Name : Devansh Srivastava

Registration number : 21BCE0527

Network Training Programme

Module 6

Q3. Given a network address of 10.0.0.0/24, divide it into 4 equal subnets. Calculate the new subnet mask. Determine the valid host range for each subnet. Assign IP addresses to devices in Packet Tracer and verify connectivity.

Analyzing the original network:

Network address: 10.0.0.0/24

Original subnet mask: 255.255.255.0

Number of host bits: 8

Number of available hosts: 2^8 - 2 = 254

Calculate new subnet mask for 4 equal subnets:

So, we require 2 additional subnet bits (2^2 = 4 subnets)

New prefix length: 24 + 2 = /26

Number of host in each network: 2^32-26=2^6=64 hosts

New subnet mask: 255.255.255.192

Calculate the subnets:

Subnet 0: 10.0.0.0/26

Network address: 10.0.0.0

Broadcast address: 10.0.0.63

Valid host range: 10.0.0.1 - 10.0.0.62

Subnet 1: 10.0.0.64/26

Network address: 10.0.0.64

Broadcast address: 10.0.0.127

Valid host range: 10.0.0.65 - 10.0.0.126

Subnet 2: 10.0.0.128/26

Network address: 10.0.0.128

Broadcast address: 10.0.0.191

Valid host range: 10.0.0.129 - 10.0.0.190

Subnet 3: 10.0.0.192/26

Network address: 10.0.0.192

Broadcast address: 10.0.0.255

Valid host range: 10.0.0.193 - 10.0.0.254

Configure devices in Packet Tracer:

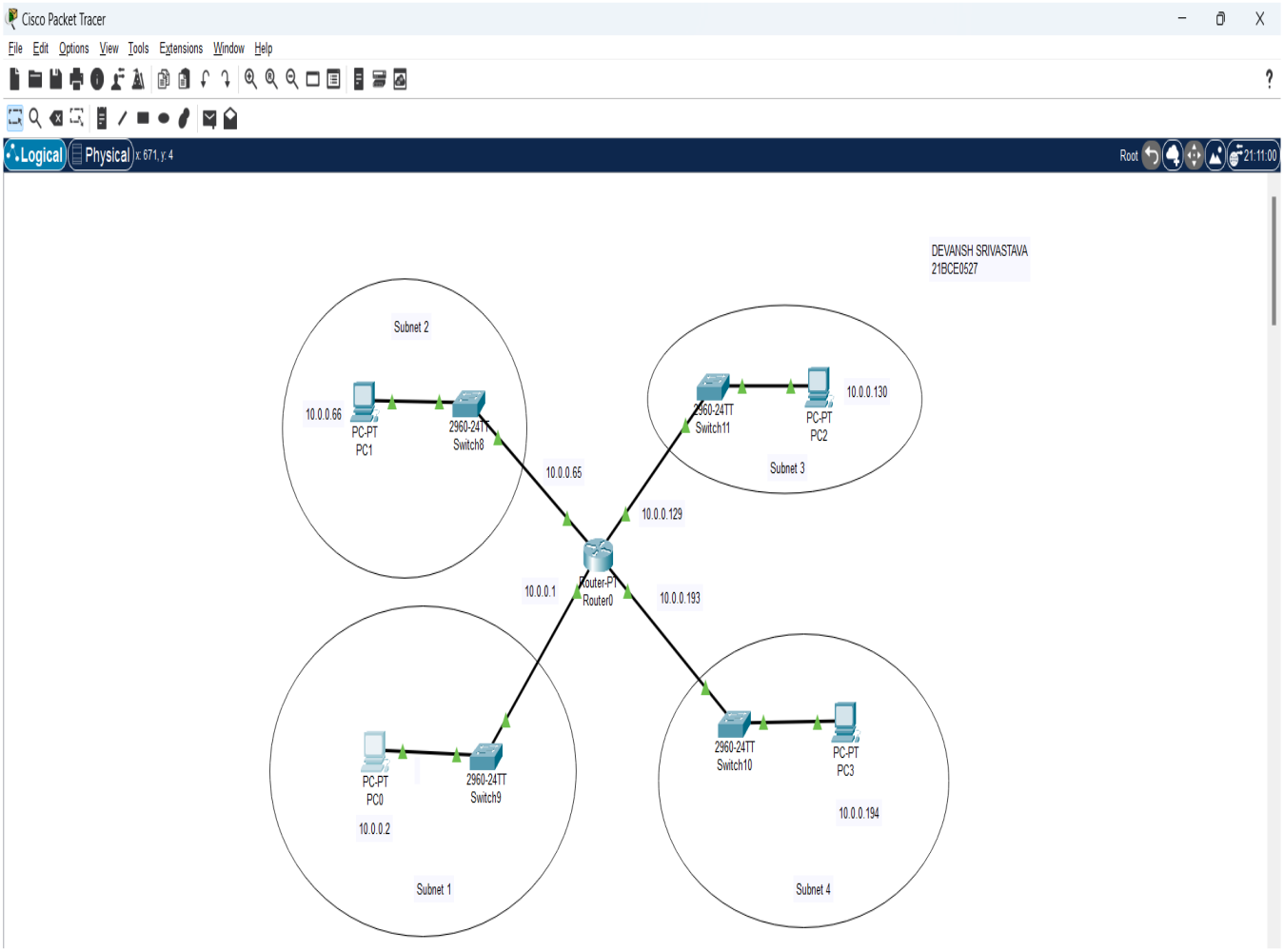
Assigning PC1: 10.0.0.2/26, Gateway: 10.0.0.1

