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Registration No:21BCE0527

Network Training Programme

Module 5

Q5. iven an IP address range of 192.168.1.0/24, divide the network into 4 subnets.

Task: Manually calculate the new subnet mask and the range of valid IP addresses for each subnet.

Assign IP addresses from these subnets to devices in Cisco Packet Tracer and verify connectivity using ping between them.

Step 1: Calculate the Subnet Mask and Ranges

To divide a /24 network into 4 subnets, we need to borrow 2 additional bits ($2^2 = 4$).

- Original network: 192.168.1.0/24
- New subnets will be: /26
- New subnet mask: 255.255.255.192

Each subnet will have 64 addresses (256 ÷ 4 = 64).

Subnet 1:

- Network address: 192.168.1.0/26
- First usable IP: 192.168.1.1
- Last usable IP: 192.168.1.62
- Broadcast address: 192.168.1.63

Subnet 2:

- Network address: 192.168.1.64/26
- First usable IP: 192.168.1.65
- Last usable IP: 192.168.1.126
- Broadcast address: 192.168.1.127

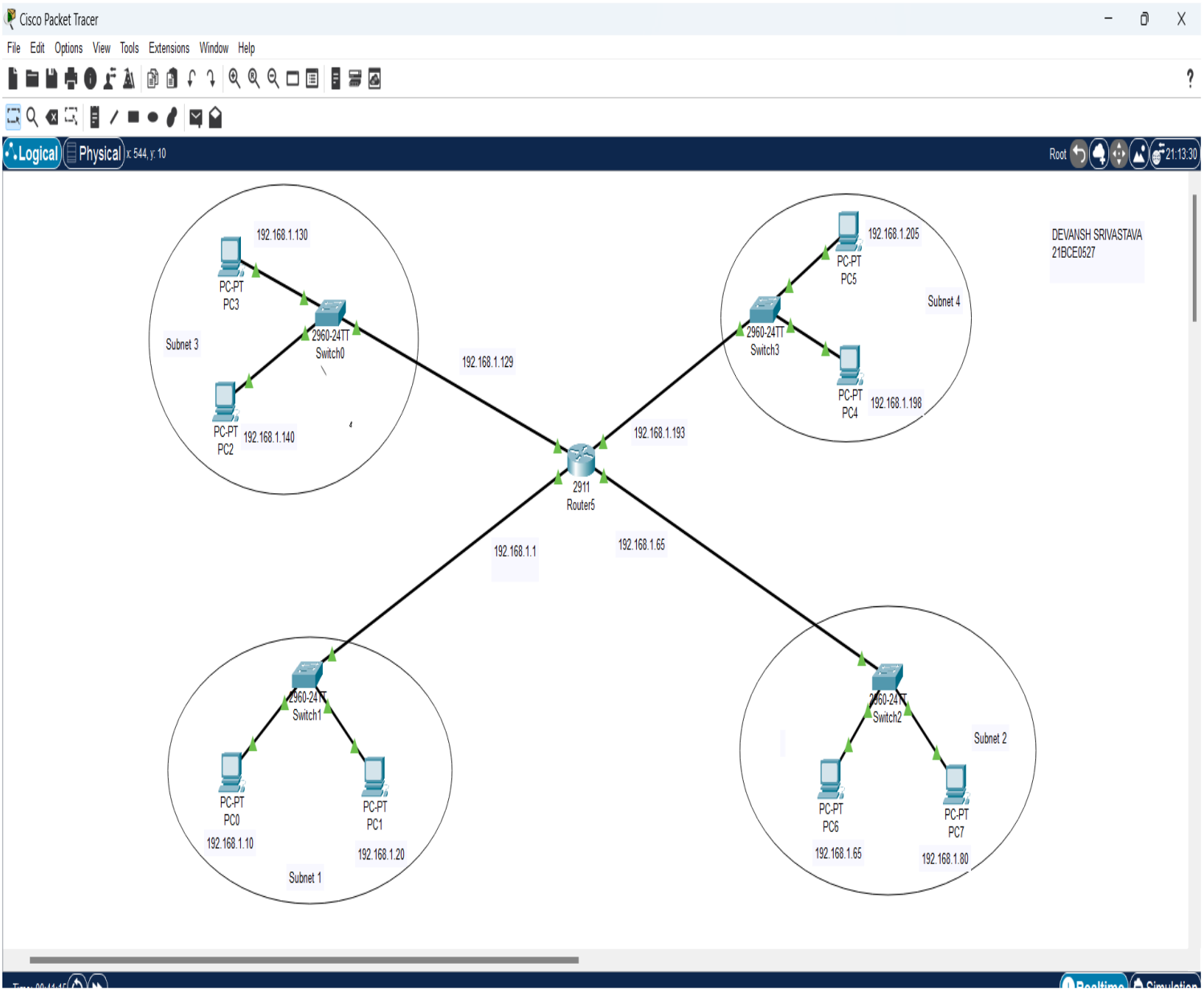
Subnet 3:

- Network address: 192.168.1.128/26
- First usable IP: 192.168.1.129
- Last usable IP: 192.168.1.190
- Broadcast address: 192.168.1.191

Subnet 4:

- Network address: 192.168.1.192/26
- First usable IP: 192.168.1.193
- Last usable IP: 192.168.1.254
- Broadcast address: 192.168.1.255

Network Diagram:



Configuration of IP address to the Pcs of each subnet along with default gateway of that subnet respectively

Default Gateway of each Subnet:

