# ECE4016 Assignment 03: Part 2. Network Design Simulation

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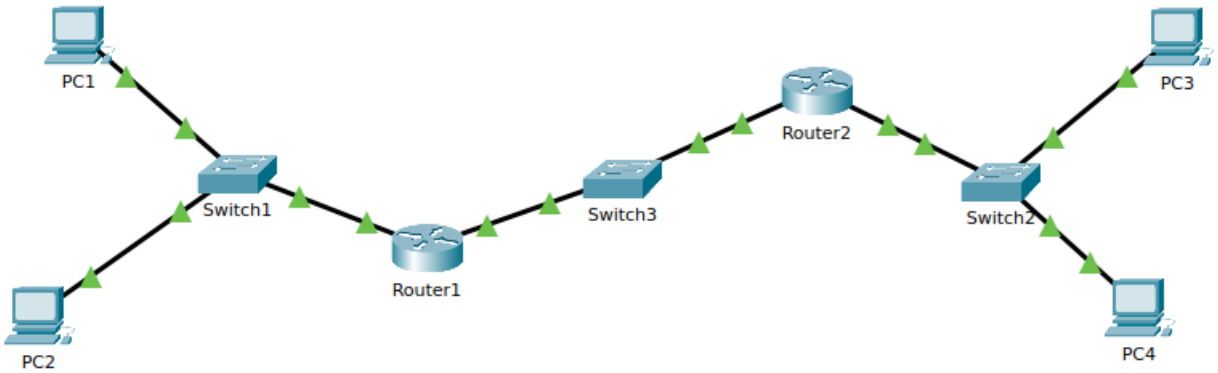
## Task 1