Assigning PC2: 10.0.0.66/26, Gateway: 10.0.0.65

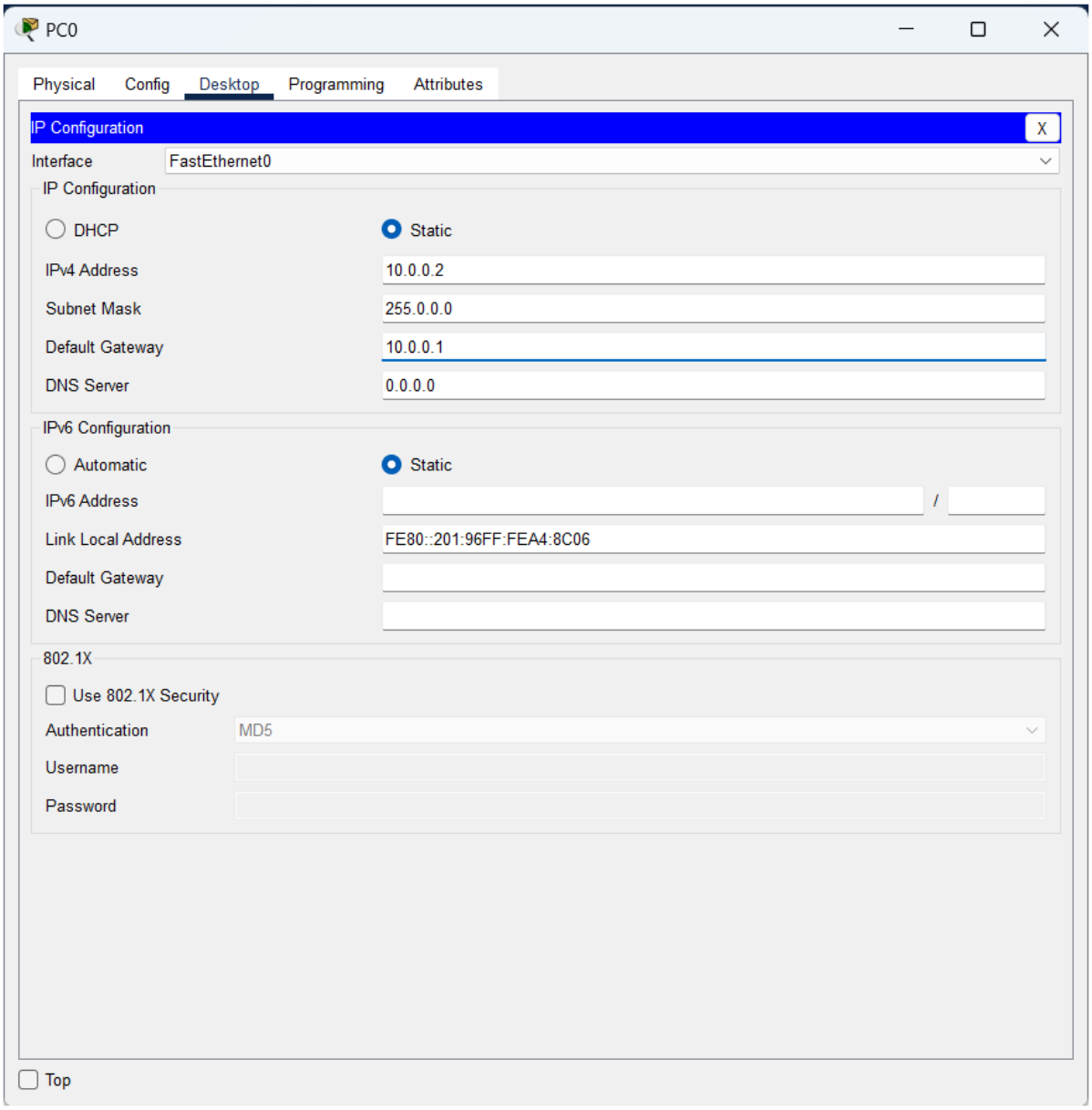
Assigning PC3: 10.0.0.130/26, Gateway: 10.0.0.129

Assigning PC4: 10.0.0.194/26, Gateway: 10.0.0.193

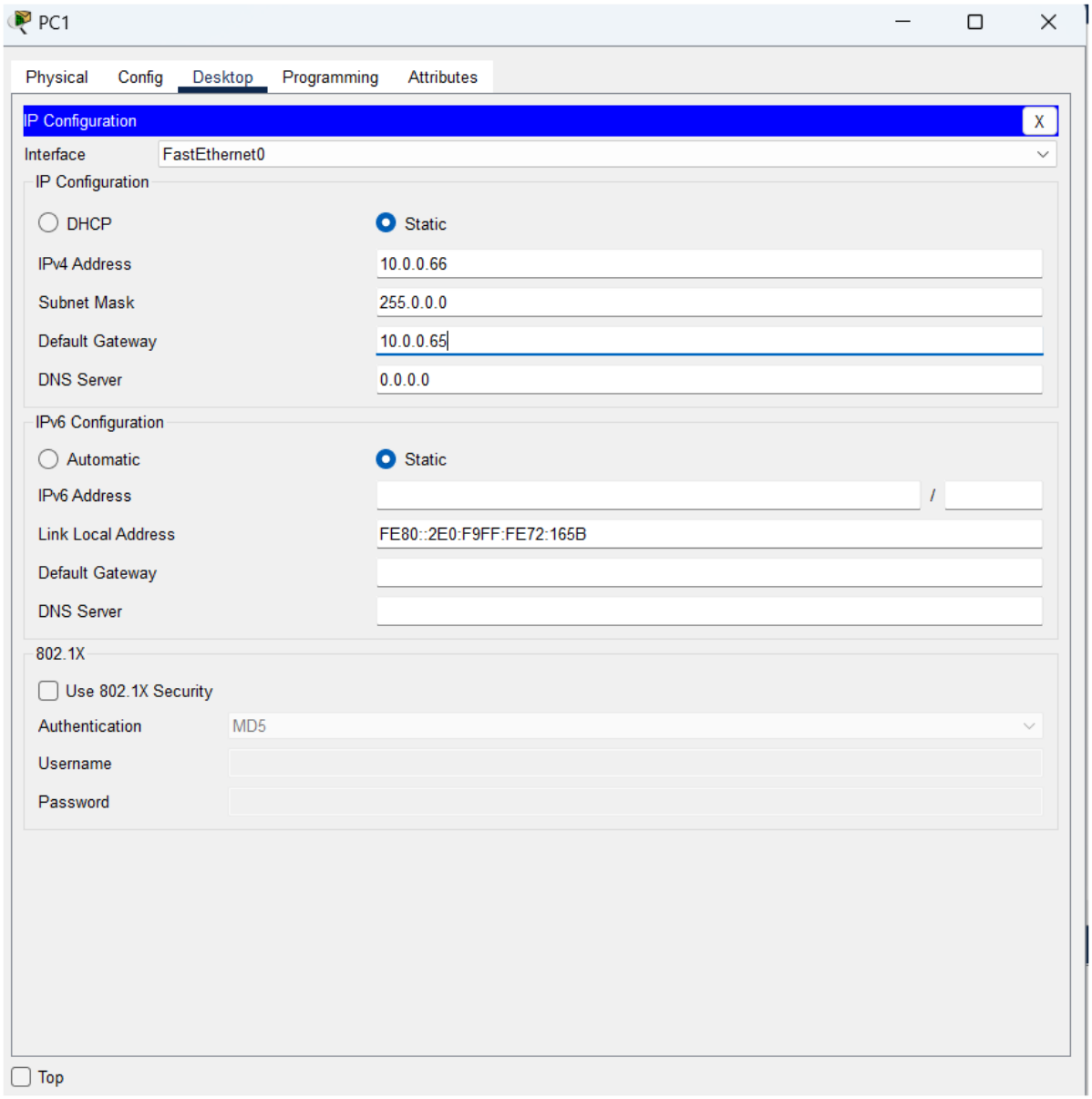
Network Diagram:



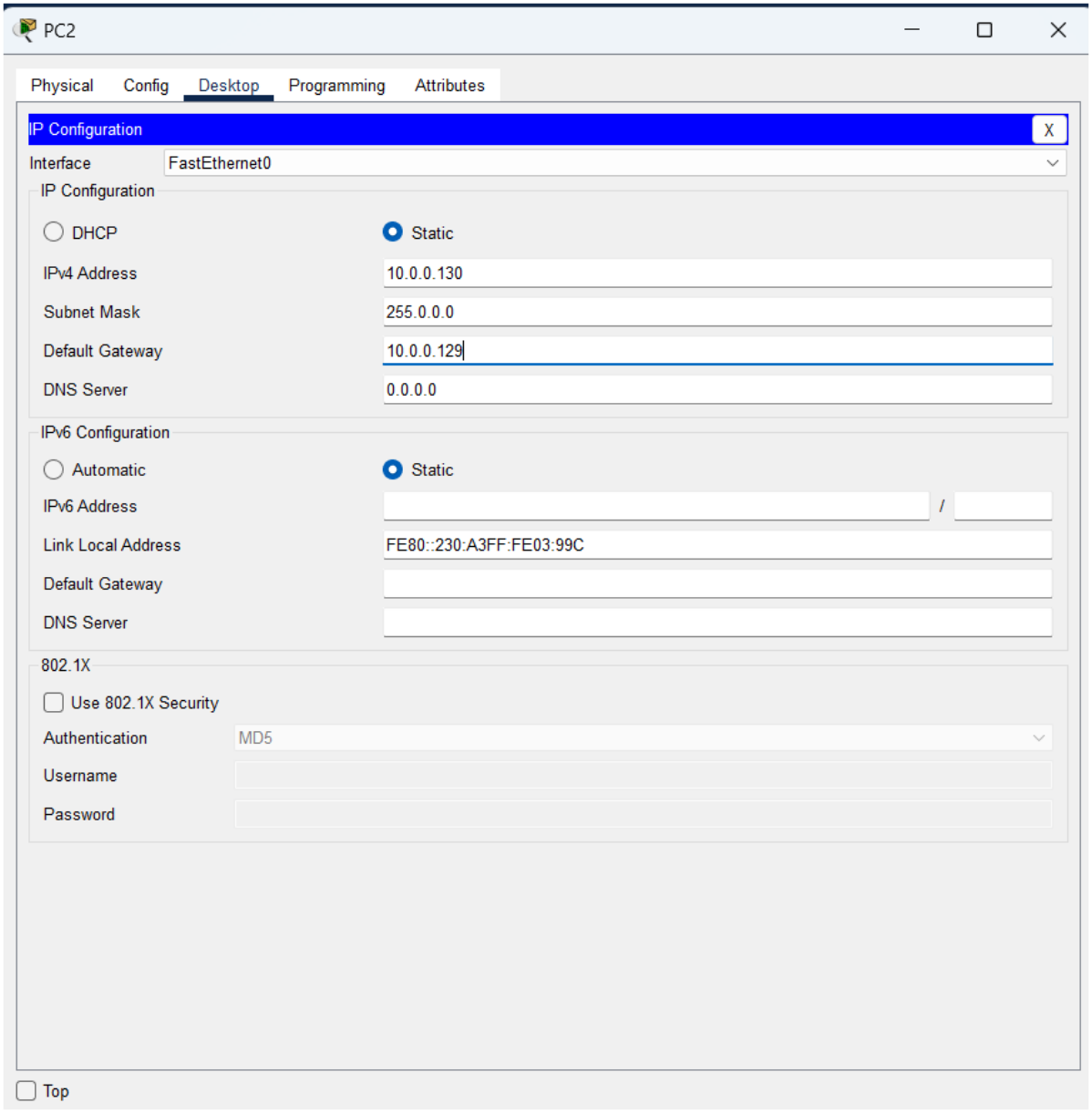
PC0


PC0
Physical
Config
Desktop
Programming
Attributes
IP Configuration
X
Interface
FastEthernet0
IP Configuration
DHCP
Static
IPv4 Address
10.0.0.2
Subnet Mask
255.0.0.0
Default Gateway
10.0.0.1
DNS Server
0.0.0.0
IPv6 Configuration
Automatic
Static
IPv6 Address
/
Link Local Address
FE80::201:96FF:FEA4:8C06
Default Gateway
DNS Server
802.1X
Use 802.1X Security
Authentication
MD5
Username
Password
Top

