv6 DNS Server
Top

PC1

Physical Config Desktop Programming Attributes

GLOBAL
Settings
Algorithm Settings
INTERFACE
FastEthernet0
Bluetooth

FastEthernet0

Port Status: On
Bandwidth: 100 Mbps 10 Mbps Auto
Duplex: Half Duplex Full Duplex Auto
MAC Address: 0005.5E4E.DDBD

IP Configuration
DHCP
Static
IP Address: 192.168.1.30
Subnet Mask: 255.255.255.224

IPv6 Configuration
DHCP
Auto Config
Static
IPv6 Address:
Link Local Address: FE80::205:5EFF:FE4E:DDBD

Top

PC2

Physical Config Desktop Programming Attributes

GLOBAL
Settings
Algorithm Settings
INTERFACE
FastEthernet0
Bluetooth

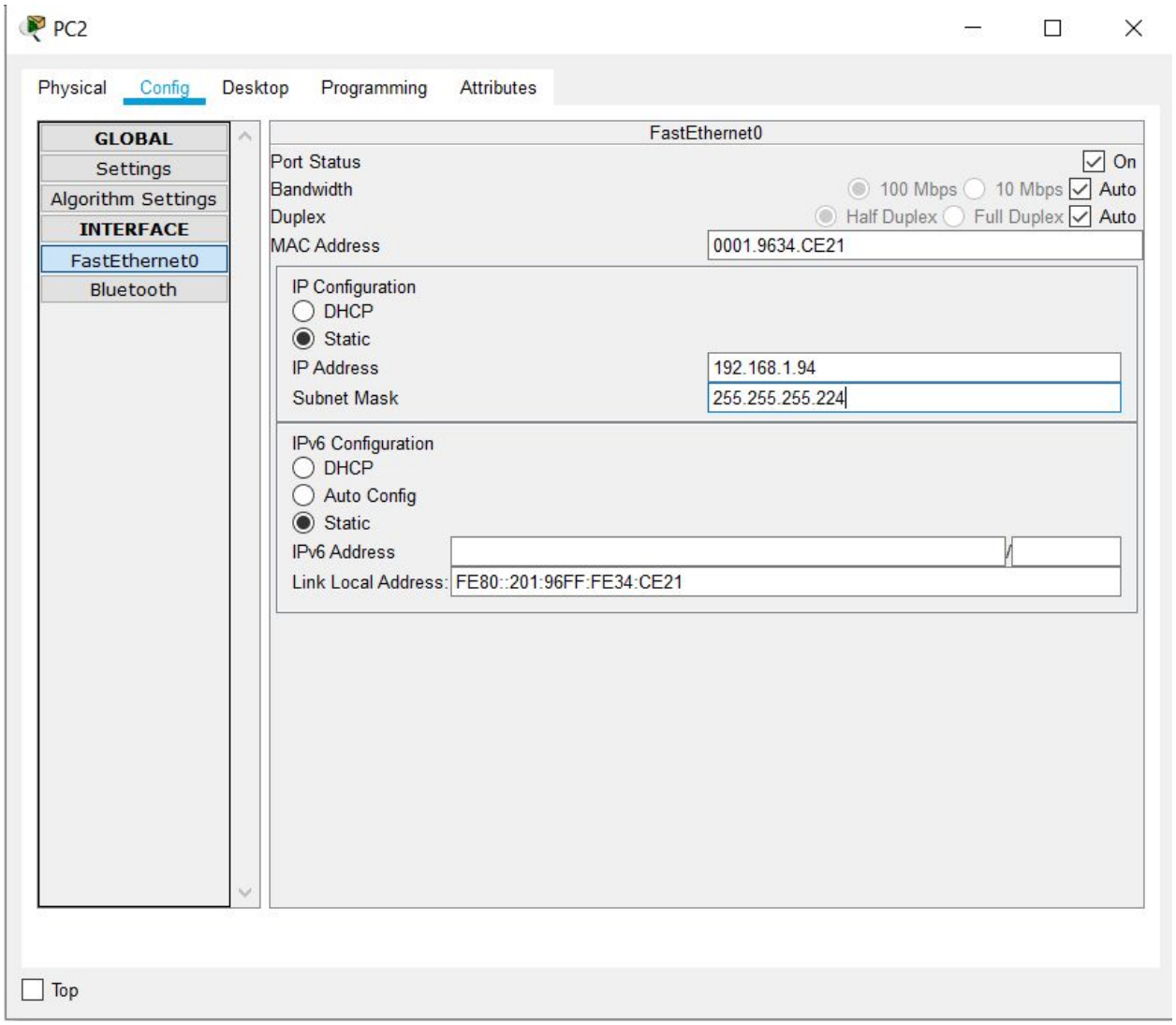
Global Settings

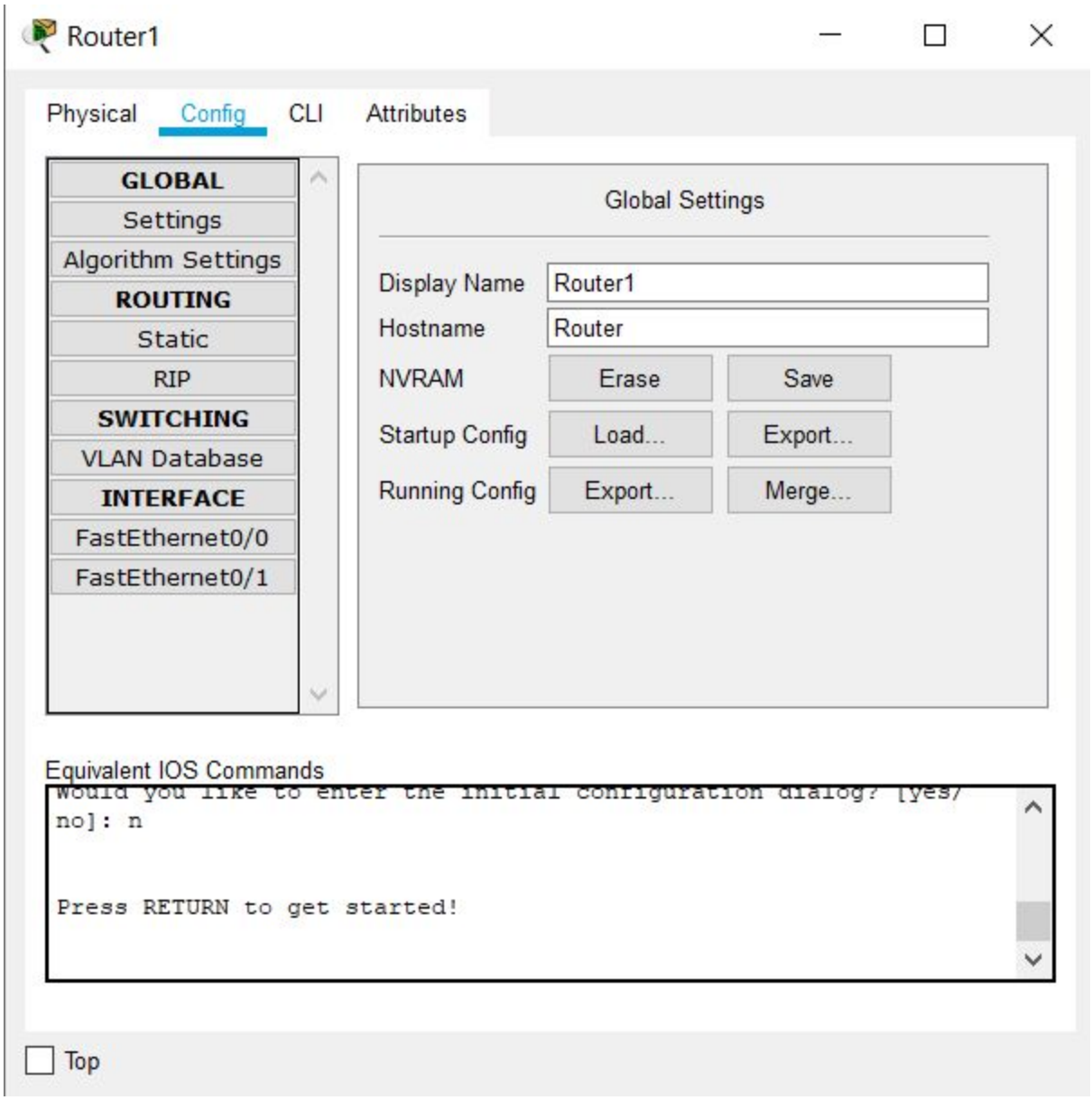
Display Name: PC2
Interfaces: FastEthernet0