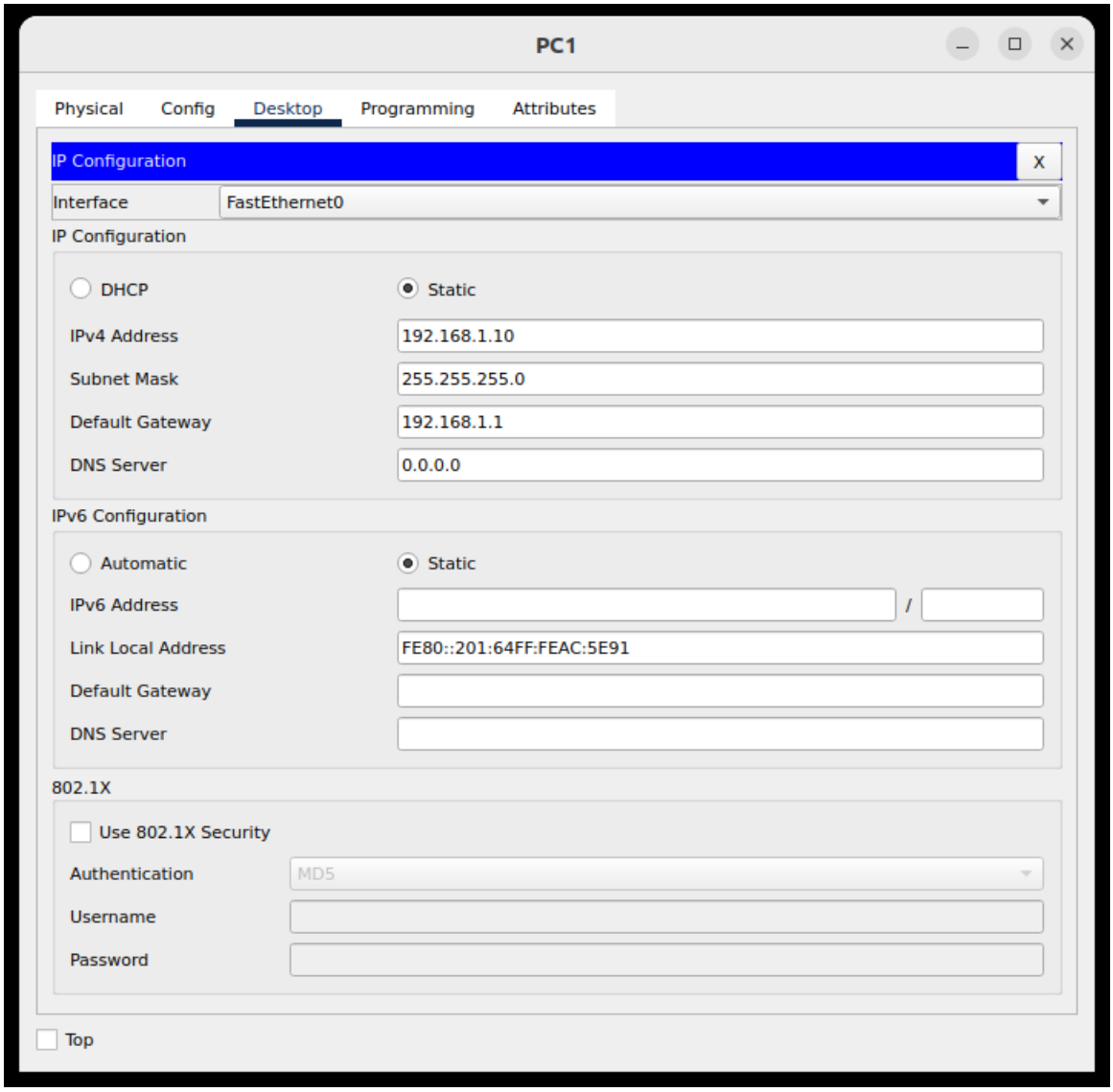
### I. Configuration

In this task, we have 4 PCs, 3 Switches and 2 Routers. The topology of this task is as following:

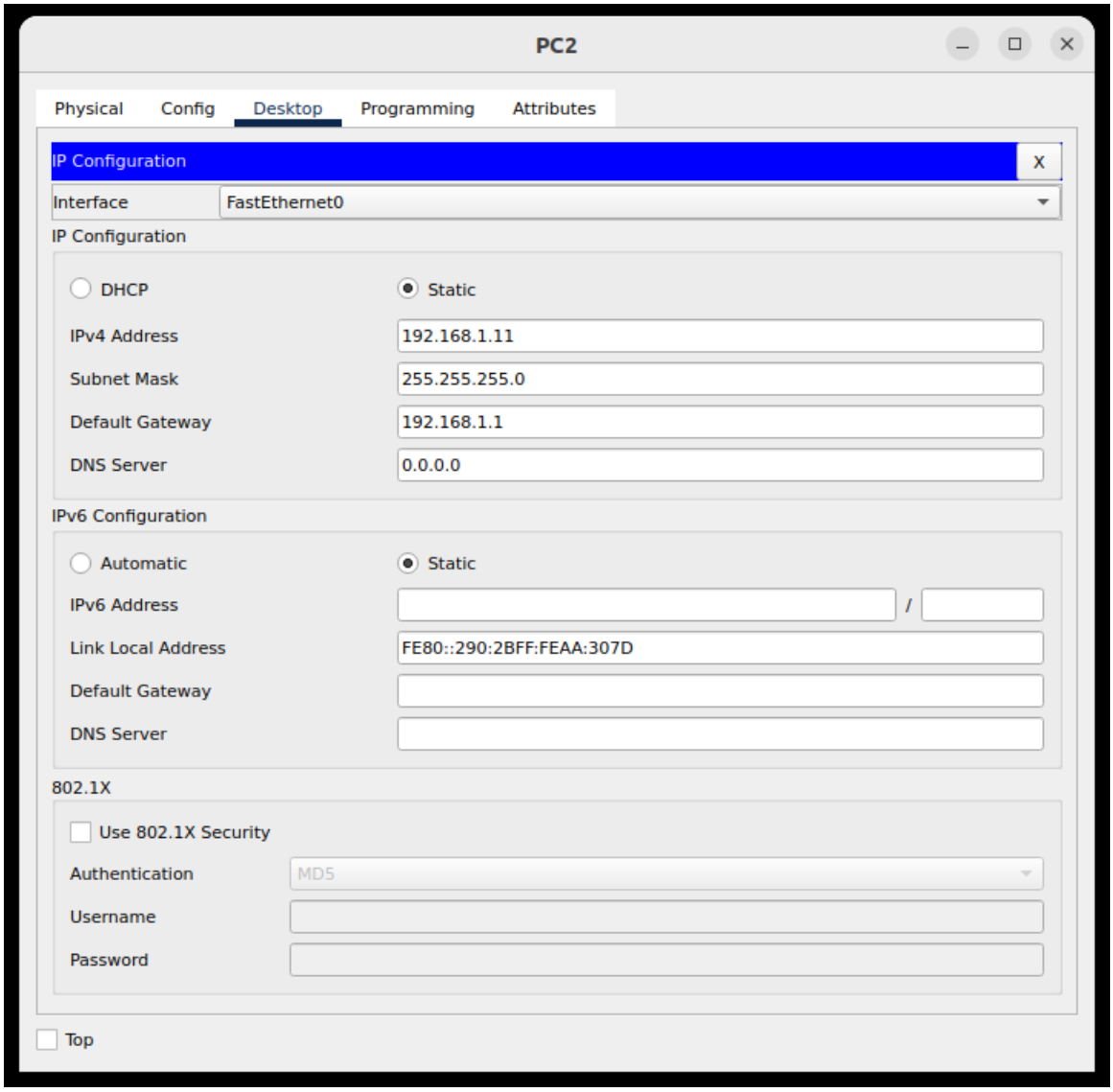



For **PCs**, configuration of **IPv4 Address, Subnet Mask and Default Gateway** is needed.