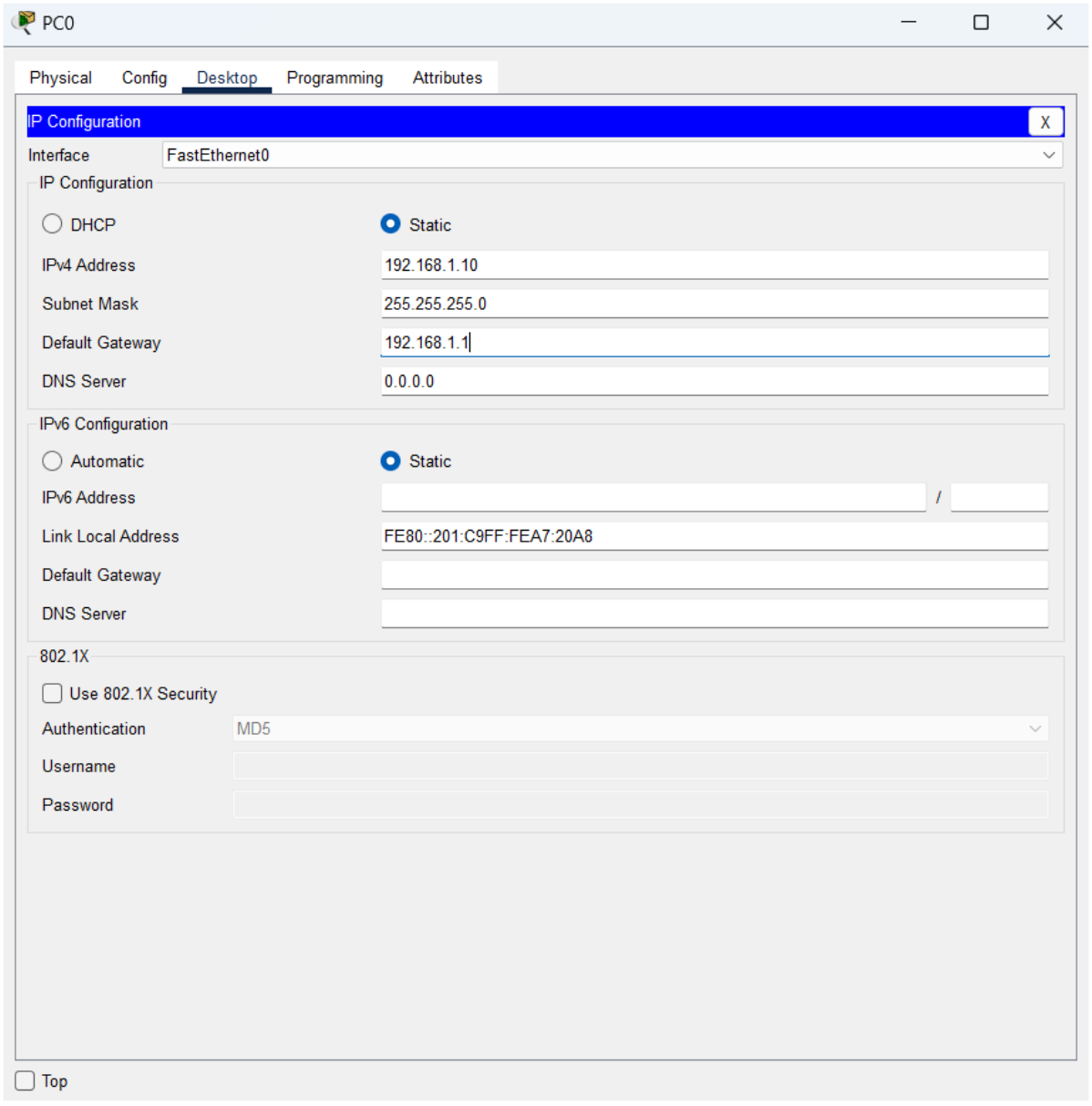
Subnet 1- 192.168.1.1

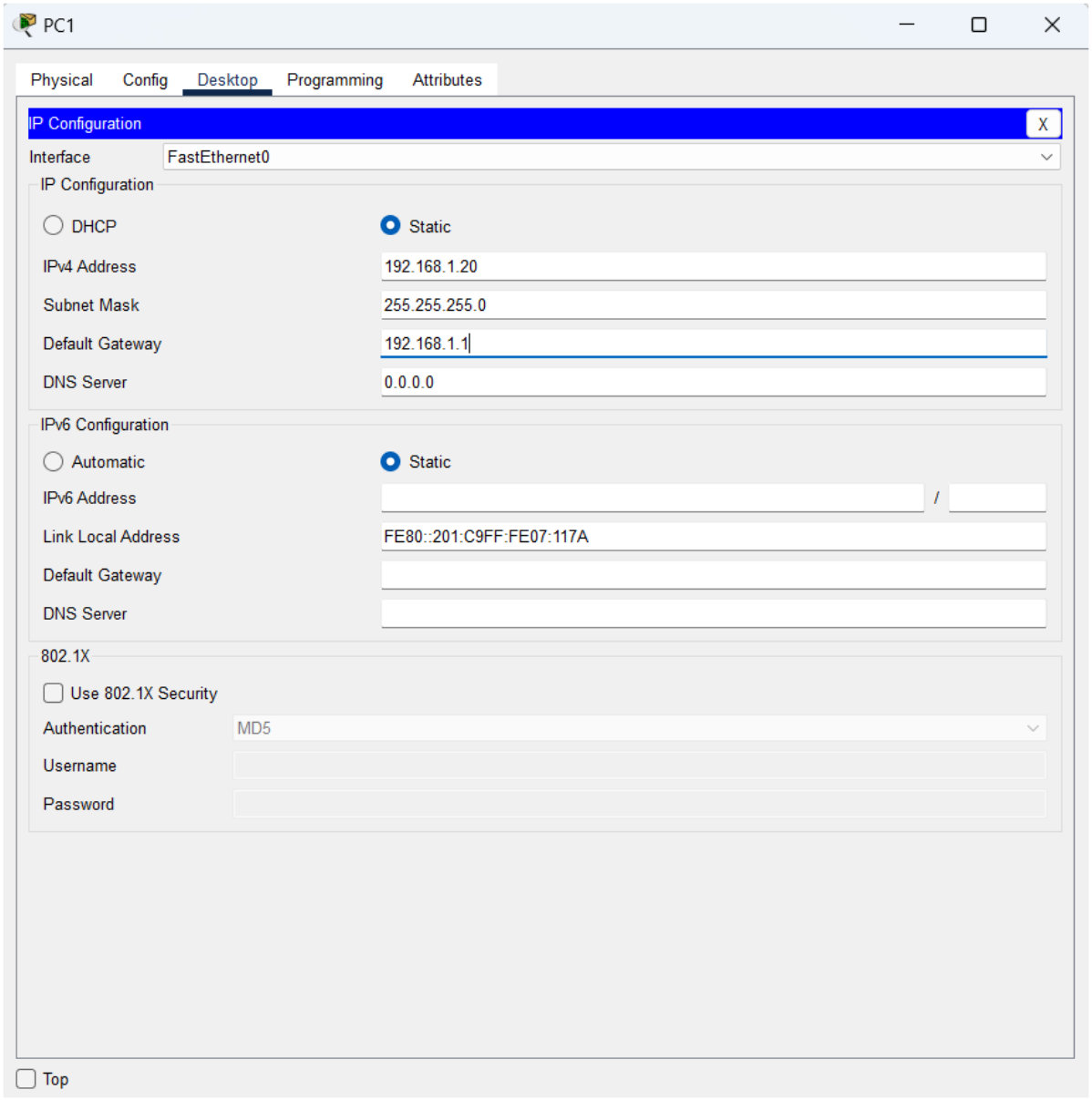
Subnet 2- 192.168.1.65

Subnet 3- 192.168.1.129

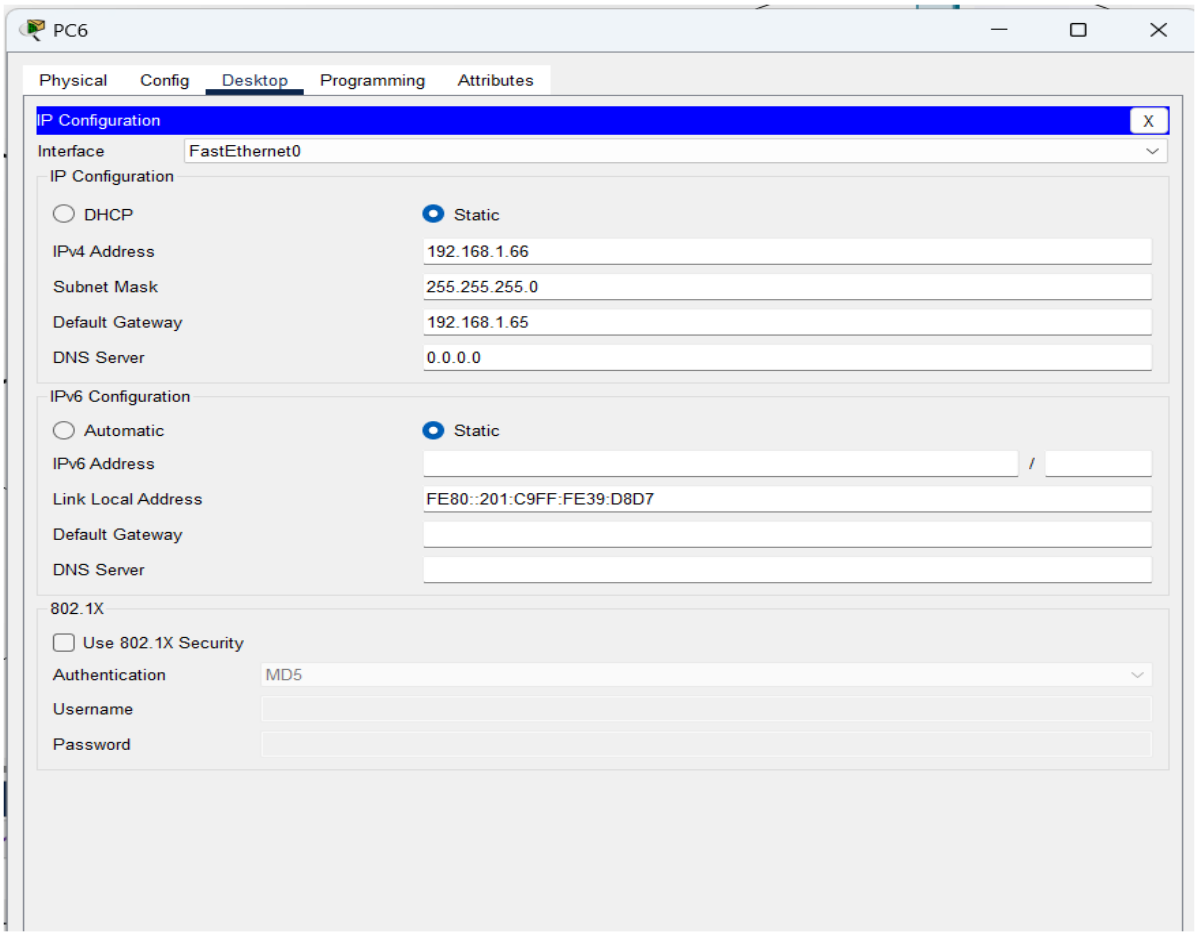
Subnet 4- 192.168.1.193

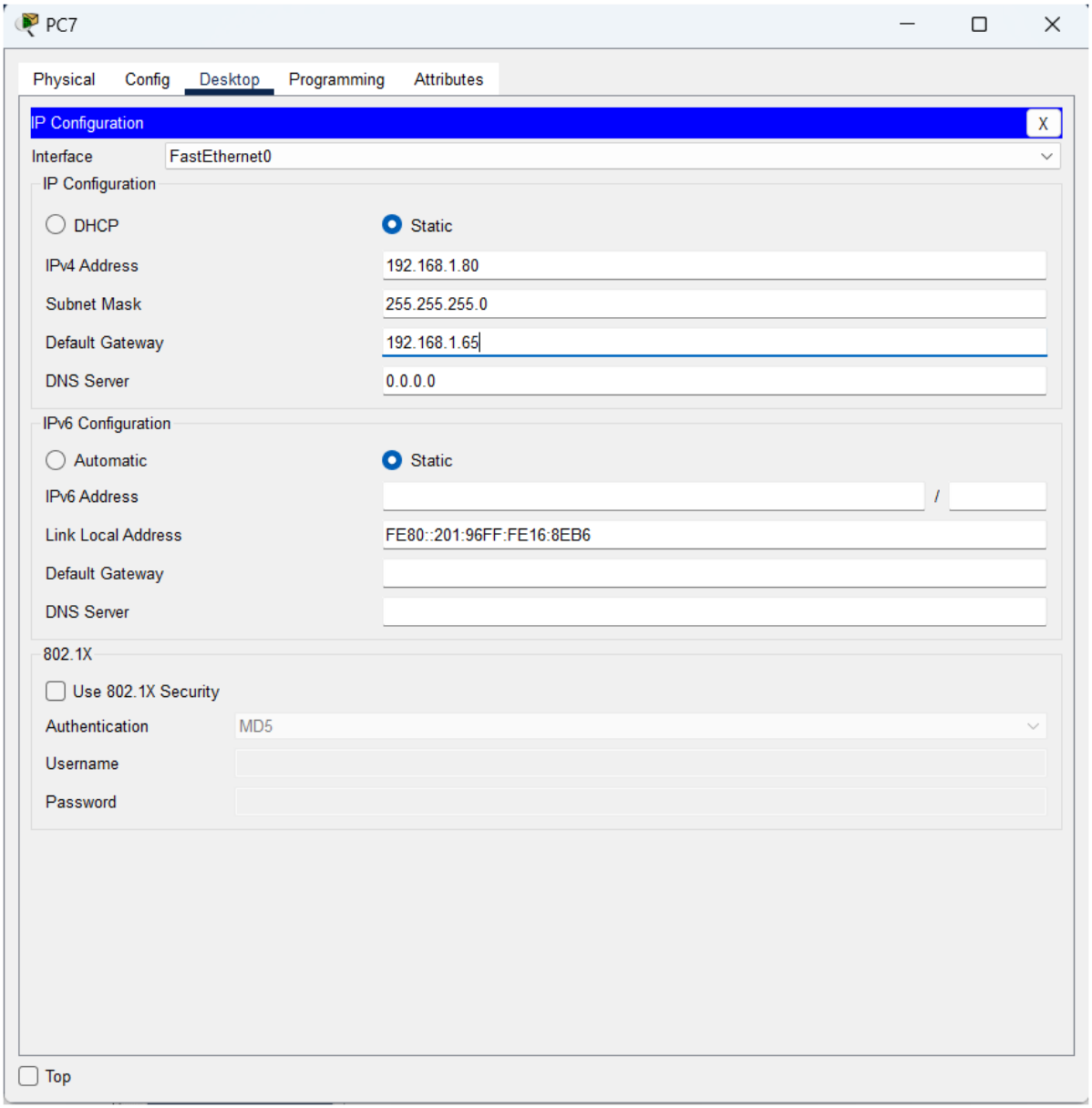