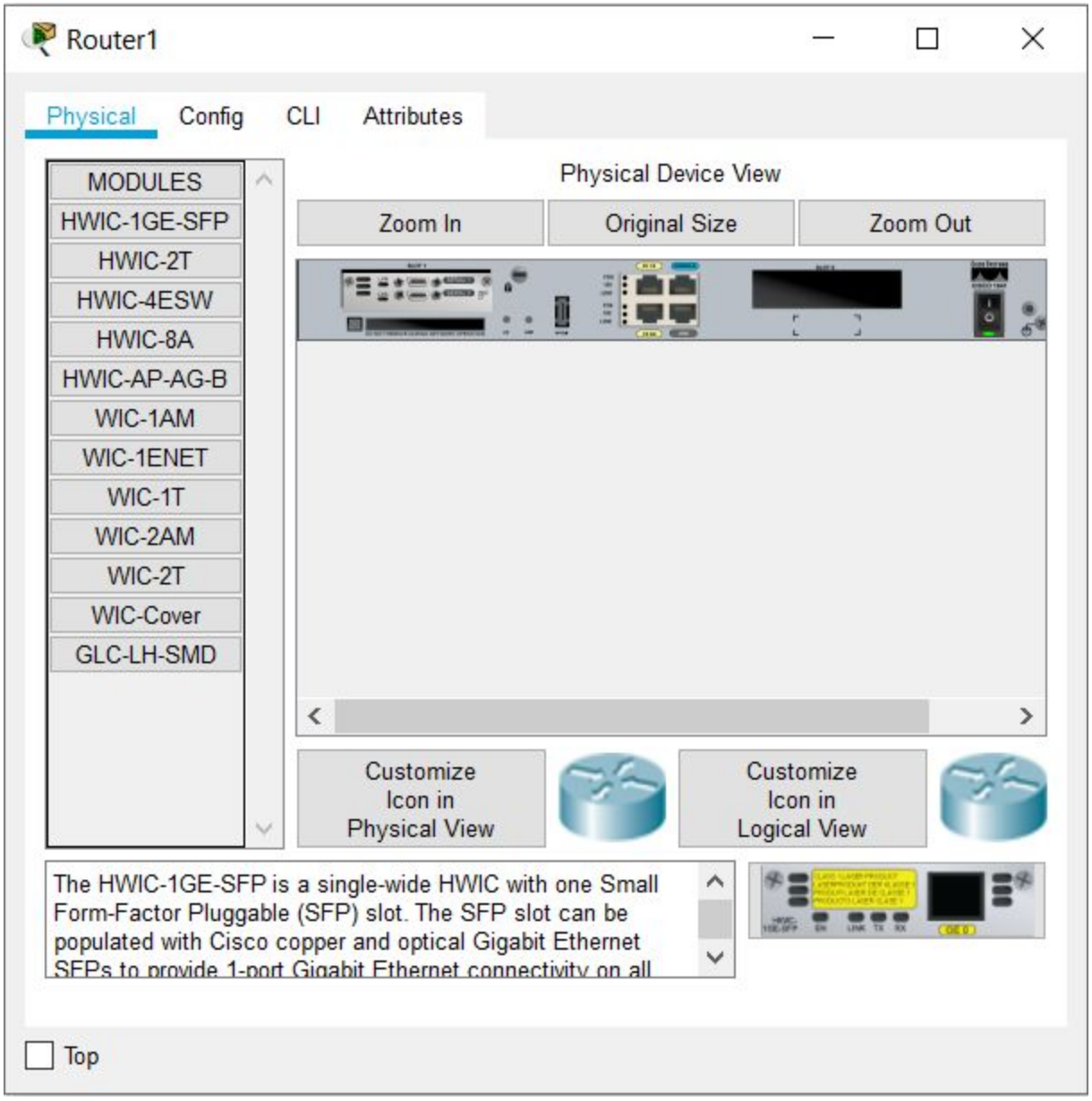
Gateway/DNS IPv4
DHCP
Static
Gateway: 192.168.1.65
DNS Server:

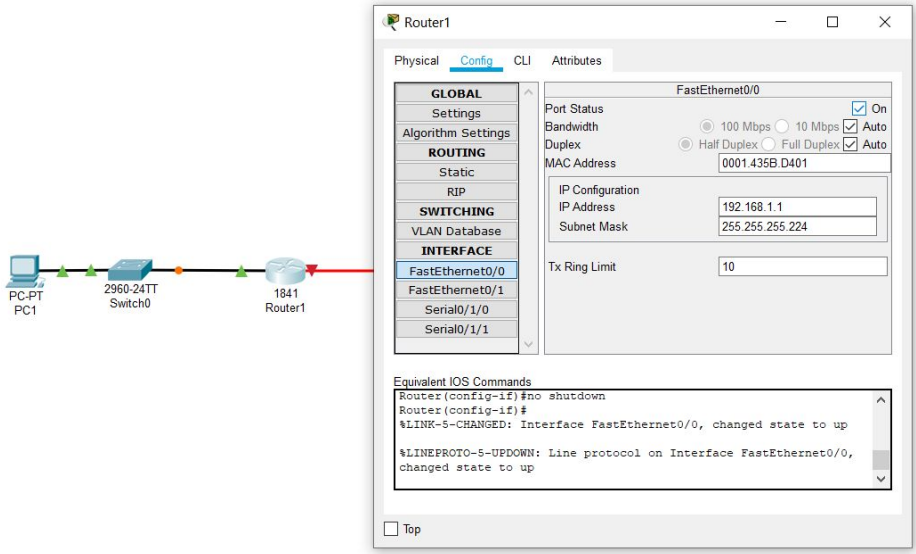
Gateway/DNS IPv6
DHCP
Auto Config
Static
IPv6 Gateway:
IPv6 DNS Server:

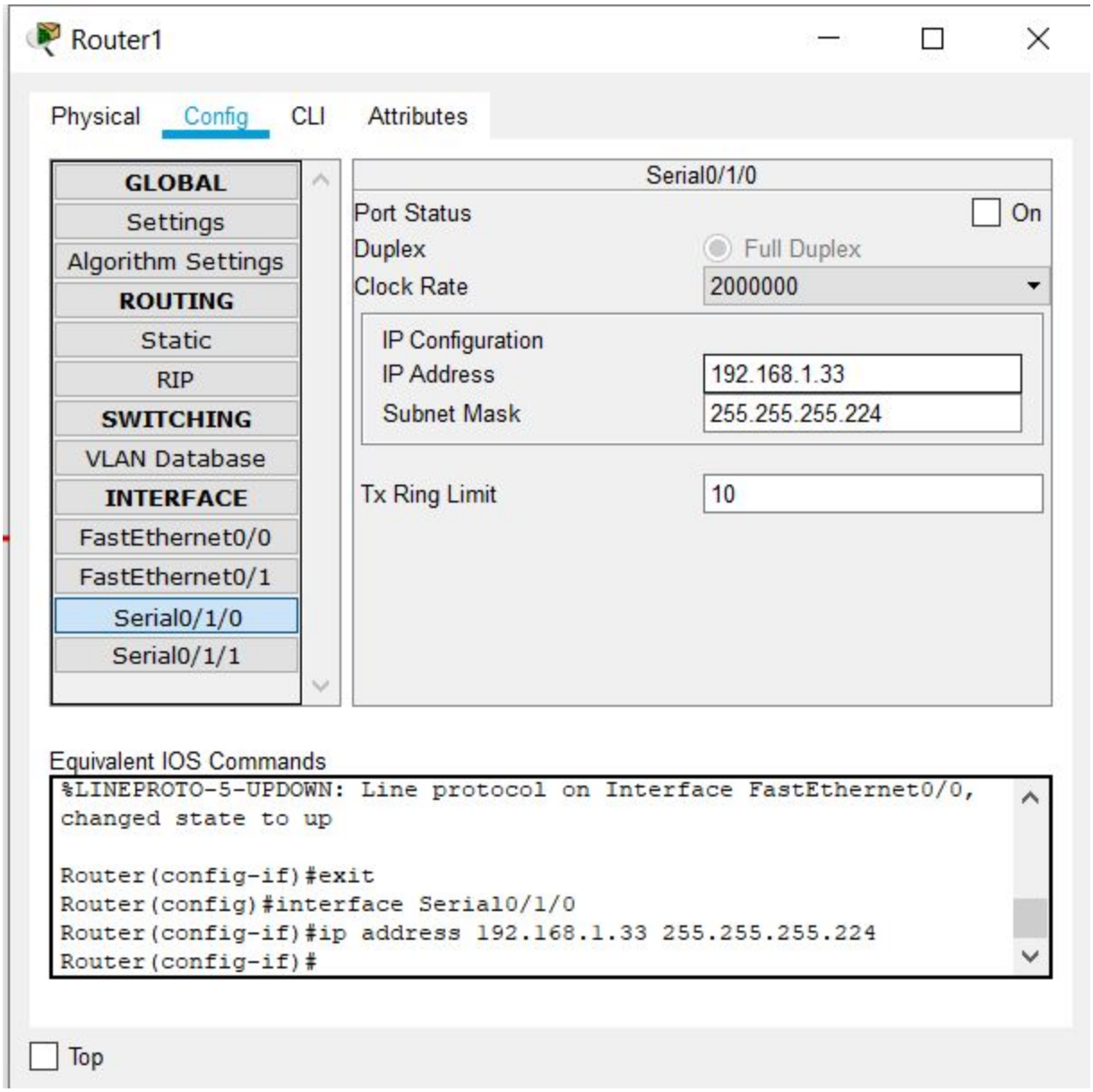
Top

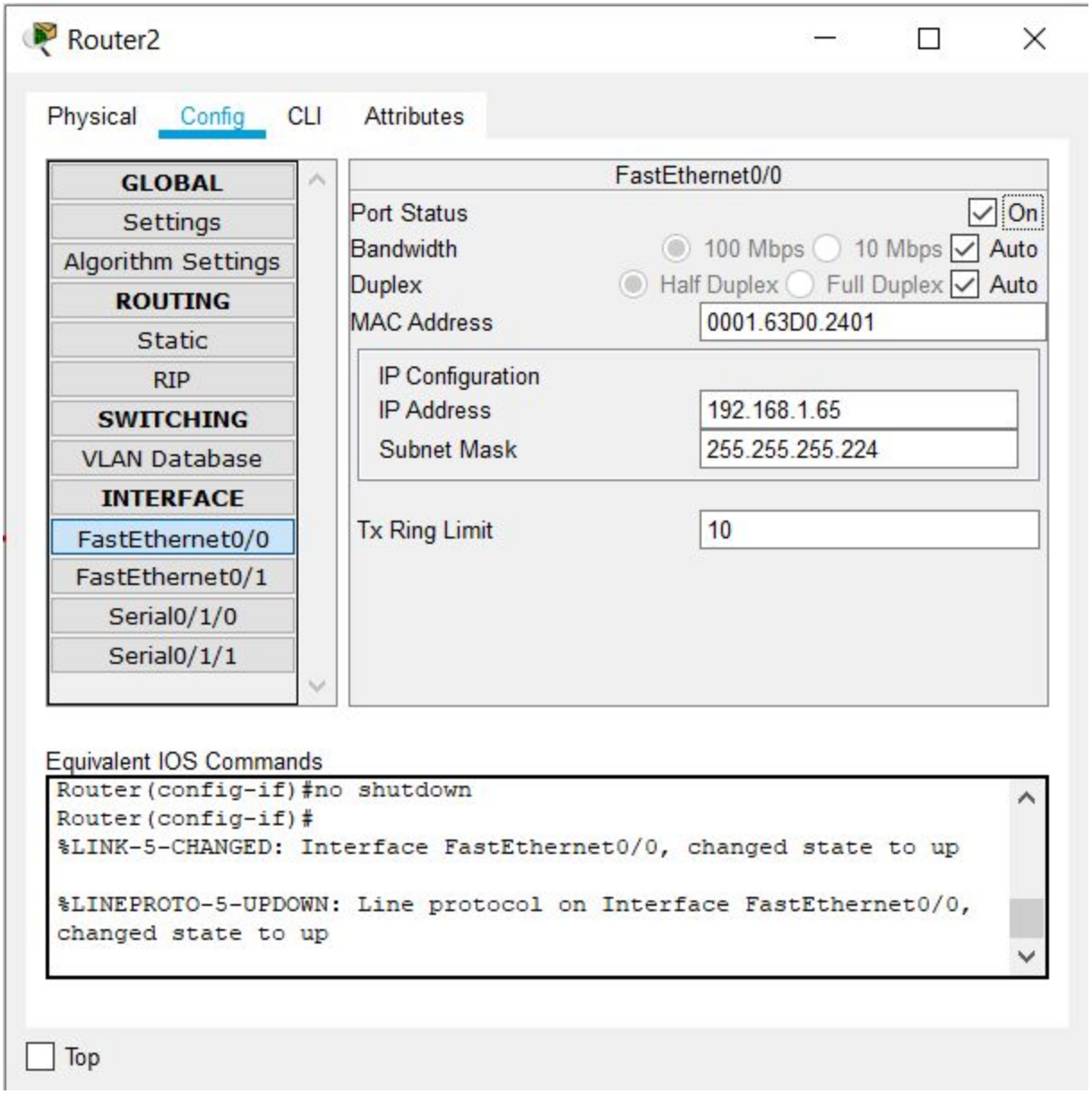

PC2
Physical
Config
Desktop
Programming
Attributes
GLOBAL
Settings
Algorithm Settings
INTERFACE
FastEthernet0
Bluetooth
FastEthernet0
Port Status
On
Bandwidth
100 Mbps
10 Mbps
Auto
Duplex
Half Duplex
Full Duplex
Auto
MAC Address
0001.9634.CE21
IP Configuration
DHCP
Static
IP Address
192.168.1.94
Subnet Mask
255.255.255.224
IPv6 Configuration
DHCP
Auto Config
Static
IPv6 Address
Link Local Address:
FE80::201:96FF:FE34:CE21
Top