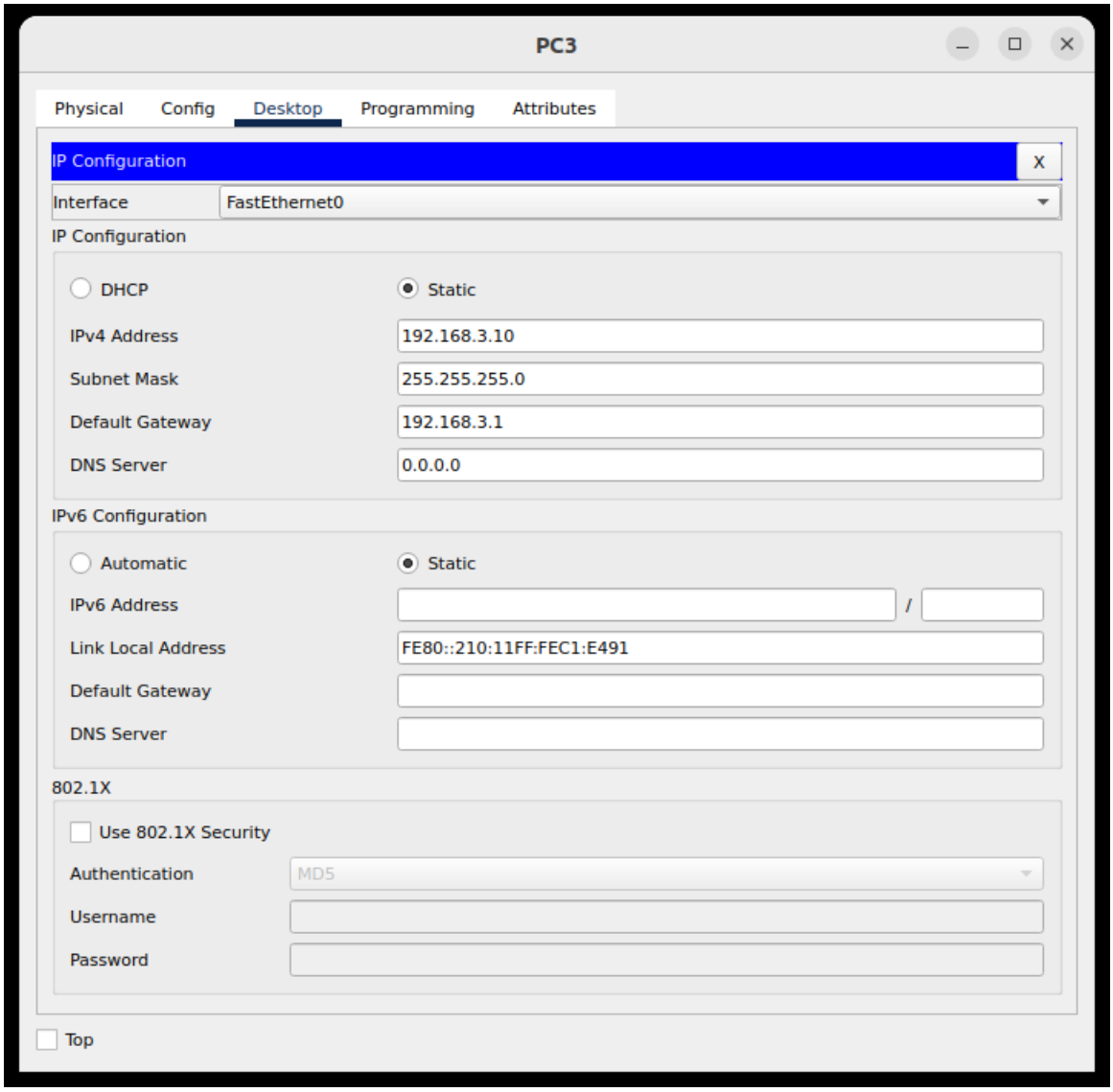
- PC1:


PC1
Physical
Config
Desktop
Programming
Attributes
IP Configuration
X
Interface
FastEthernet0
IP Configuration
DHCP
Static
IPv4 Address
192.168.1.10
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::201:64FF:FEAC:5E91
Default Gateway
DNS Server
802.1X
Use 802.1X Security
Authentication
MD5
Username
Password
Top

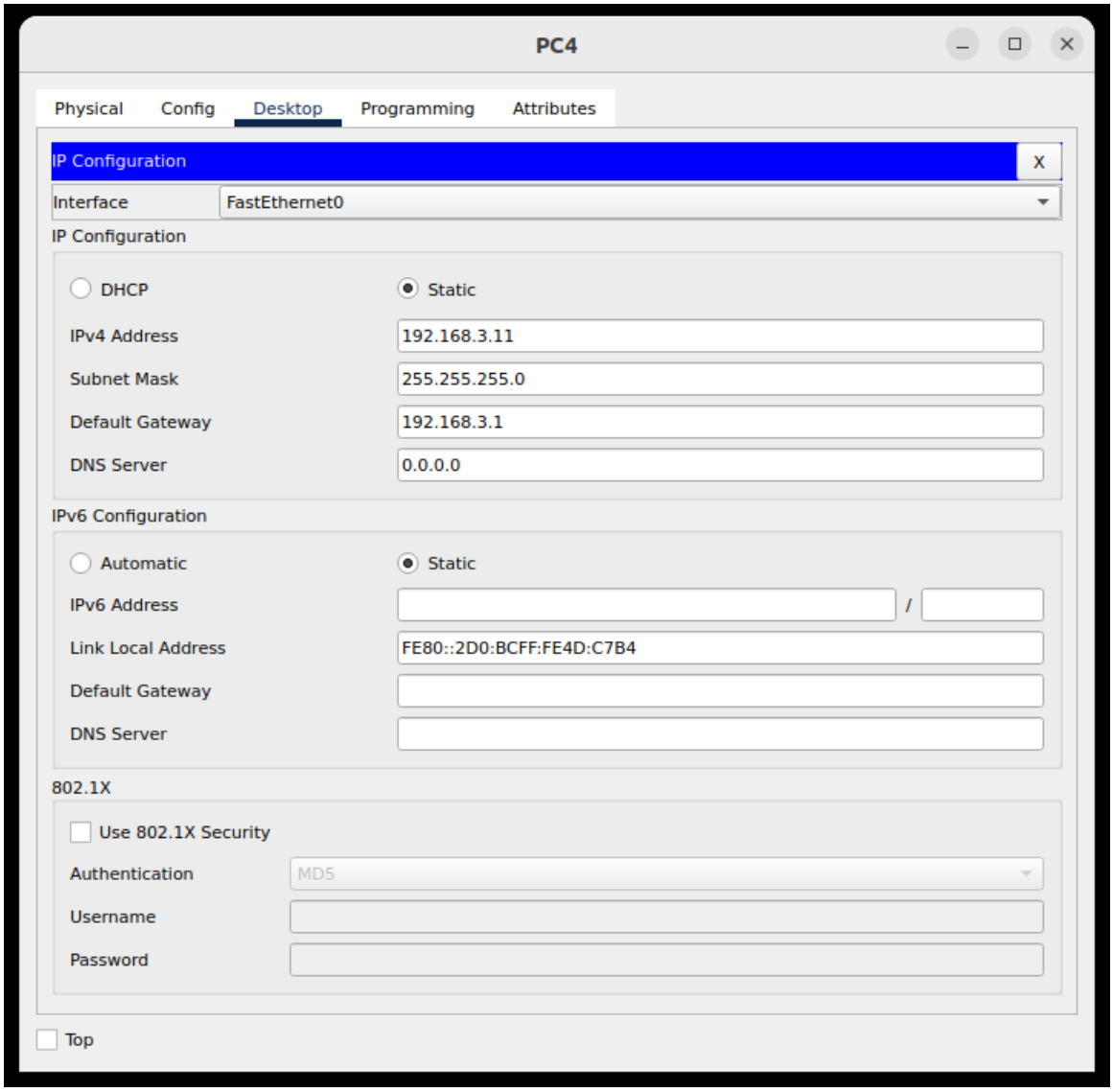
- PC2:


PC2
Physical
Config
Desktop
Programming
Attributes
IP Configuration
X
Interface
FastEthernet0
IP Configuration
DHCP
Static
IPv4 Address
192.168.1.11
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::290:2BFF:FEAA:307D
Default Gateway
DNS Server
802.1X
Use 802.1X Security
Authentication
MD5
Username
Password
Top

- PC3:

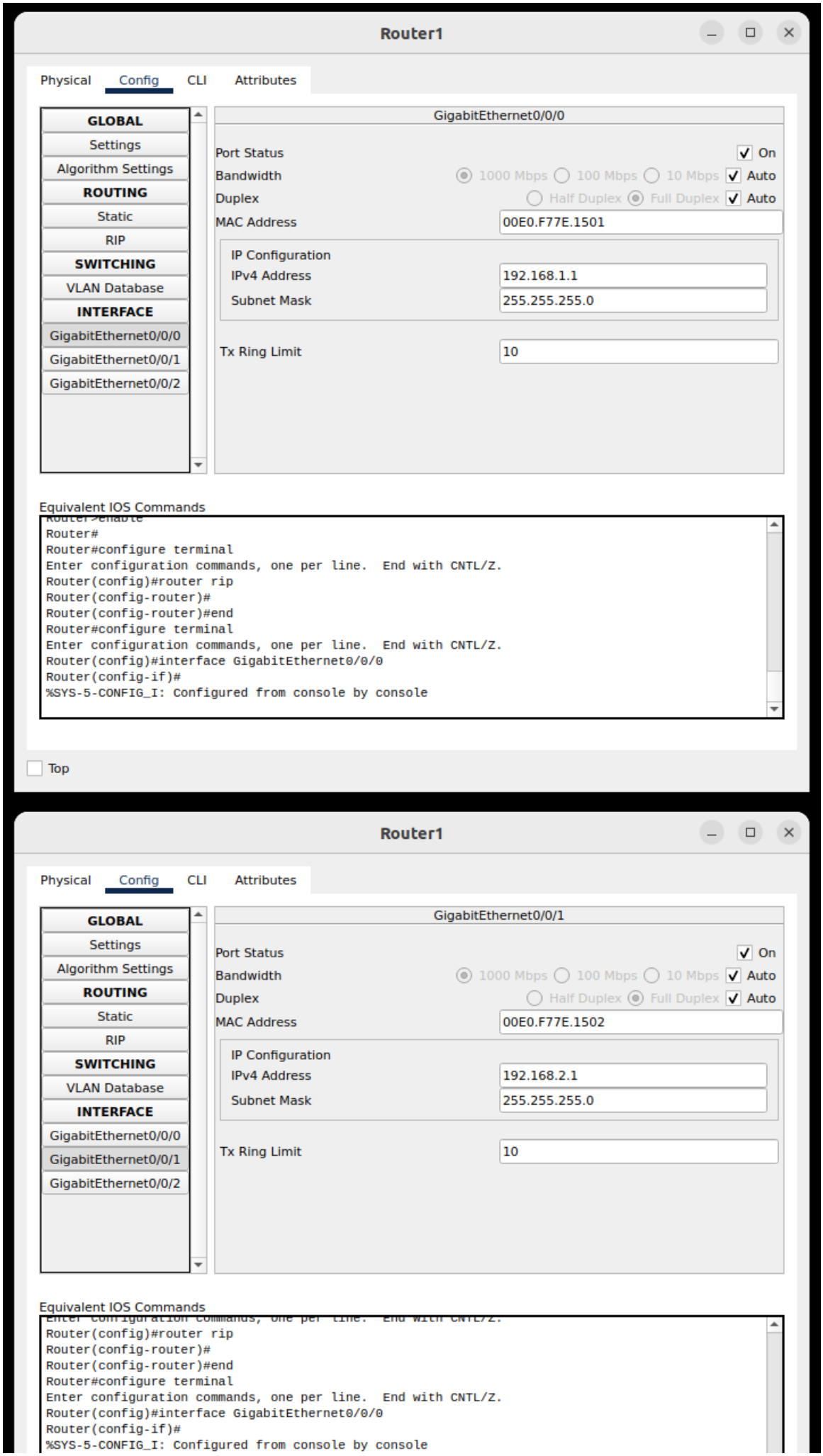

PC3
Physical
Config
Desktop
Programming
Attributes
IP Configuration
X
Interface
FastEthernet0
IP Configuration
DHCP
Static
IPv4 Address
192.168.3.10
Subnet Mask
255.255.255.0
Default Gateway
192.168.3.1
DNS Server
0.0.0.0
IPv6 Configuration
Automatic
Static
IPv6 Address
/
Link Local Address
FE80::210:11FF:FEC1:E491
Default Gateway
DNS Server
802.1X
Use 802.1X Security
Authentication
MD5
Username
Password
Top