Subnet 1



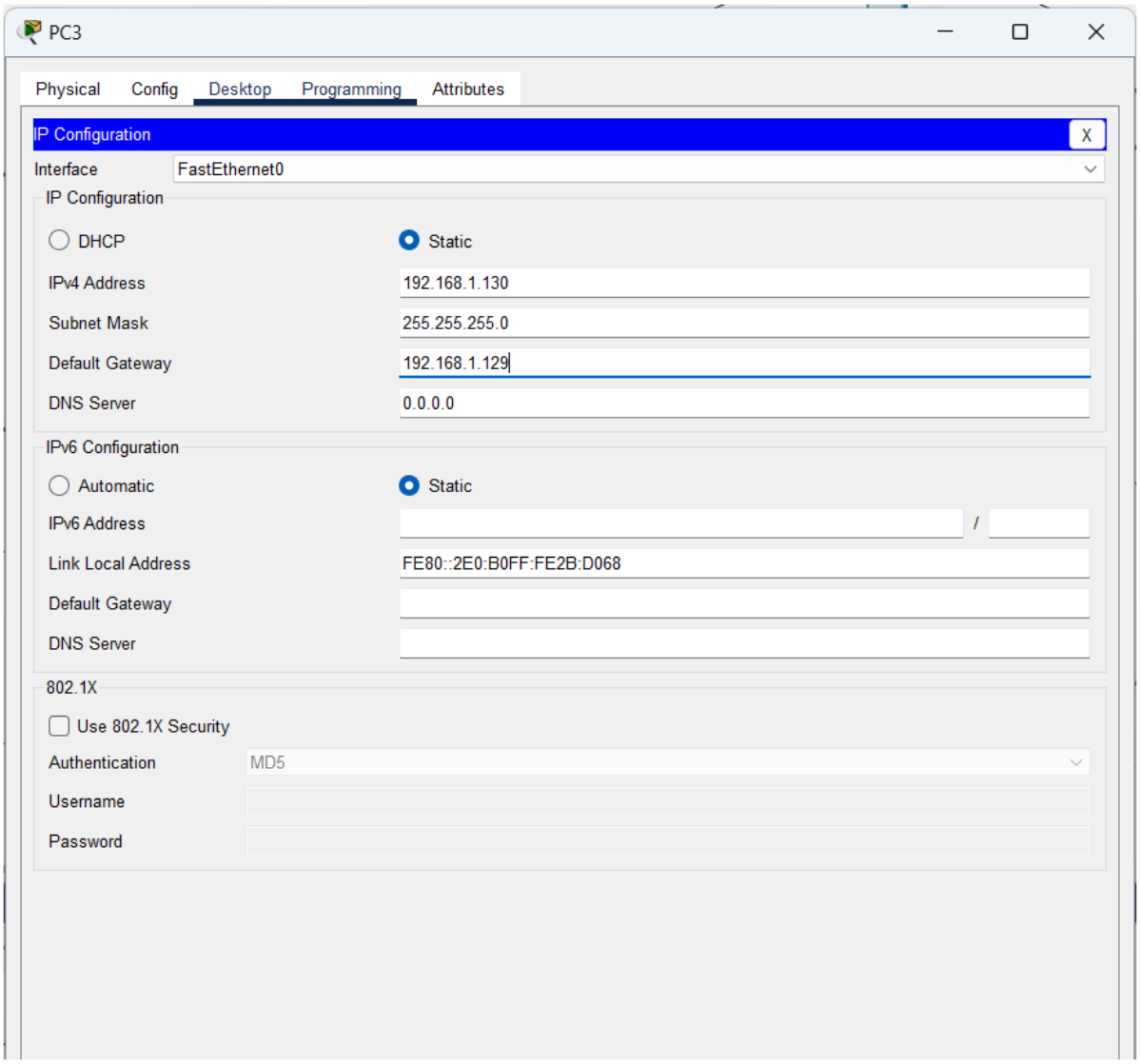

PC1
Physical
Config
Desktop
Programming
Attributes
IP Configuration
X
Interface
FastEthernet0
IP Configuration
DHCP
Static
IPv4 Address
192.168.1.20
Subnet Mask
255.255.255.0
Default Gateway
192.168.1.1
DNS Server
0.0.0.0
IPv6 Configuration
Automatic
Static
IPv6 Address
/
Link Local Address
FE80::201:C9FF:FE07:117A
Default Gateway
DNS Server
802.1X
Use 802.1X Security
Authentication
MD5
Username
Password
Top