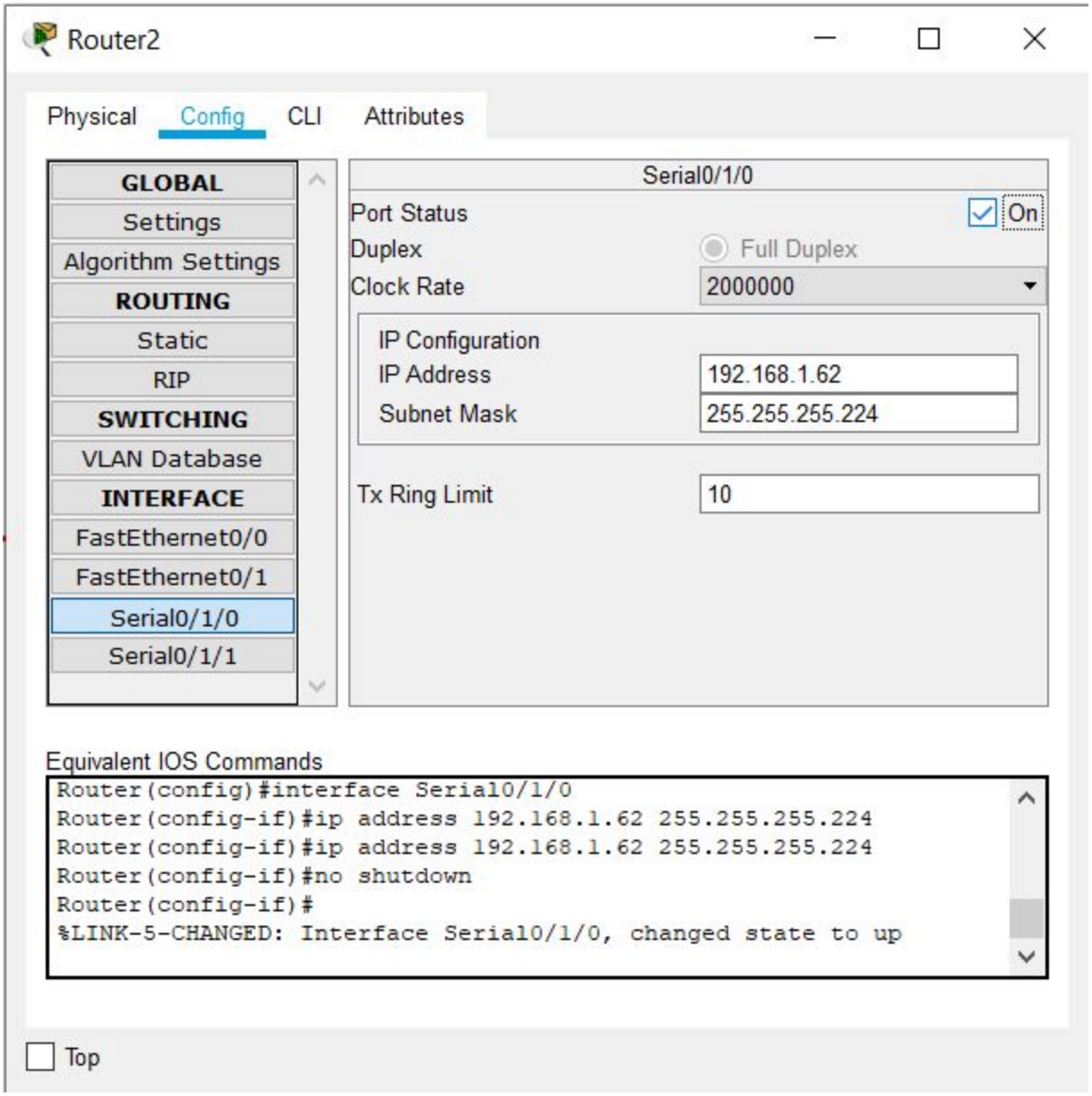

Router1
Physical
Config
CLI
Attributes
GLOBAL
Settings
Algorithm Settings
ROUTING
Static
RIP
SWITCHING
VLAN Database
INTERFACE
FastEthernet0/0
FastEthernet0/1
Global Settings
Display Name
Router1
Hostname
Router
NVRAM
Erase
Save
Startup Config
Load...
Export...
Running Config
Export...
Merge...
Equivalent IOS Commands
Would you like to enter the initial configuration dialog? [yes/
no]: n
Press RETURN to get started!
Top

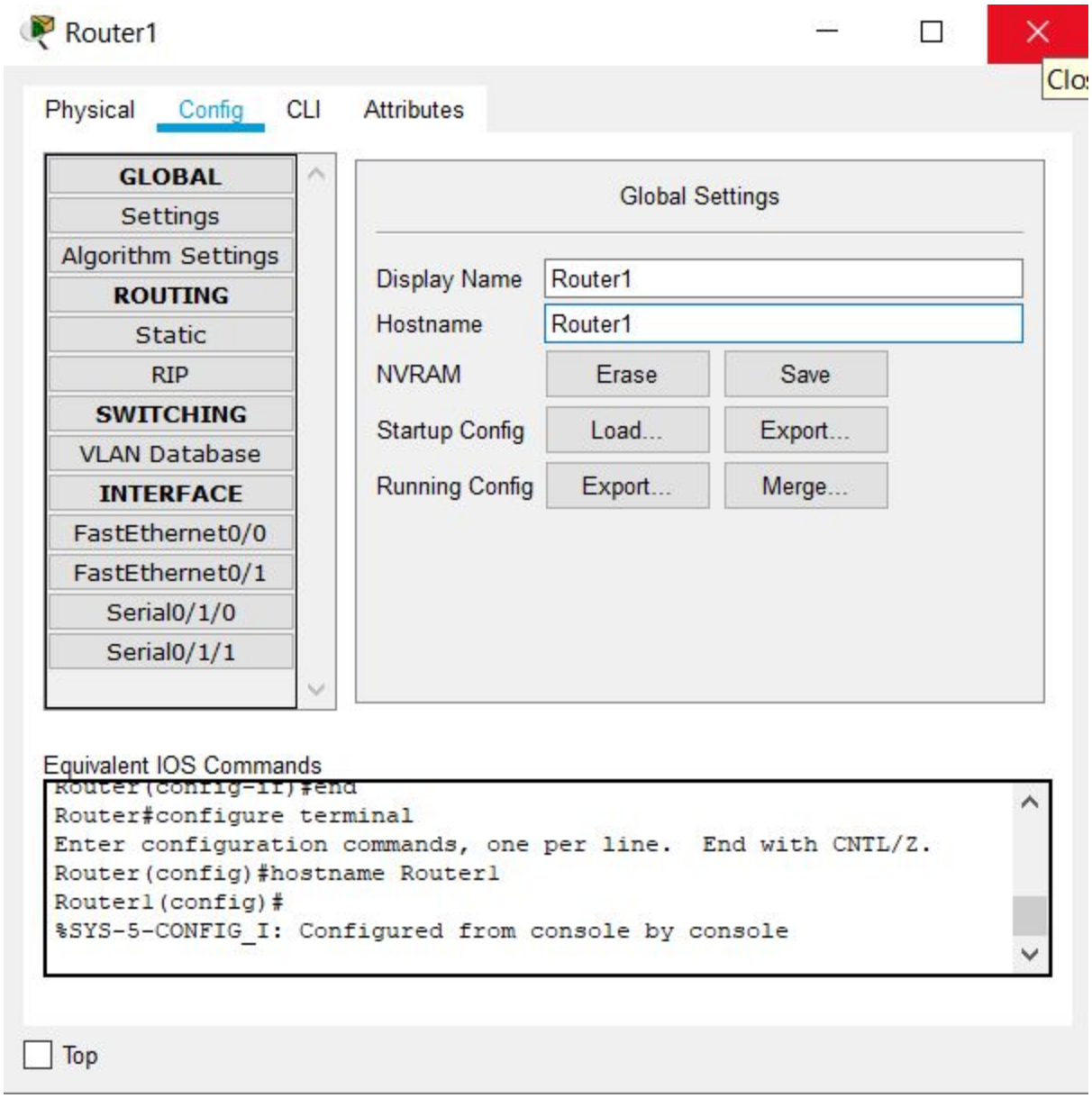

Router1
Physical
Config
CLI
Attributes
MODULES
HWIC-1GE-SFP
HWIC-2T
HWIC-4ESW
HWIC-8A
HWIC-AP-AG-B
WIC-1AM
WIC-1ENET
WIC-1T
WIC-2AM
WIC-2T
WIC-Cover
GLC-LH-SMD
Physical Device View
Zoom In
Original Size
Zoom Out
Customize Icon in Physical View
Customize Icon in Logical View
The HWIC-1GE-SFP is a single-wide HWIC with one Small Form-Factor Pluggable (SFP) slot. The SFP slot can be populated with Cisco copper and optical Gigabit Ethernet SFPs to provide 1-port Gigabit Ethernet connectivity on all
Top