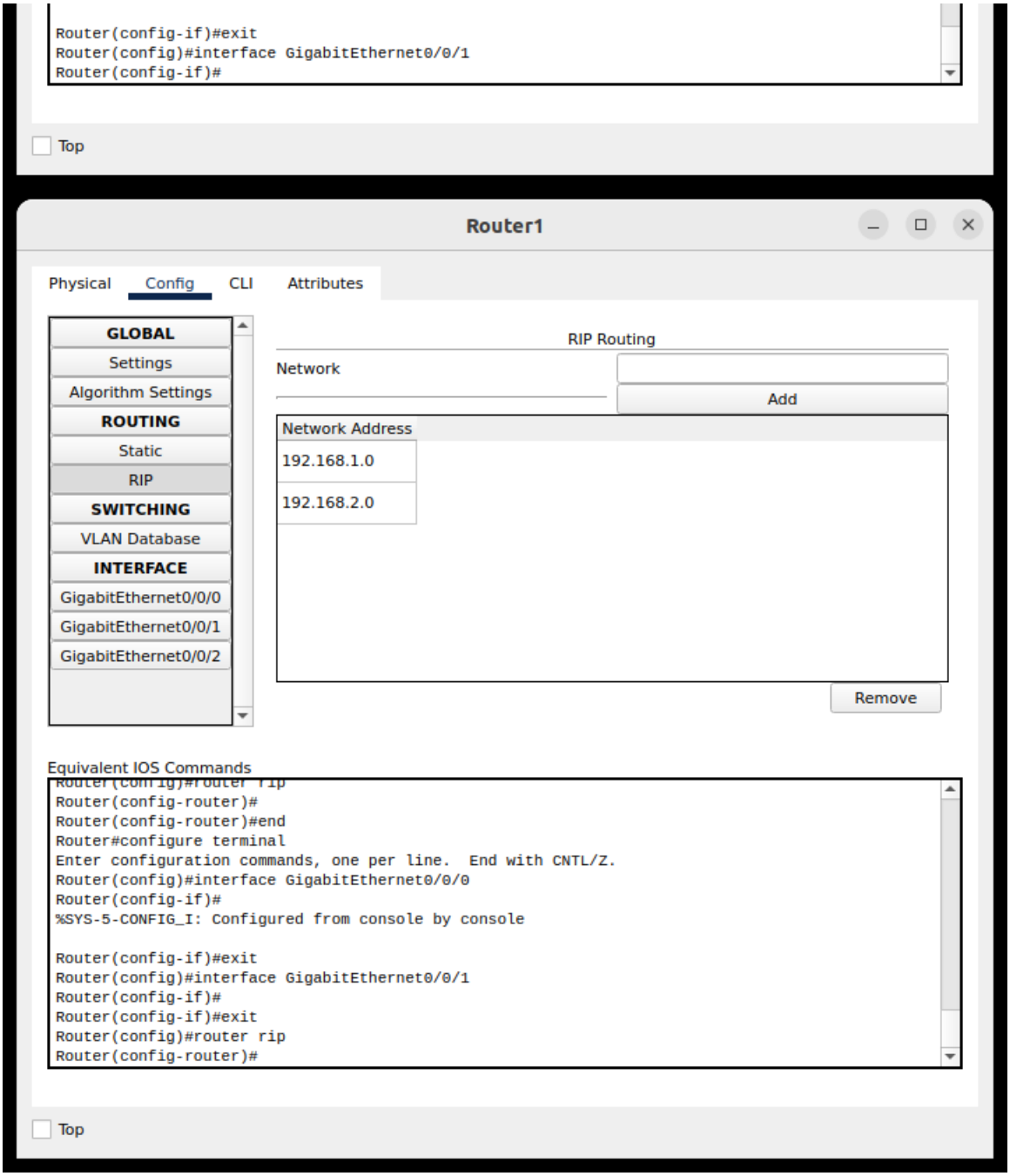
- PC4:




For **Routers**, configuration of interfaces and RIP Routing is needed.