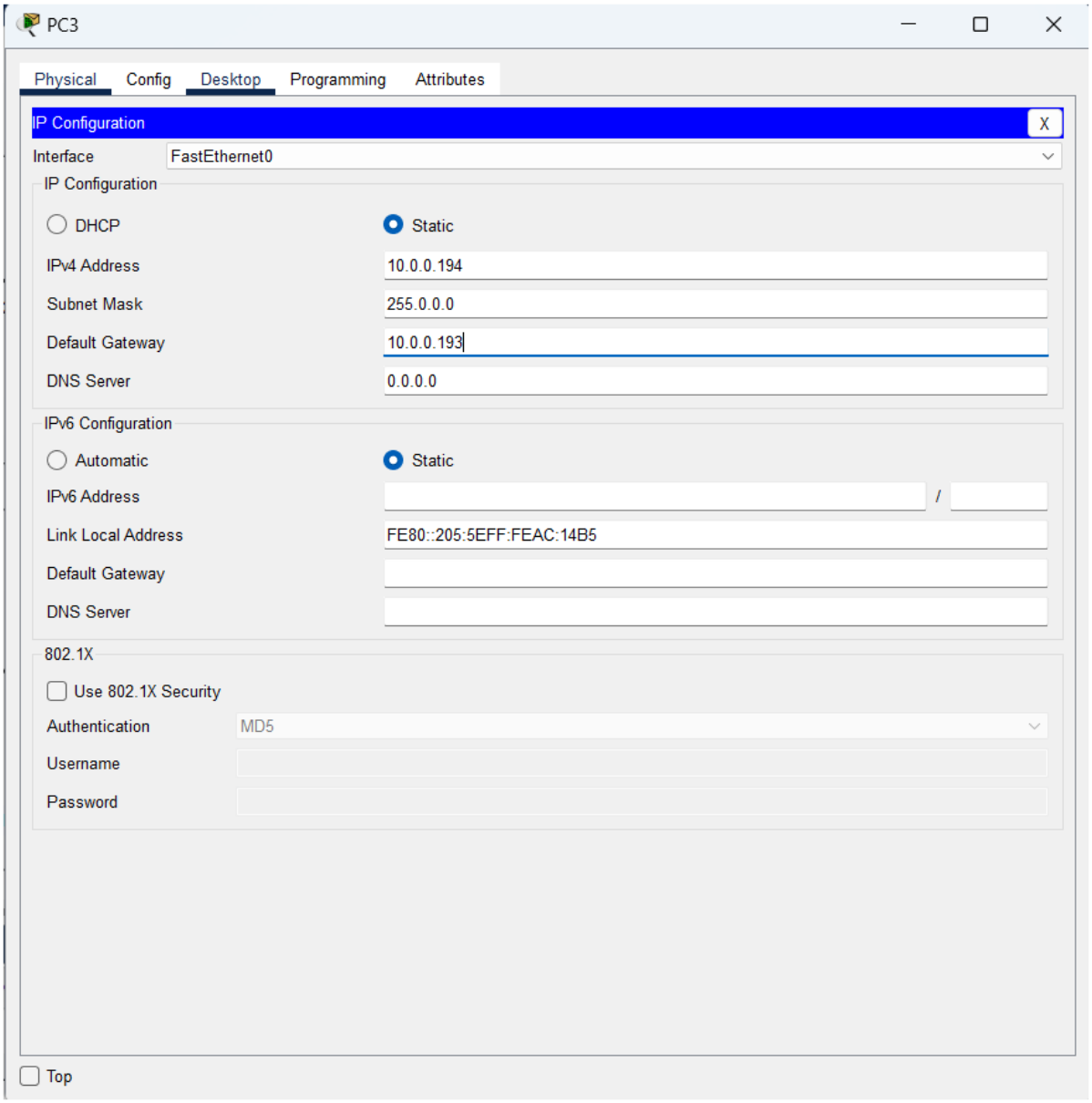
PC1


PC1
Physical
Config
Desktop
Programming
Attributes
IP Configuration
X
Interface
FastEthernet0
IP Configuration
DHCP
Static
IPv4 Address
10.0.0.66
Subnet Mask
255.0.0.0
Default Gateway
10.0.0.65
DNS Server
0.0.0.0
IPv6 Configuration
Automatic
Static
IPv6 Address
/
Link Local Address
FE80::2E0:F9FF:FE72:165B
Default Gateway
DNS Server
802.1X
Use 802.1X Security
Authentication
MD5
Username
Password
Top