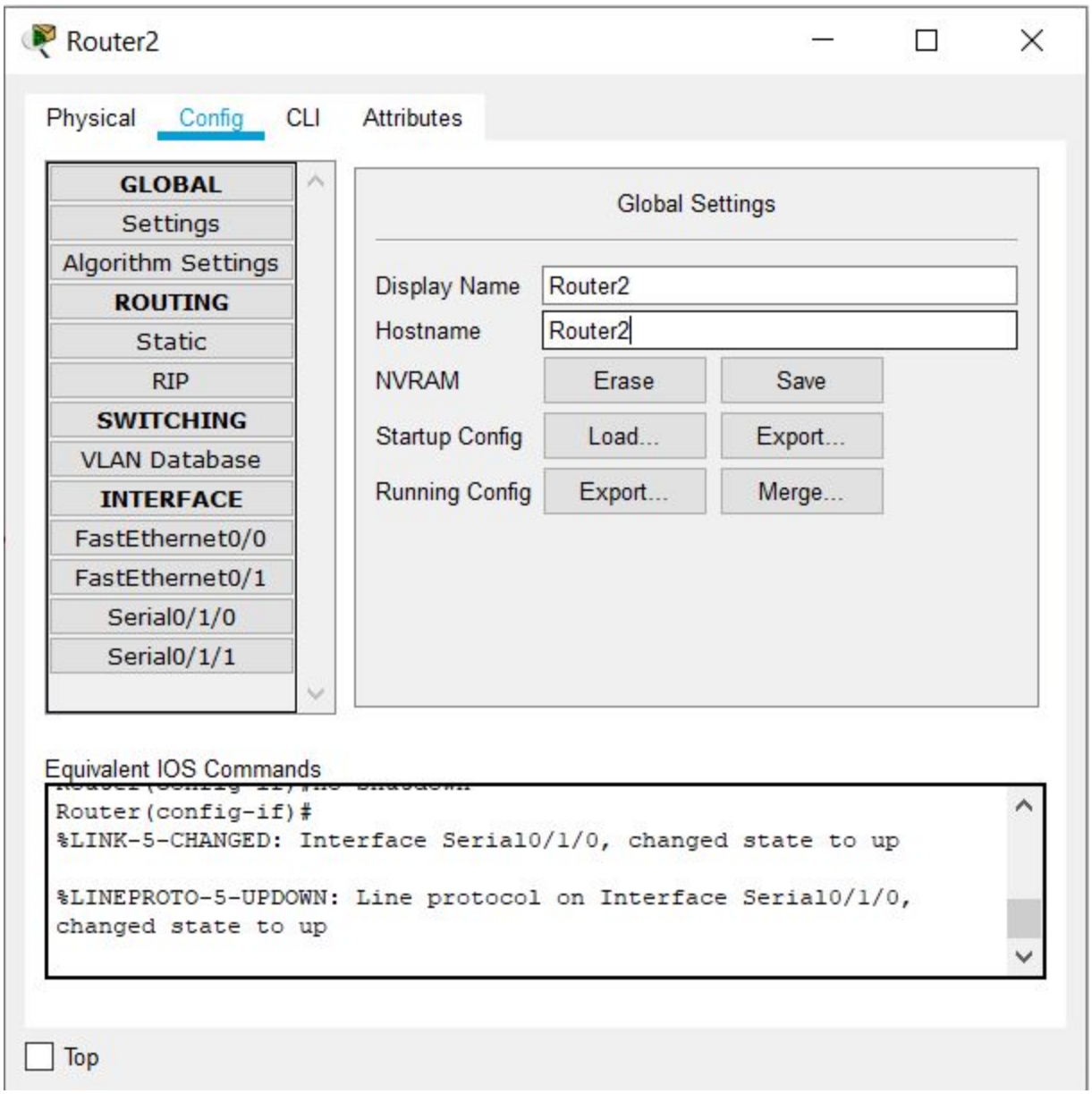

PC-PT
PC1
2960-24TT
Switch0
1841
Router1
Router1
Physical
Config
CLI
Attributes
GLOBAL
Settings
Algorithm Settings
ROUTING
Static
RIP
SWITCHING
VLAN Database
INTERFACE
FastEthernet0/0
FastEthernet0/1
Serial0/1/0
Serial0/1/1
FastEthernet0/0
Port Status
On
Bandwidth
100 Mbps
10 Mbps
Auto
Duplex
Half Duplex
Full Duplex
Auto
MAC Address
0001.435B.D401
IP Configuration
IP Address
192.168.1.1
Subnet Mask
255.255.255.224
Tx Ring Limit
10
Equivalent IOS Commands
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
Top

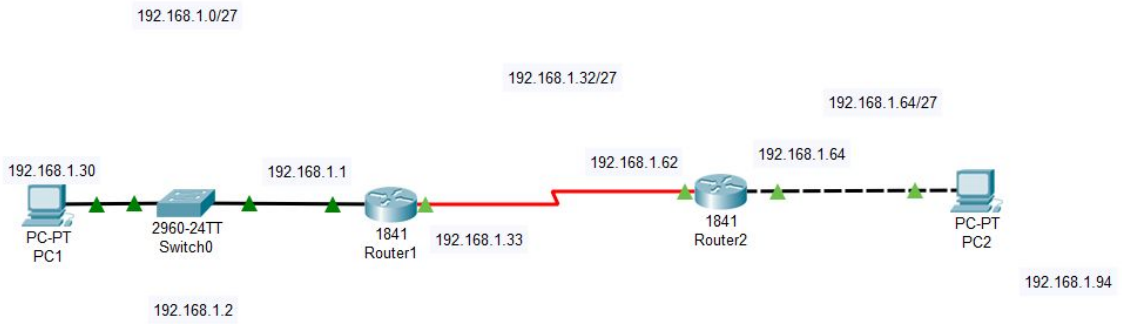

Router1
Physical
Config
CLI
Attributes
GLOBAL
Settings
Algorithm Settings
ROUTING
Static
RIP
SWITCHING
VLAN Database
INTERFACE
FastEthernet0/0
FastEthernet0/1
Serial0/1/0
Serial0/1/1
Serial0/1/0
Port Status
On
Duplex
Full Duplex
Clock Rate
2000000
IP Configuration
IP Address
192.168.1.33
Subnet Mask
255.255.255.224
Tx Ring Limit
10
Equivalent IOS Commands
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up
Router(config-if)#exit
Router(config)#interface Serial0/1/0
Router(config-if)#ip address 192.168.1.33 255.255.255.224
Router(config-if)#
Top

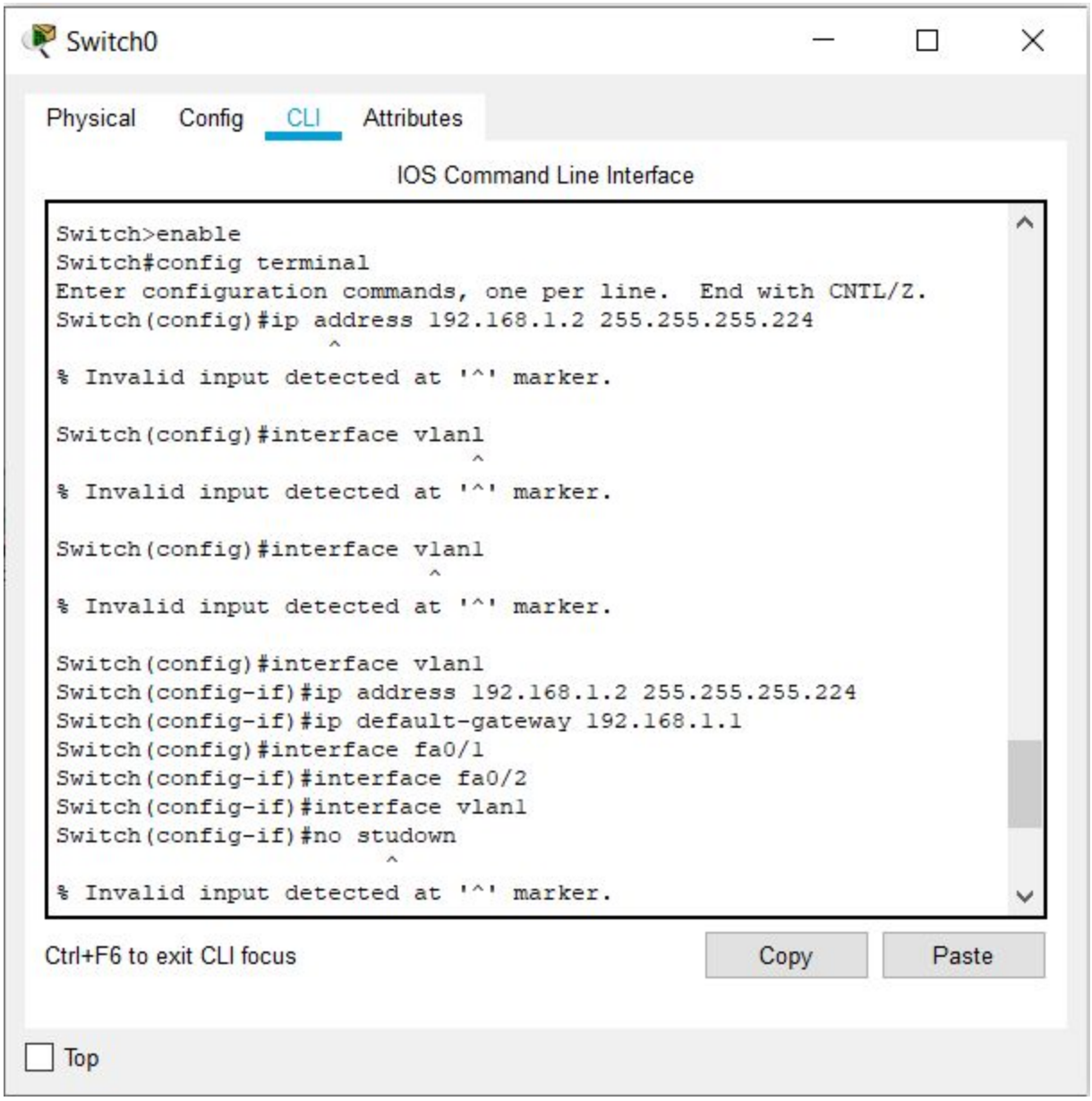

Router2
Physical
Config
CLI
Attributes
GLOBAL
Settings
Algorithm Settings
ROUTING
Static
RIP
SWITCHING
VLAN Database
INTERFACE
FastEthernet0/0
FastEthernet0/1
Serial0/1/0
Serial0/1/1
FastEthernet0/0
Port Status
On
Bandwidth
100 Mbps
10 Mbps
Auto
Duplex
Half Duplex
Full Duplex
Auto
MAC Address
0001.63D0.2401
IP Configuration
IP Address
192.168.1.65
Subnet Mask
255.255.255.224
Tx Ring Limit
10
Equivalent IOS Commands
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
Top