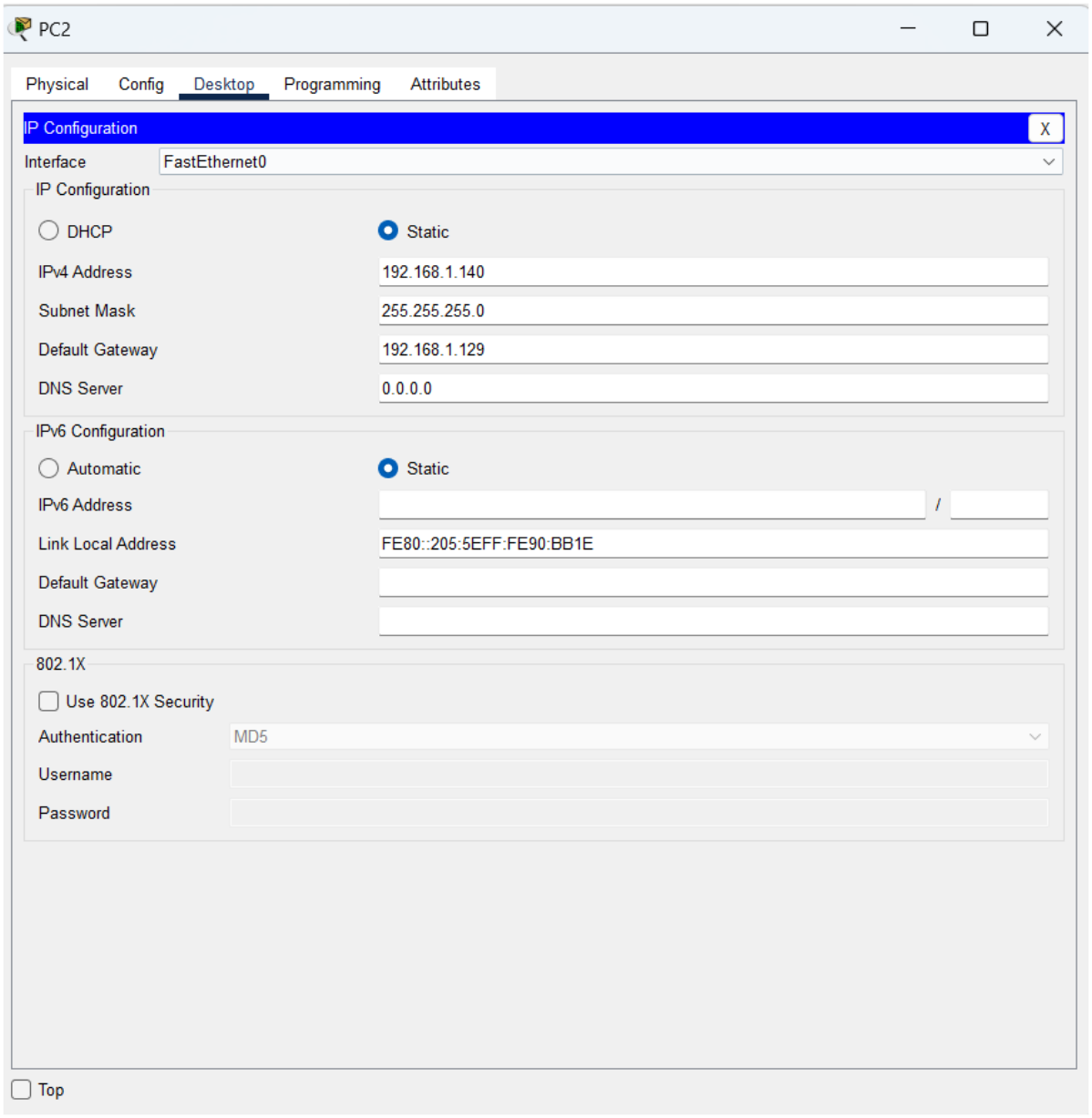
Subnet 2


PC6
Physical
Config
Desktop
Programming
Attributes
IP Configuration
X
Interface
FastEthernet0
IP Configuration
DHCP
Static
IPv4 Address
192.168.1.66
Subnet Mask
255.255.255.0
Default Gateway
192.168.1.65
DNS Server
0.0.0.0
IPv6 Configuration
Automatic
Static
IPv6 Address
/
Link Local Address
FE80::201:C9FF:FE39:D8D7
Default Gateway
DNS Server
802.1X
Use 802.1X Security
Authentication
MD5
Username
Password

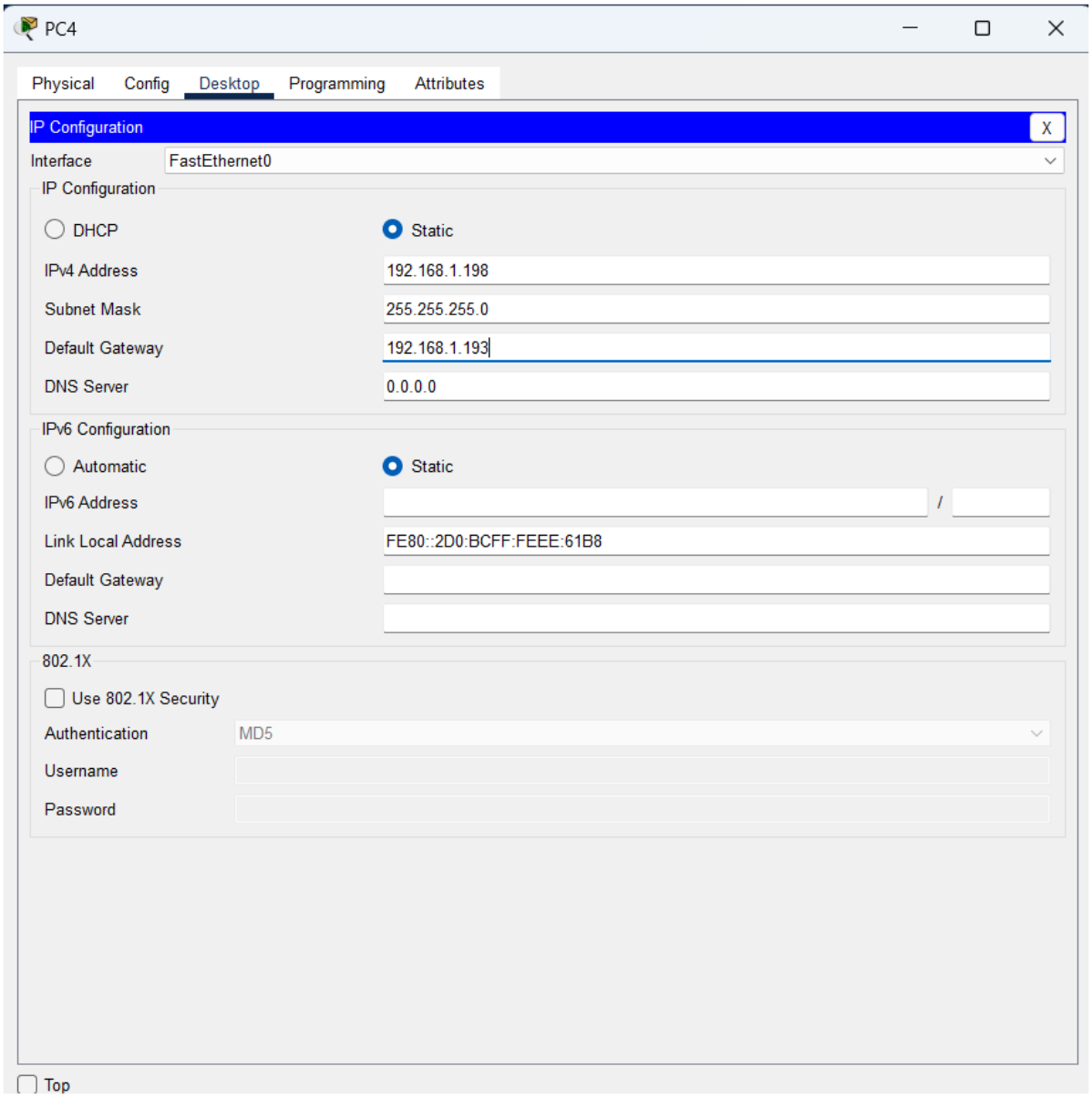

PC7
Physical
Config
Desktop
Programming
Attributes
IP Configuration
X
Interface
FastEthernet0
IP Configuration
DHCP
Static
IPv4 Address
192.168.1.80
Subnet Mask
255.255.255.0
Default Gateway
192.168.1.65
DNS Server
0.0.0.0
IPv6 Configuration
Automatic
Static
IPv6 Address
/
Link Local Address
FE80::201:96FF:FE16:8EB6
Default Gateway
DNS Server
802.1X
Use 802.1X Security
Authentication
MD5
Username
Password
Top