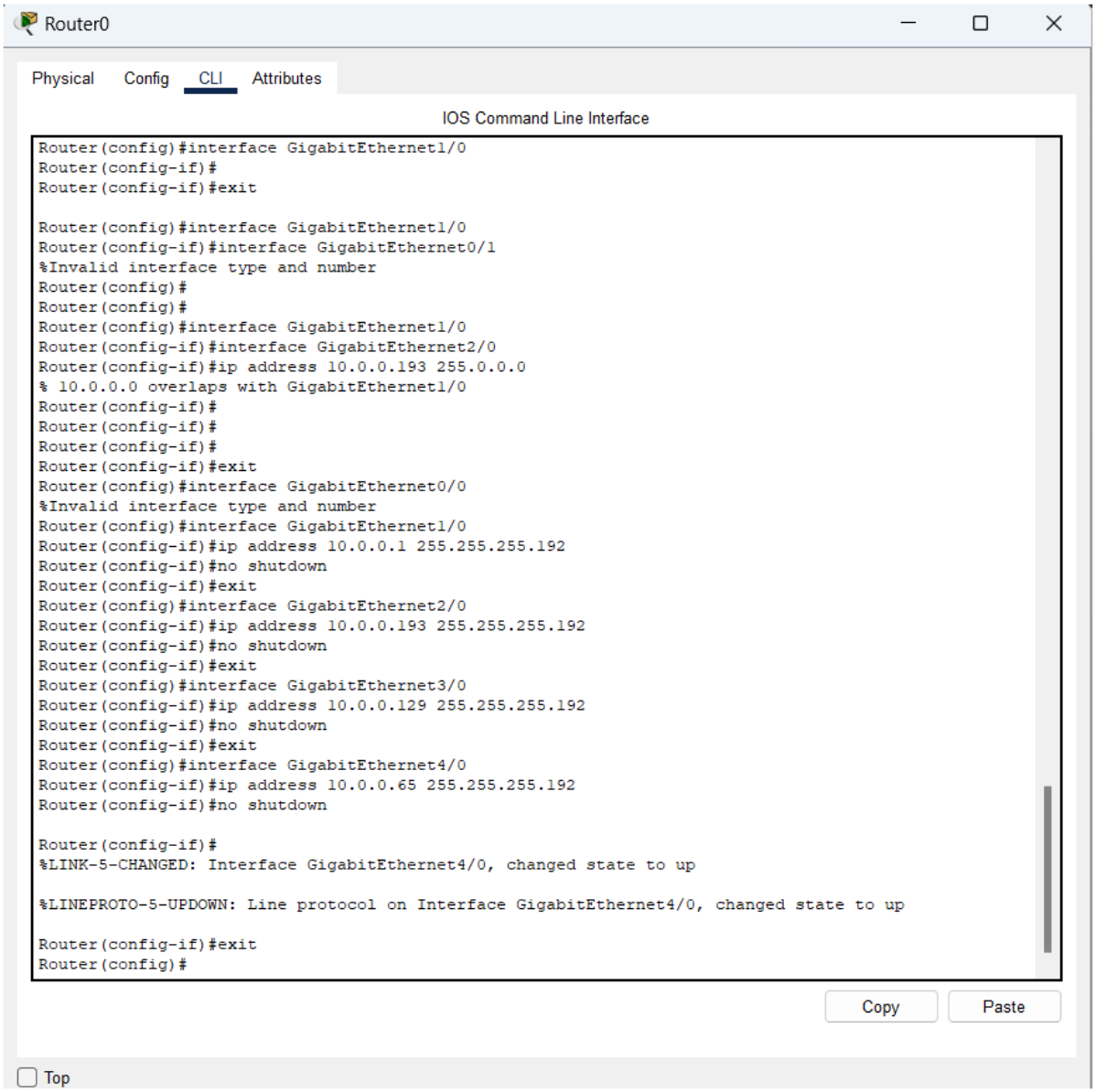
PC2


PC2
Physical
Config
Desktop
Programming
Attributes
IP Configuration
X
Interface
FastEthernet0
IP Configuration
DHCP
Static
IPv4 Address
10.0.0.130
Subnet Mask
255.0.0.0
Default Gateway
10.0.0.129
DNS Server
0.0.0.0
IPv6 Configuration
Automatic
Static
IPv6 Address
/
Link Local Address
FE80::230:A3FF:FE03:99C
Default Gateway
DNS Server
802.1X
Use 802.1X Security
Authentication
MD5
Username
Password
Top