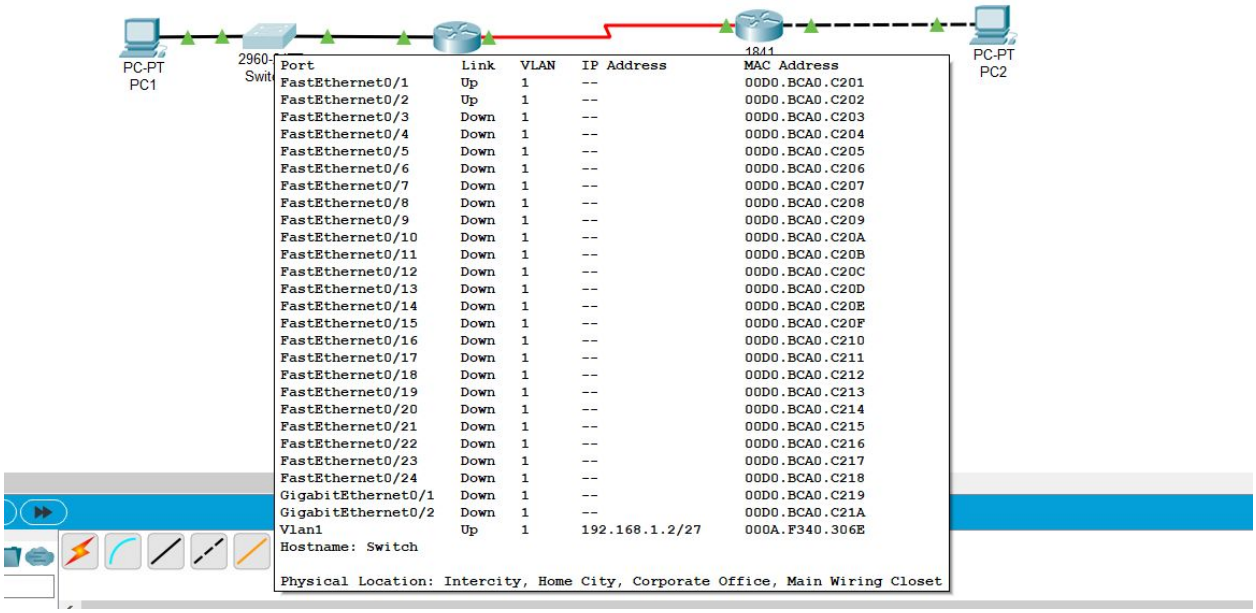

Router2
Physical
Config
CLI
Attributes
GLOBAL
Settings
Algorithm Settings
ROUTING
Static
RIP
SWITCHING
VLAN Database
INTERFACE
FastEthernet0/0
FastEthernet0/1
Serial0/1/0
Serial0/1/1
Serial0/1/0
Port Status
On
Duplex
Full Duplex
Clock Rate
2000000
IP Configuration
IP Address
192.168.1.62
Subnet Mask
255.255.255.224
Tx Ring Limit
10
Equivalent IOS Commands
Router(config)#interface Serial0/1/0
Router(config-if)#ip address 192.168.1.62 255.255.255.224
Router(config-if)#ip address 192.168.1.62 255.255.255.224
Router(config-if)#no shutdown
Router(config-if)#
%LINK-5-CHANGED: Interface Serial0/1/0, changed state to up
Top


Router1
Physical
Config
CLI
Attributes
GLOBAL
Settings
Algorithm Settings
ROUTING
Static
RIP
SWITCHING
VLAN Database
INTERFACE
FastEthernet0/0
FastEthernet0/1
Serial0/1/0
Serial0/1/1
Global Settings
Display Name
Router1
Hostname
Router1
NVRAM
Erase
Save
Startup Config
Load...
Export...
Running Config
Export...
Merge...
Equivalent IOS Commands
Router(config-if)#end
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#hostname Router1
Router1(config)#
%SYS-5-CONFIG_I: Configured from console by console
Top


Router2
Physical
Config
CLI
Attributes
GLOBAL
Settings
Algorithm Settings
ROUTING
Static
RIP
SWITCHING
VLAN Database
INTERFACE
FastEthernet0/0
FastEthernet0/1
Serial0/1/0
Serial0/1/1
Global Settings
Display Name
Router2
Hostname
Router2
NVRAM
Erase
Save
Startup Config
Load...
Export...
Running Config
Export...
Merge...
Equivalent IOS Commands
Router(config-if)#
%LINK-5-CHANGED: Interface Serial0/1/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/1/0,
changed state to up
Top


192.168.1.0/27
192.168.1.32/27
192.168.1.64/27
192.168.1.30
192.168.1.1
192.168.1.62
192.168.1.64
PC-PT
PC1
2960-24TT
Switch0
1841
Router1
192.168.1.33
1841
Router2
PC-PT
PC2
192.168.1.94
192.168.1.2

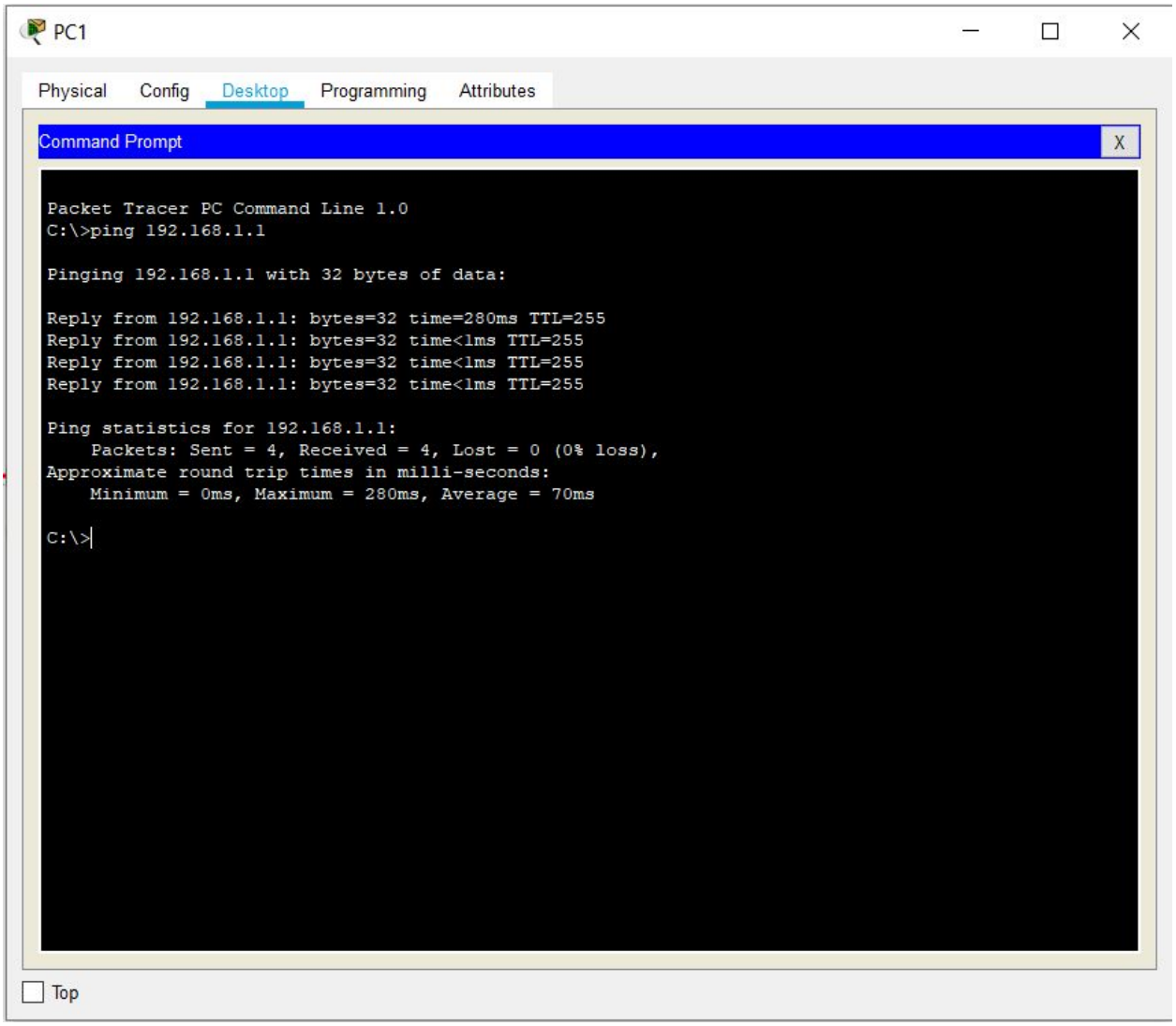

Switch0
Physical
Config
CLI
Attributes
IOS Command Line Interface
Switch>enable
Switch#config terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#ip address 192.168.1.2 255.255.255.224
^
% Invalid input detected at '^' marker.
Switch(config)#interface vlan1
^
% Invalid input detected at '^' marker.
Switch(config)#interface vlan1
^
% Invalid input detected at '^' marker.
Switch(config)#interface vlan1
Switch(config-if)#ip address 192.168.1.2 255.255.255.224
Switch(config-if)#ip default-gateway 192.168.1.1
Switch(config)#interface fa0/1
Switch(config-if)#interface fa0/2
Switch(config-if)#interface vlan1
Switch(config-if)#no studown
^
% Invalid input detected at '^' marker.
Ctrl+F6 to exit CLI focus
Copy
Paste
Top