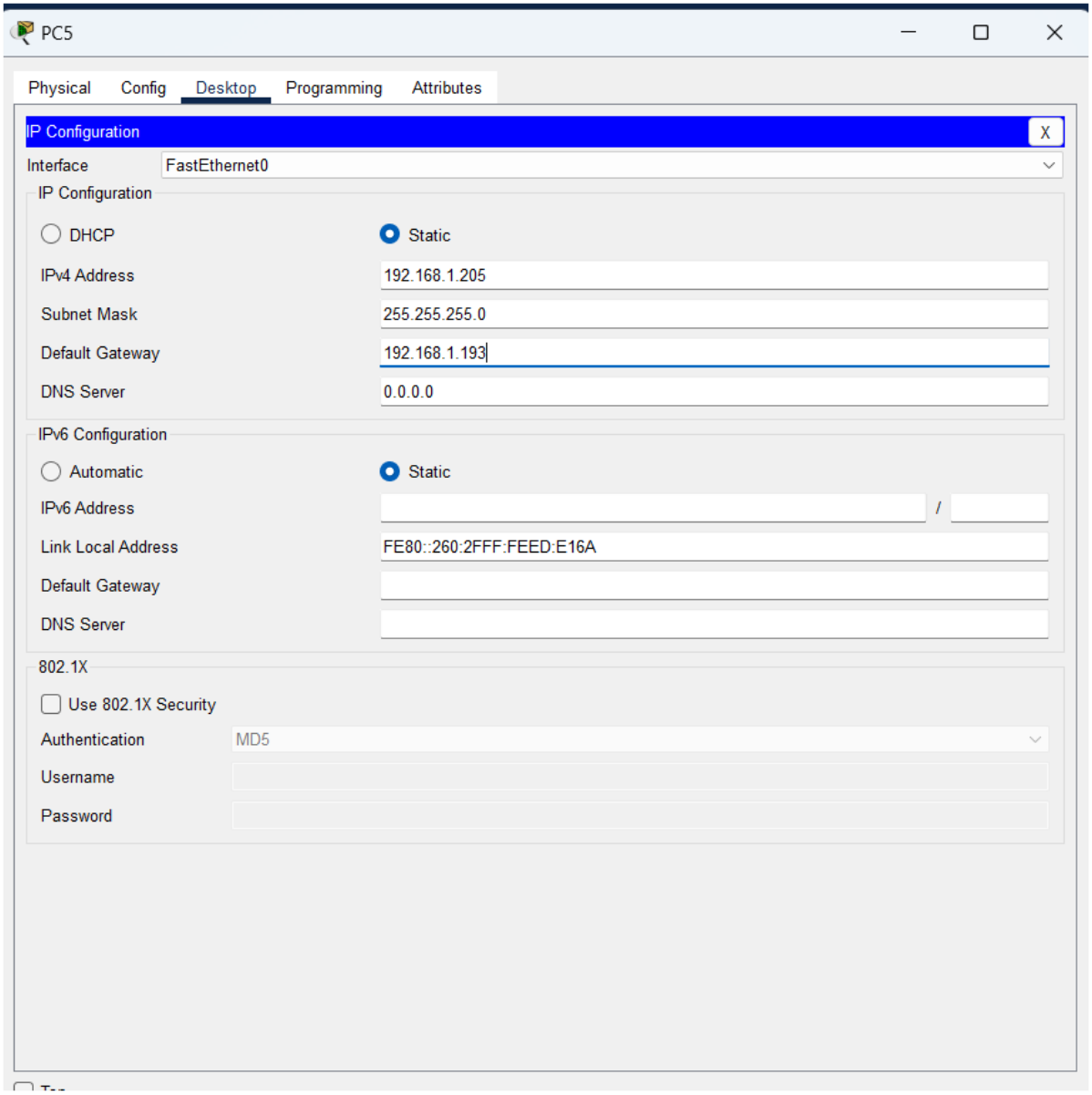
Subnet 3


PC3
Physical
Config
Desktop
Programming
Attributes
IP Configuration
X
Interface
FastEthernet0
IP Configuration
DHCP
Static
IPv4 Address
192.168.1.130
Subnet Mask
255.255.255.0
Default Gateway
192.168.1.129
DNS Server
0.0.0.0
IPv6 Configuration
Automatic
Static
IPv6 Address
Link Local Address
FE80::2E0:B0FF:FE2B:D068
Default Gateway
DNS Server
802.1X
Use 802.1X Security
Authentication
MD5
Username
Password


PC2
Physical
Config
Desktop
Programming
Attributes
IP Configuration
X
Interface
FastEthernet0
IP Configuration
DHCP
Static
IPv4 Address
192.168.1.140
Subnet Mask
255.255.255.0
Default Gateway
192.168.1.129
DNS Server
0.0.0.0
IPv6 Configuration
Automatic
Static
IPv6 Address
/
Link Local Address
FE80::205:5EFF:FE90:BB1E
Default Gateway
DNS Server
802.1X
Use 802.1X Security
Authentication
MD5
Username
Password
Top