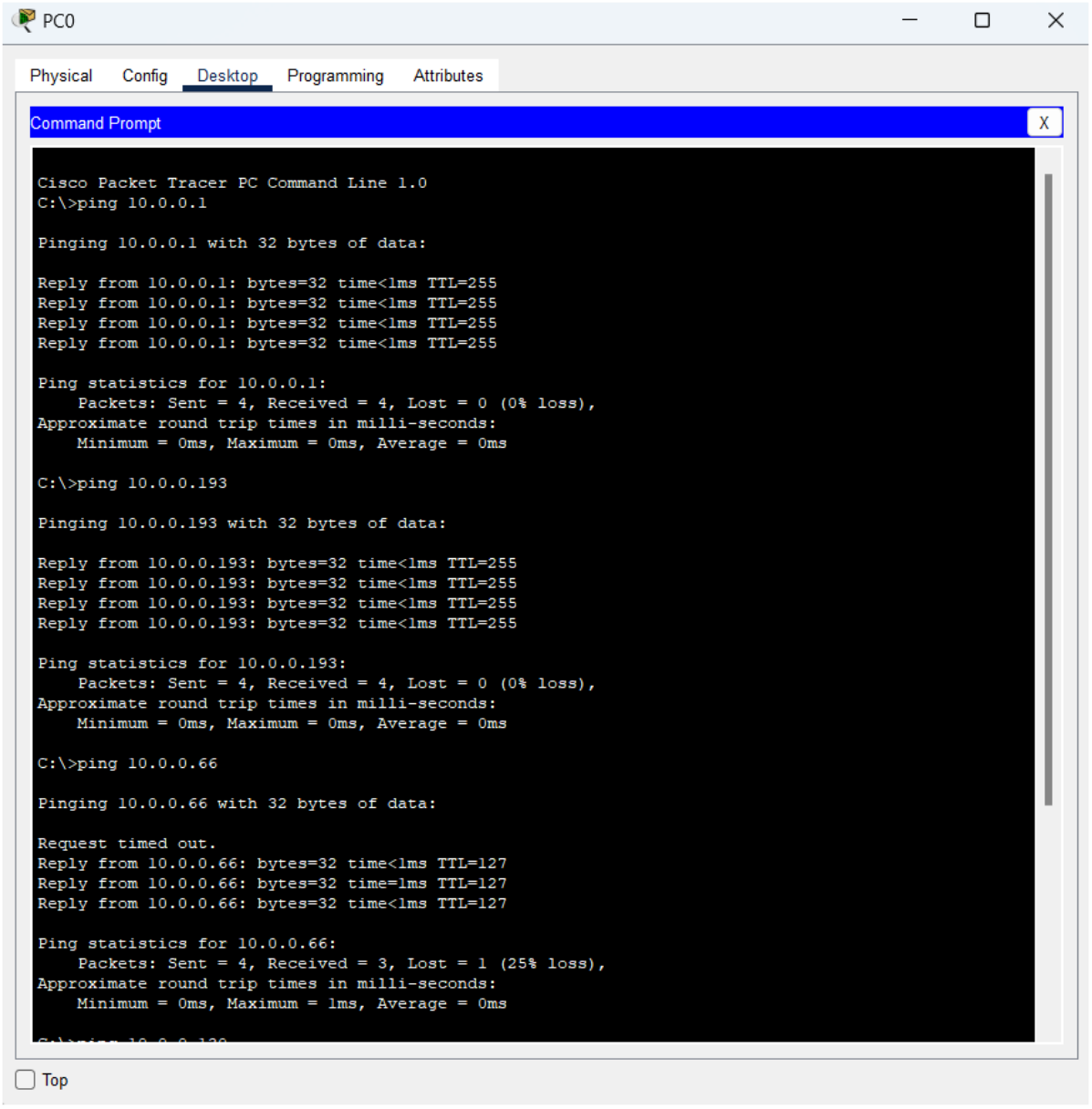
PC3

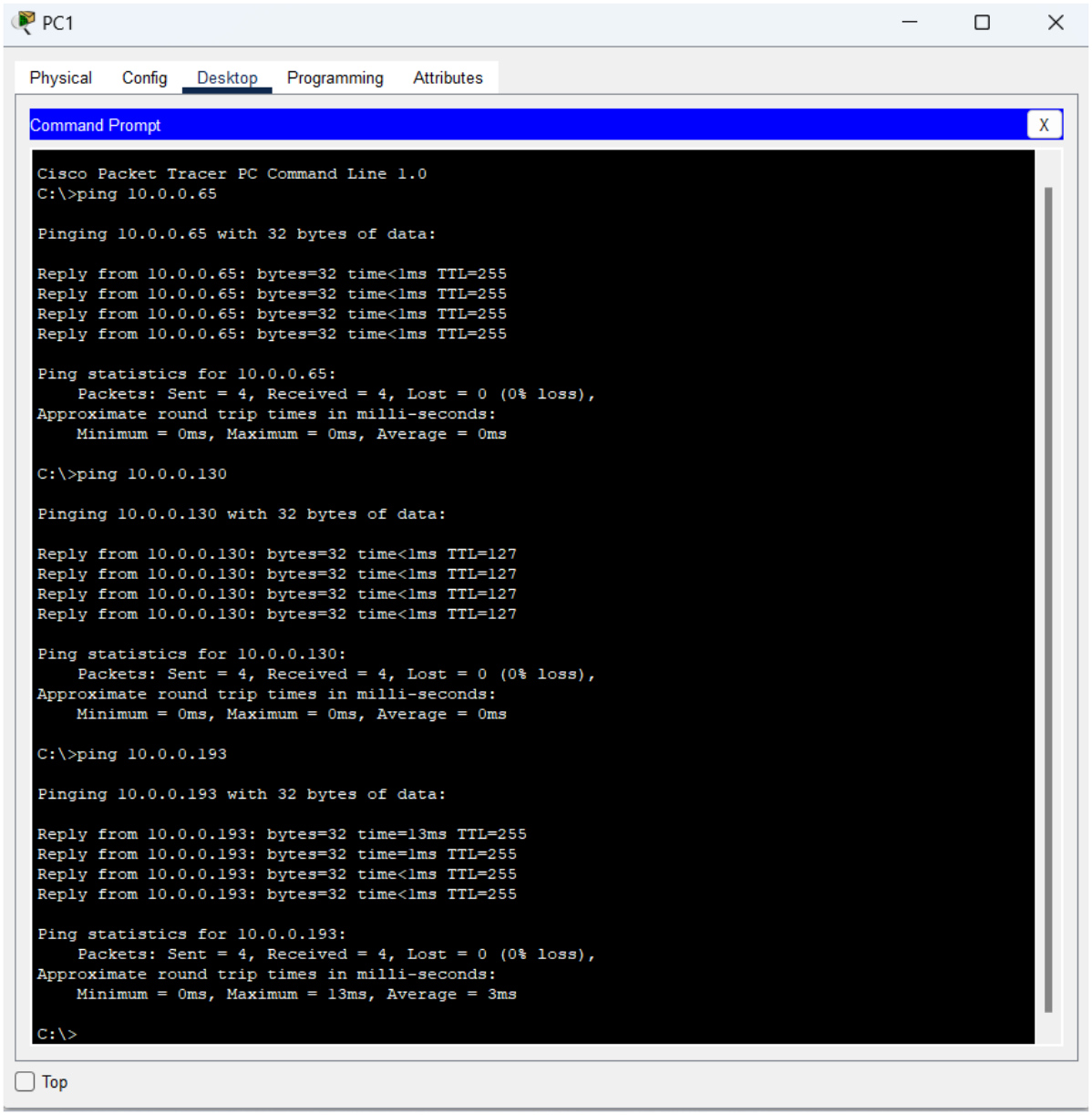

PC3
Physical
Config
Desktop
Programming
Attributes
IP Configuration
X
Interface
FastEthernet0
IP Configuration
DHCP
Static
IPv4 Address
10.0.0.194
Subnet Mask
255.0.0.0
Default Gateway
10.0.0.193
DNS Server
0.0.0.0
IPv6 Configuration
Automatic
Static
IPv6 Address
/
Link Local Address
FE80::205:5EFF:FEAC:14B5
Default Gateway
DNS Server
802.1X
Use 802.1X Security
Authentication
MD5
Username
Password
Top