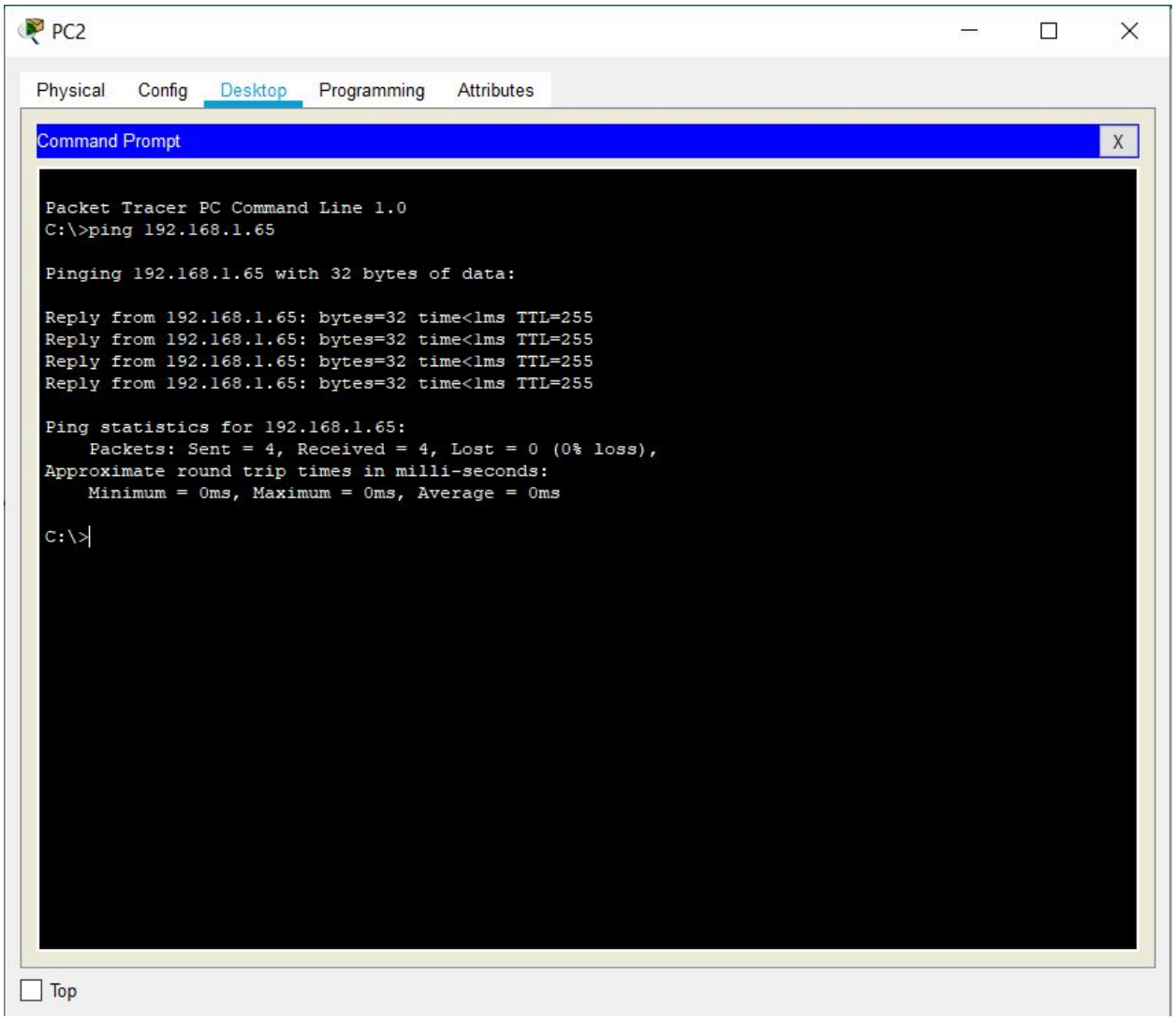
Task 4: Verify the Configurations.

Answer the following questions to verify that the network is operating as expected.

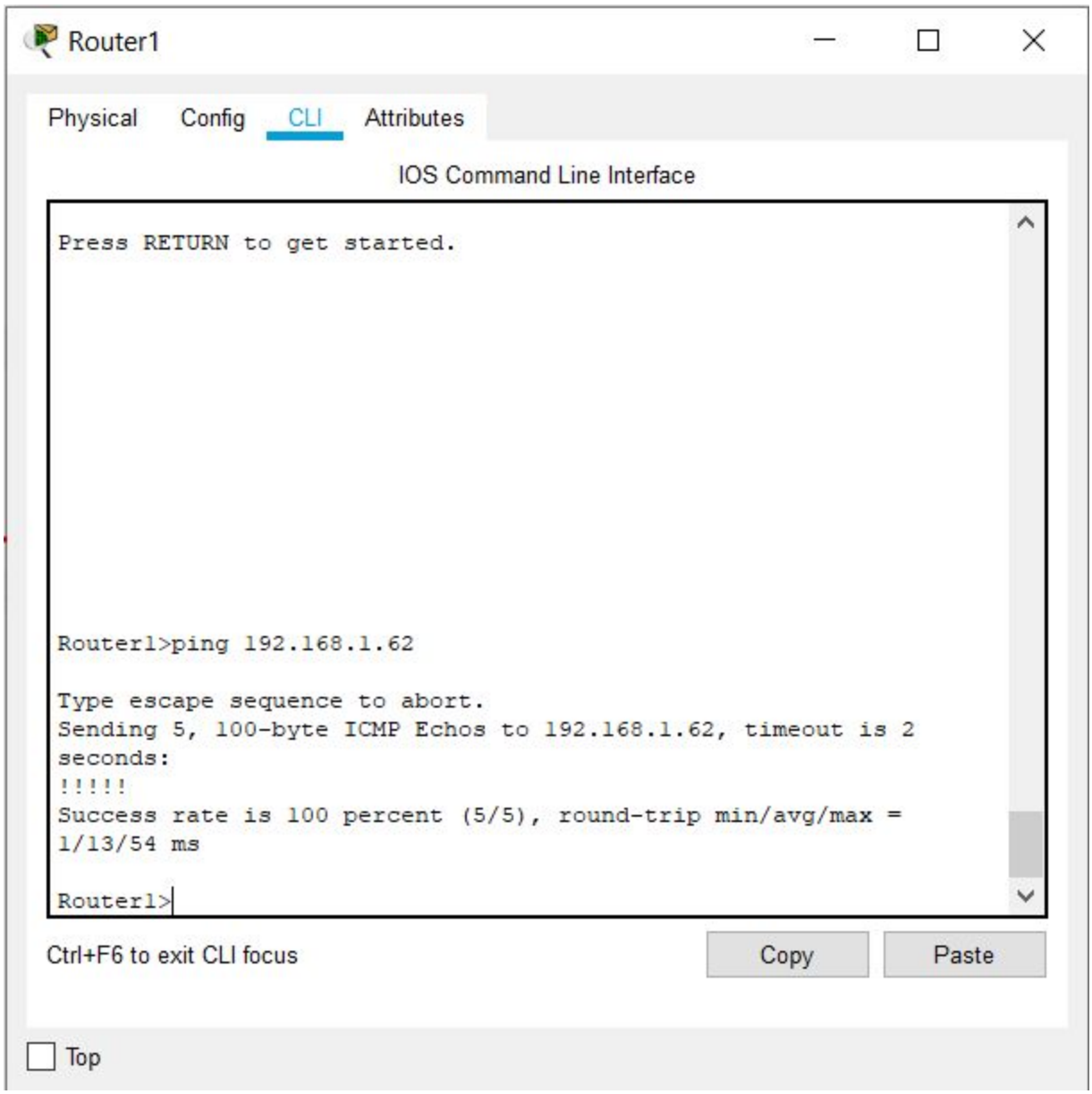
From the host attached to R1, is it possible to ping the default gateway? yes