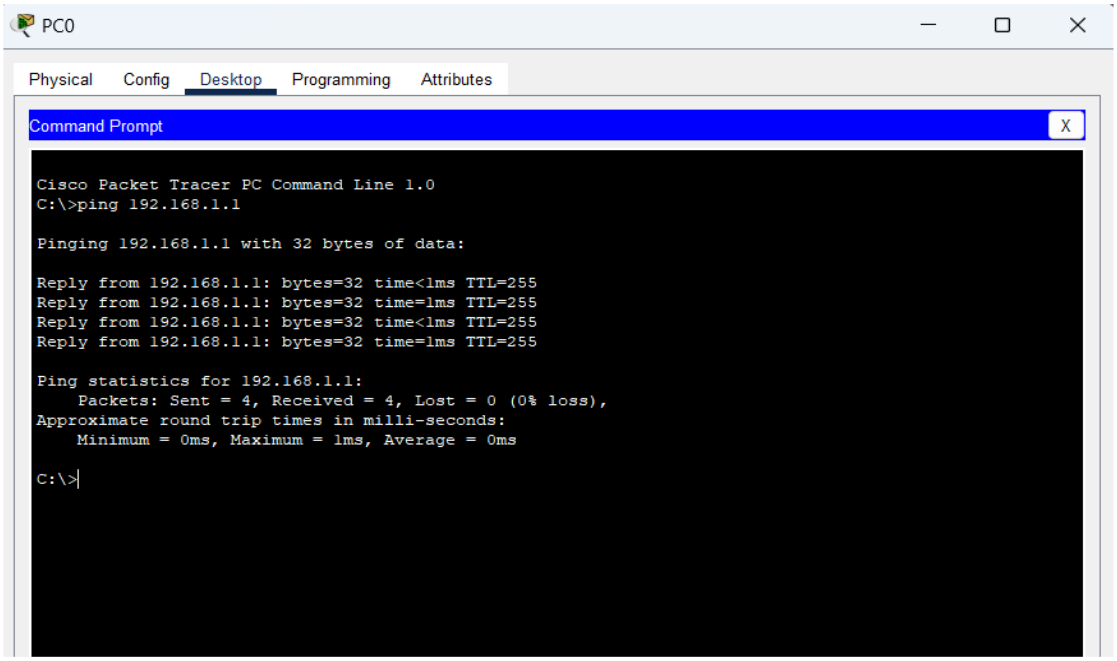
Subnet 4


PC4
Physical
Config
Desktop
Programming
Attributes
IP Configuration
X
Interface
FastEthernet0
IP Configuration
DHCP
Static
IPv4 Address
192.168.1.198
Subnet Mask
255.255.255.0
Default Gateway
192.168.1.193
DNS Server
0.0.0.0
IPv6 Configuration
Automatic
Static
IPv6 Address
/
Link Local Address
FE80::2D0:BCFF:FEEE:61B8
Default Gateway
DNS Server
802.1X
Use 802.1X Security
Authentication
MD5
Username
Password
Top

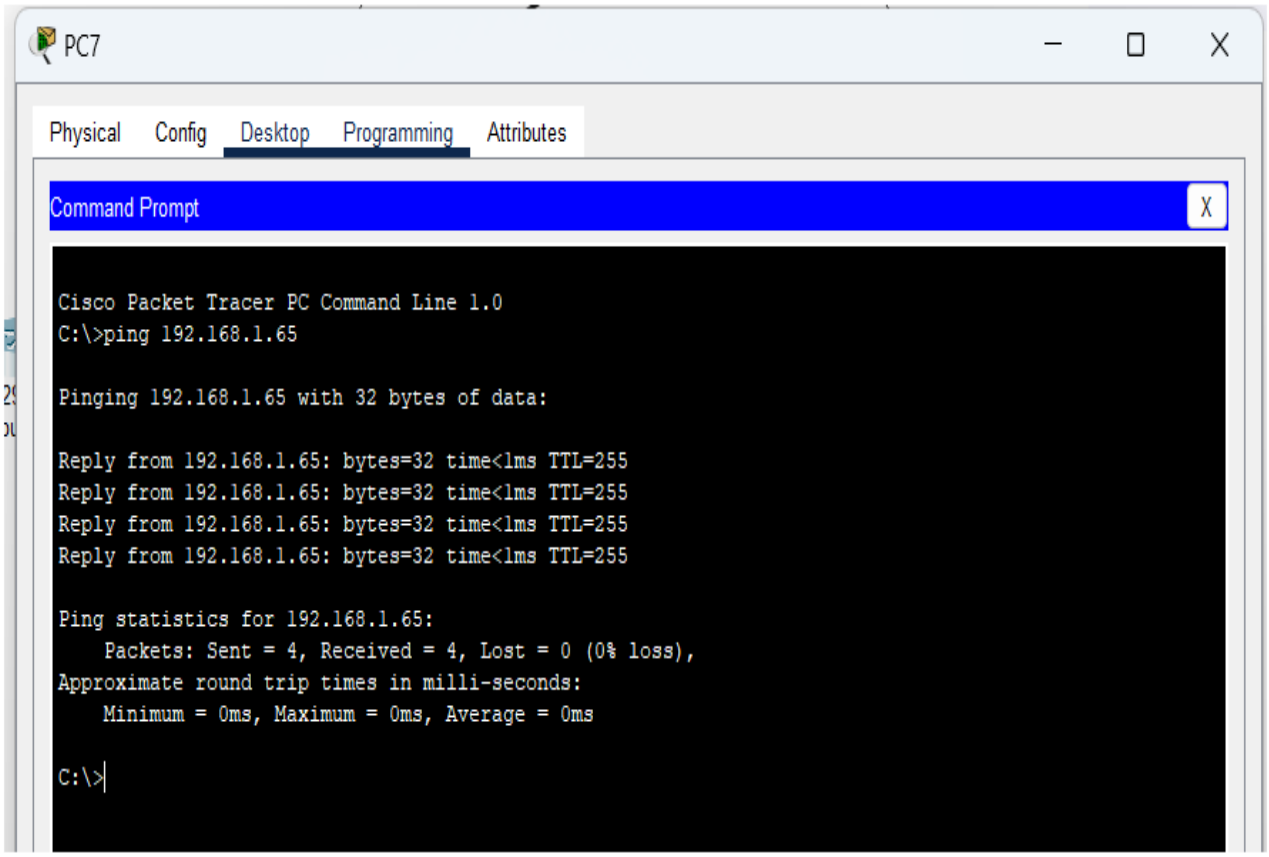

PC5
Physical
Config
Desktop
Programming
Attributes
IP Configuration
X
Interface
FastEthernet0
IP Configuration
DHCP
Static
IPv4 Address
192.168.1.205
Subnet Mask
255.255.255.0
Default Gateway
192.168.1.193
DNS Server
0.0.0.0
IPv6 Configuration
Automatic
Static
IPv6 Address
/
Link Local Address
FE80::260:2FFF:FEED:E16A
Default Gateway
DNS Server
802.1X
Use 802.1X Security
Authentication
MD5
Username
Password

Checking connectivity using Ping command:

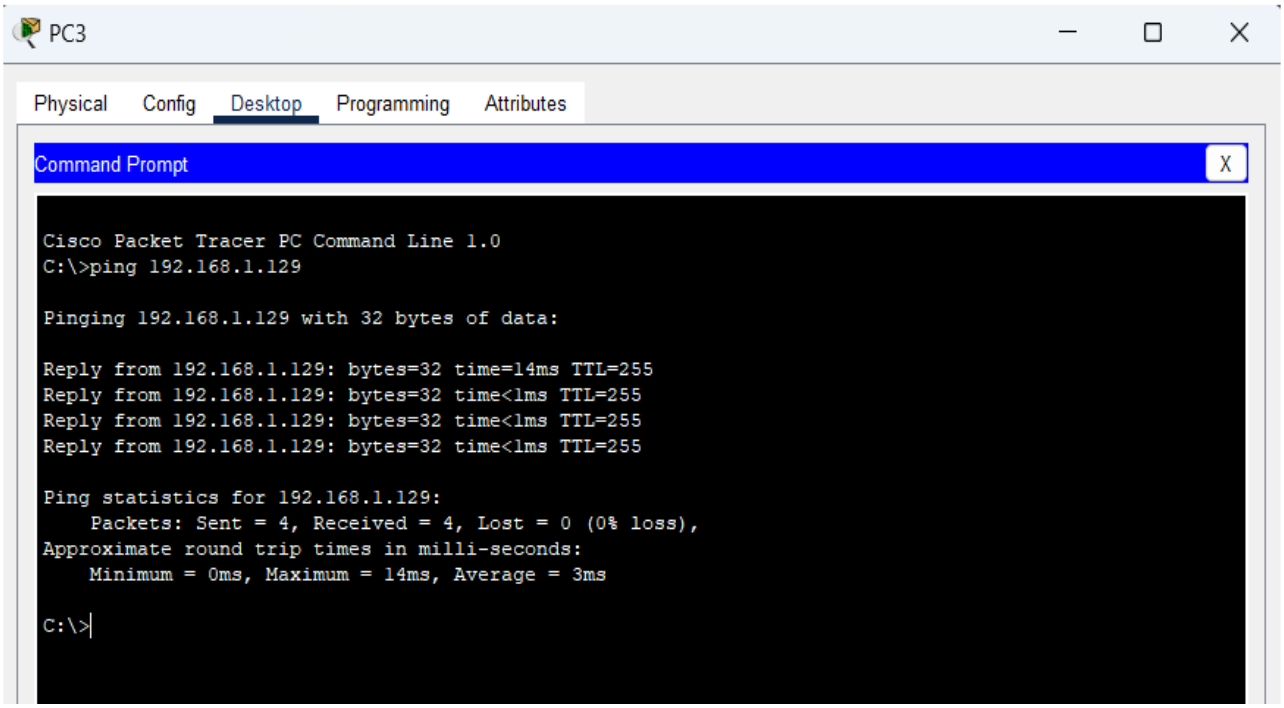
Subnet 1 PC



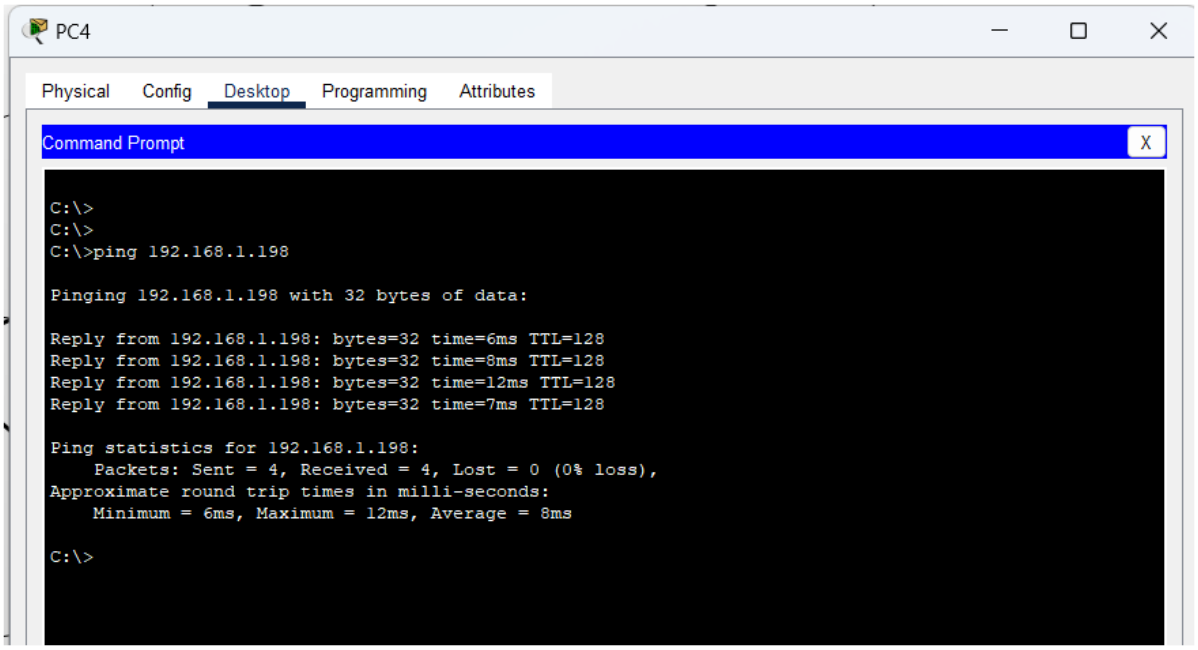
Subnet 2 PC



Subnet 3 PC


PC3
Physical
Config
Desktop
Programming
Attributes
Command Prompt
X
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 192.168.1.129
Pinging 192.168.1.129 with 32 bytes of data:
Reply from 192.168.1.129: bytes=32 time=14ms TTL=255
Reply from 192.168.1.129: bytes=32 time<1ms TTL=255
Reply from 192.168.1.129: bytes=32 time<1ms TTL=255
Reply from 192.168.1.129: bytes=32 time<1ms TTL=255
Ping statistics for 192.168.1.129:
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
Minimum = 0ms, Maximum = 14ms, Average = 3ms
C:\>

Subnet 4 PC


PC4
Physical
Config
Desktop
Programming
Attributes
Command Prompt
X
C:\>
C:\>
C:\>ping 192.168.1.198
Pinging 192.168.1.198 with 32 bytes of data:
Reply from 192.168.1.198: bytes=32 time=6ms TTL=128
Reply from 192.168.1.198: bytes=32 time=8ms TTL=128
Reply from 192.168.1.198: bytes=32 time=12ms TTL=128
Reply from 192.168.1.198: bytes=32 time=7ms TTL=128
Ping statistics for 192.168.1.198:
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
Minimum = 6ms, Maximum = 12ms, Average = 8ms
C:\>

Key Learning:

1. Subnetting allows efficient IP address management by dividing a large network into smaller segments.
2. Choosing the correct subnet mask depends on the required number of subnets (powers of 2).
3. A /26 mask divides a /24 network into 4 equal subnets.
4. Each subnet has 62 usable IPs (excluding network & broadcast addresses).