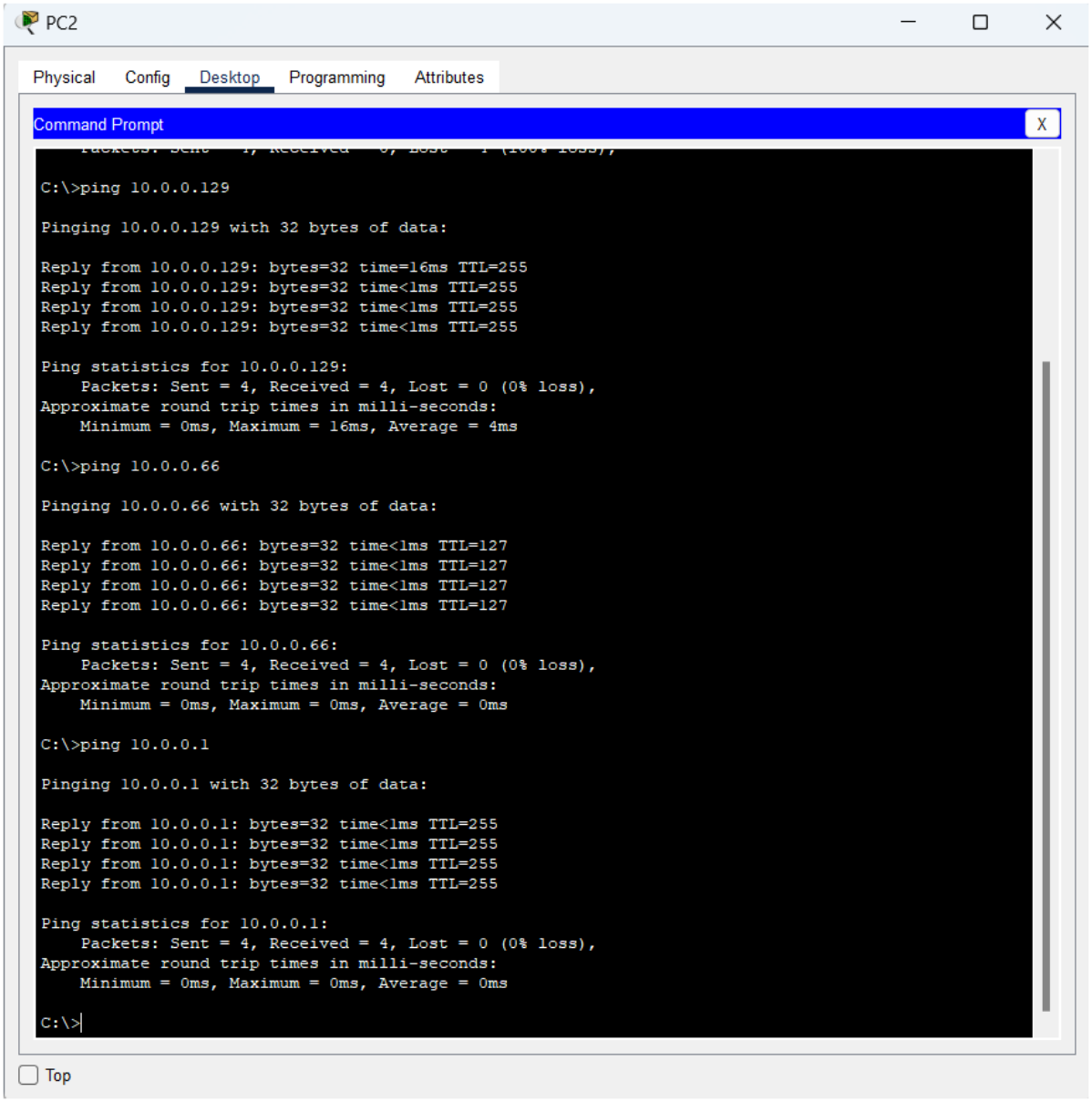
Router Configuration:

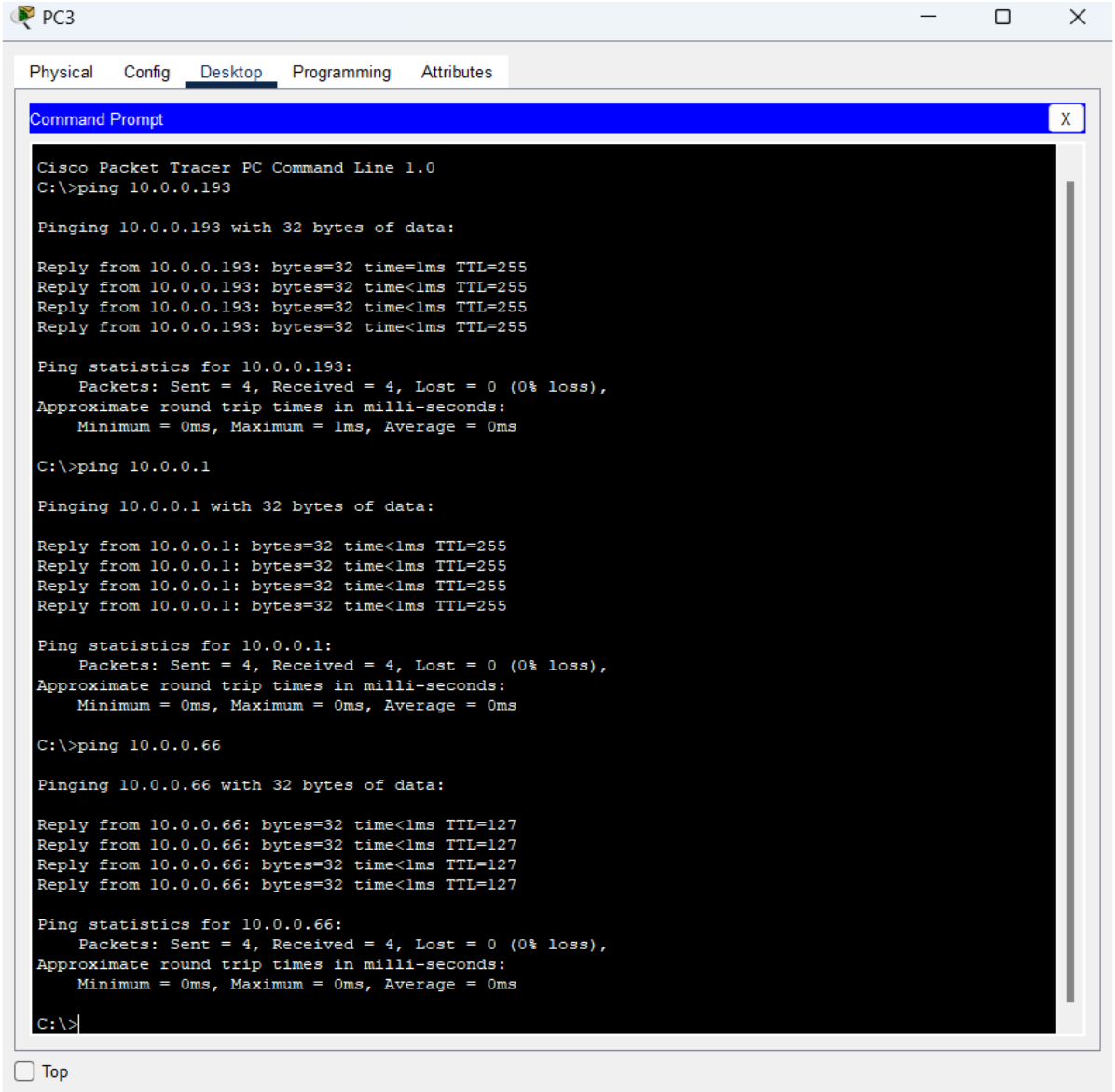


Testing Connectivity:




PC1
Physical
Config
Desktop
Programming
Attributes
Command Prompt
X
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 10.0.0.65
Pinging 10.0.0.65 with 32 bytes of data:
Reply from 10.0.0.65: bytes=32 time<1ms TTL=255
Reply from 10.0.0.65: bytes=32 time<1ms TTL=255
Reply from 10.0.0.65: bytes=32 time<1ms TTL=255
Reply from 10.0.0.65: bytes=32 time<1ms TTL=255
Ping statistics for 10.0.0.65:
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
Minimum = 0ms, Maximum = 0ms, Average = 0ms
C:\>ping 10.0.0.130
Pinging 10.0.0.130 with 32 bytes of data:
Reply from 10.0.0.130: bytes=32 time<1ms TTL=127
Reply from 10.0.0.130: bytes=32 time<1ms TTL=127
Reply from 10.0.0.130: bytes=32 time<1ms TTL=127
Reply from 10.0.0.130: bytes=32 time<1ms TTL=127
Ping statistics for 10.0.0.130:
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
Minimum = 0ms, Maximum = 0ms, Average = 0ms
C:\>ping 10.0.0.193
Pinging 10.0.0.193 with 32 bytes of data:
Reply from 10.0.0.193: bytes=32 time=13ms TTL=255
Reply from 10.0.0.193: bytes=32 time=1ms TTL=255
Reply from 10.0.0.193: bytes=32 time<1ms TTL=255
Reply from 10.0.0.193: bytes=32 time<1ms TTL=255
Ping statistics for 10.0.0.193:
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
Minimum = 0ms, Maximum = 13ms, Average = 3ms
C:\>
Top


PC2
Physical
Config
Desktop
Programming
Attributes
Command Prompt
X
C:\>ping 10.0.0.129
Pinging 10.0.0.129 with 32 bytes of data:
Reply from 10.0.0.129: bytes=32 time=16ms TTL=255
Reply from 10.0.0.129: bytes=32 time<1ms TTL=255
Reply from 10.0.0.129: bytes=32 time<1ms TTL=255
Reply from 10.0.0.129: bytes=32 time<1ms TTL=255
Ping statistics for 10.0.0.129:
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
Minimum = 0ms, Maximum = 16ms, Average = 4ms
C:\>ping 10.0.0.66
Pinging 10.0.0.66 with 32 bytes of data:
Reply from 10.0.0.66: bytes=32 time<1ms TTL=127
Reply from 10.0.0.66: bytes=32 time<1ms TTL=127
Reply from 10.0.0.66: bytes=32 time<1ms TTL=127
Reply from 10.0.0.66: bytes=32 time<1ms TTL=127
Ping statistics for 10.0.0.66:
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
Minimum = 0ms, Maximum = 0ms, Average = 0ms
C:\>ping 10.0.0.1
Pinging 10.0.0.1 with 32 bytes of data:
Reply from 10.0.0.1: bytes=32 time<1ms TTL=255
Reply from 10.0.0.1: bytes=32 time<1ms TTL=255
Reply from 10.0.0.1: bytes=32 time<1ms TTL=255
Reply from 10.0.0.1: bytes=32 time<1ms TTL=255
Ping statistics for 10.0.0.1:
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
Minimum = 0ms, Maximum = 0ms, Average = 0ms
C:\>
Top



Key Learning:

1.Subnet Mask Precision: The correct subnet mask (255.255.255.192) must be used consistently across all interfaces to prevent overlap errors - using a different mask like 255.0.0.0 causes the router to interpret networks incorrectly.

2.Interface Independence: Each subnet needs its own dedicated physical interface on the router with the appropriate gateway address (10.0.0.1, 10.0.0.65, etc.) to maintain proper network segmentation.

3.Connected Route Creation: A router automatically creates routing table entries for directly connected subnets, enabling communication between devices on different subnets without additional configuration.

4.Verification Through Connectivity: Successful pings between devices on different subnets confirms proper subnet implementation, interface configuration, and router functionality.