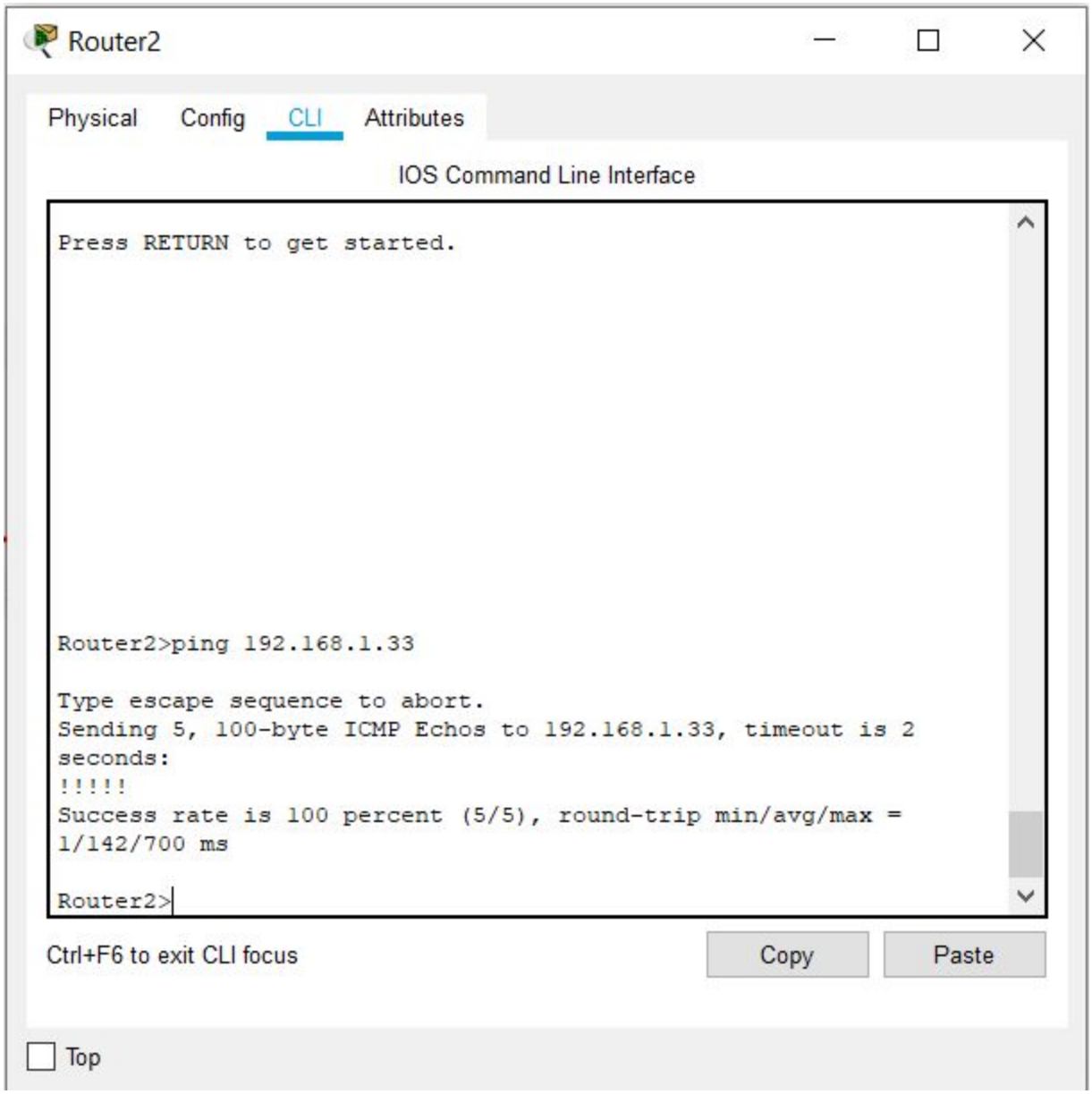
From the host attached to R2, is it possible to ping the default gateway? yes



From the router R1, is it possible to ping the Serial 0/0/0 interface of R2? yes



From the router R2, is it possible to ping the Serial 0/0/0 interface of R1? yes

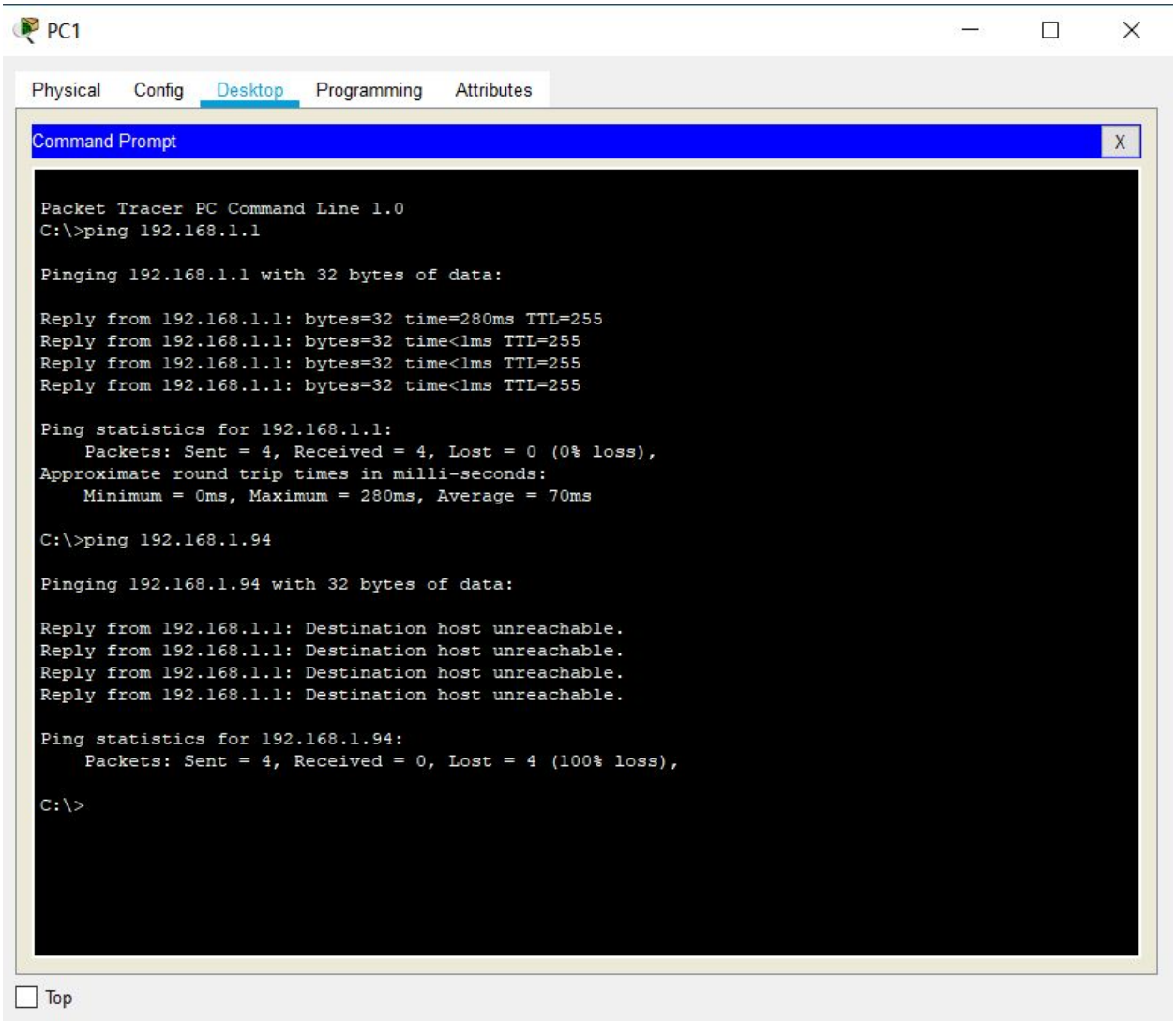


The answer to the above questions should be **yes**. If any of the above pings failed, check your physical connections and configurations.

Task 5: Reflection

Are there any devices on the network that cannot ping each other?

PC1 cannot ping PC2



What is missing from the network that is preventing communication between these devices?

We cannot ping these devices because we have not configured routing.

The routing needs to have either static or dynamic routing to determine the path to which the packet is to be forwarded.