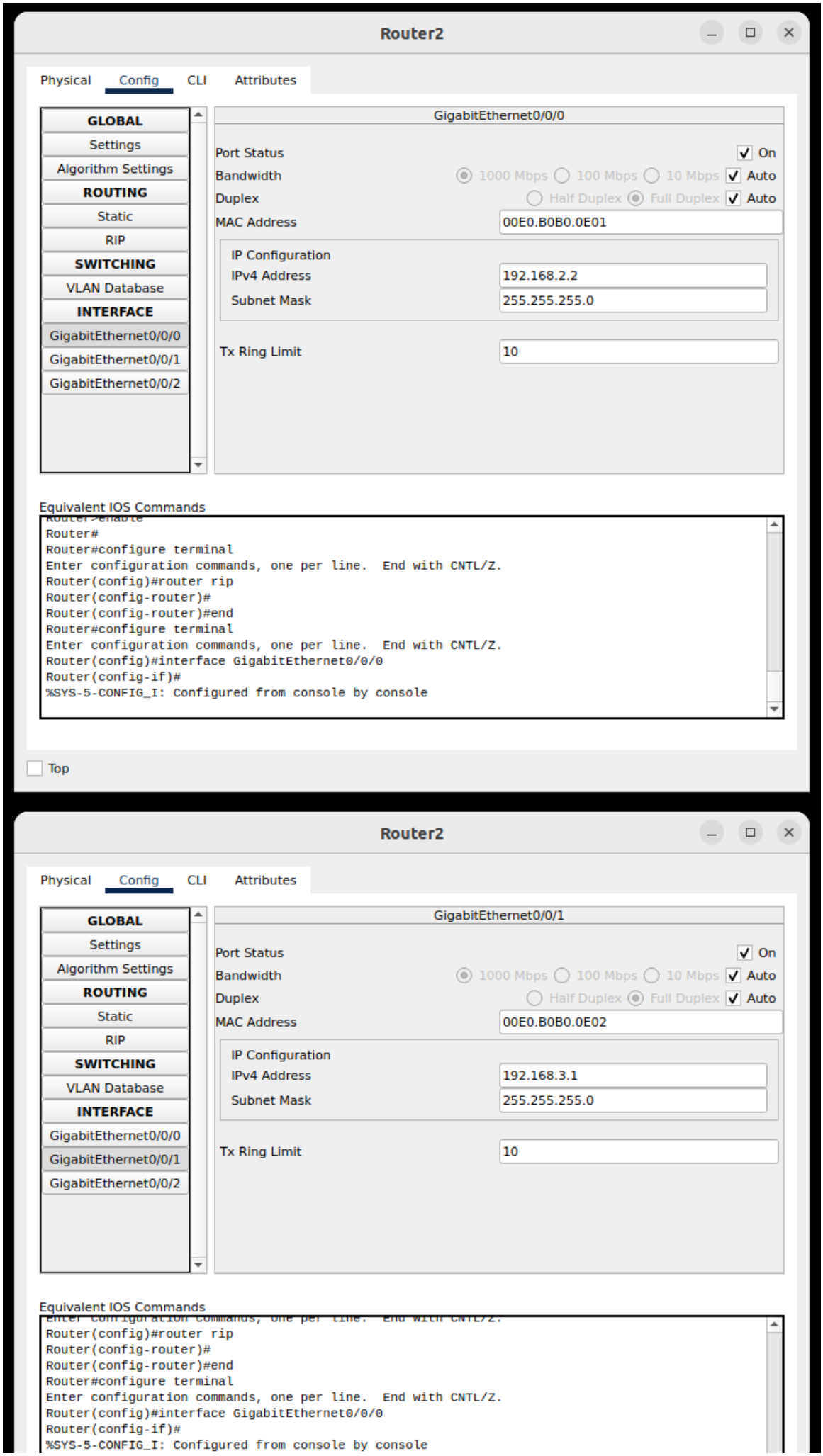
- Router1:

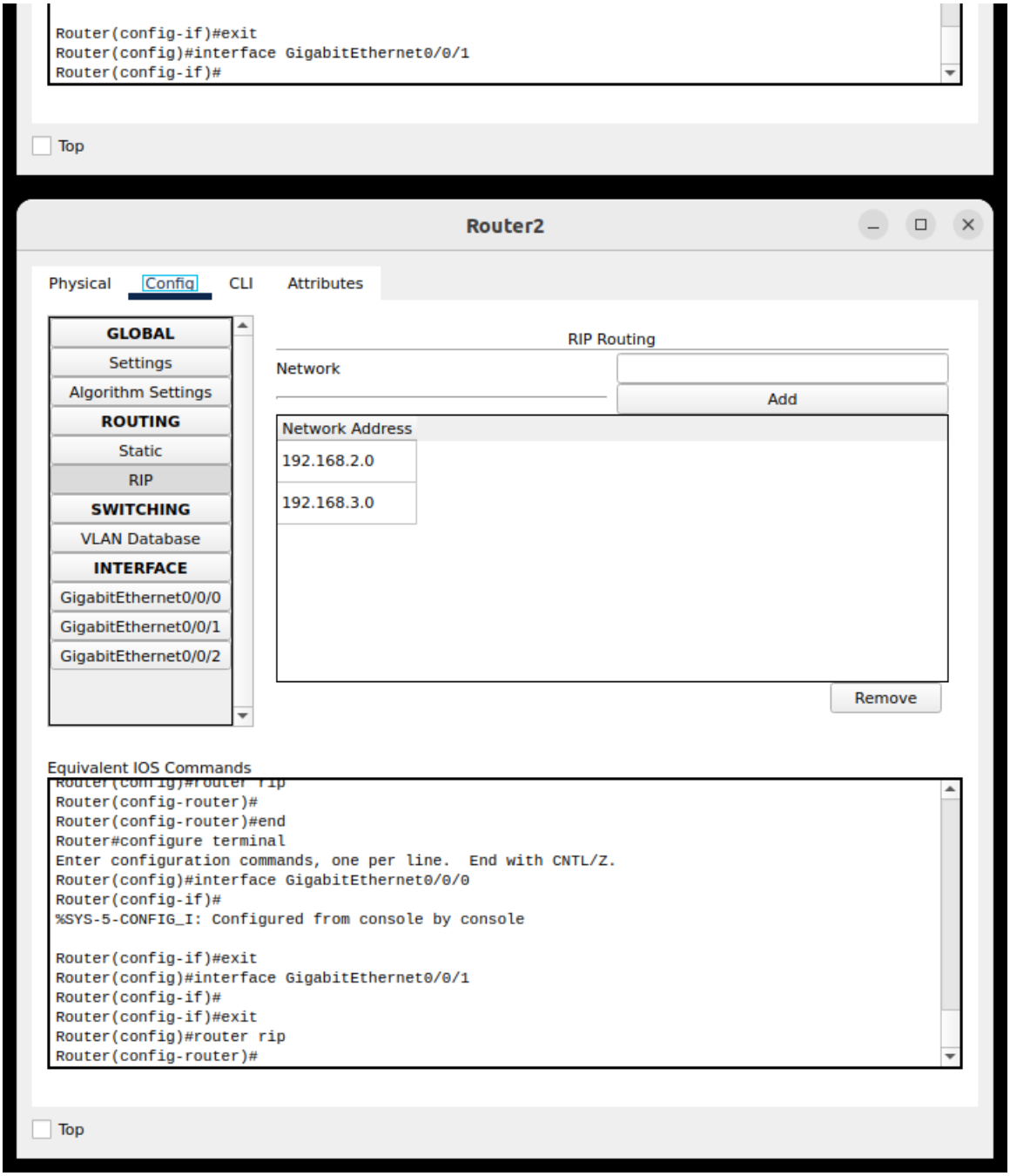

Router1
Physical
Config
CLI
Attributes
GLOBAL
Settings
Algorithm Settings
ROUTING
Static
RIP
SWITCHING
VLAN Database
INTERFACE
GigabitEthernet0/0/0
GigabitEthernet0/0/1
GigabitEthernet0/0/2
GigabitEthernet0/0/0
Port Status
On
Bandwidth
1000 Mbps
100 Mbps
10 Mbps
Auto
Duplex
Half Duplex
Full Duplex
Auto
MAC Address
00E0.F77E.1501
IP Configuration
IPv4 Address
192.168.1.1
Subnet Mask
255.255.255.0
Tx Ring Limit
10
Equivalent IOS Commands
Router#
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#router rip
Router(config-router)#
Router(config-router)#end
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface GigabitEthernet0/0/0
Router(config-if)#
%SYS-5-CONFIG_I: Configured from console by console
Top
Router1
Physical
Config
CLI
Attributes
GLOBAL
Settings
Algorithm Settings
ROUTING
Static
RIP
SWITCHING
VLAN Database
INTERFACE
GigabitEthernet0/0/0
GigabitEthernet0/0/1
GigabitEthernet0/0/2
GigabitEthernet0/0/1
Port Status
On
Bandwidth
1000 Mbps
100 Mbps
10 Mbps
Auto
Duplex
Half Duplex
Full Duplex
Auto
MAC Address
00E0.F77E.1502
IP Configuration
IPv4 Address
192.168.2.1
Subnet Mask
255.255.255.0
Tx Ring Limit
10
Equivalent IOS Commands
Router(config)#router rip
Router(config-router)#
Router(config-router)#end
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface GigabitEthernet0/0/0
Router(config-if)#
%SYS-5-CONFIG_I: Configured from console by console




where interface `GigabitEthernet0/0/0` connects to Switch1 and `GigabitEthernet0/0/1`

- Router2:


Router2
Physical
Config
CLI
Attributes
GLOBAL
Settings
Algorithm Settings
ROUTING
Static
RIP
SWITCHING
VLAN Database
INTERFACE
GigabitEthernet0/0/0
GigabitEthernet0/0/1
GigabitEthernet0/0/2
GigabitEthernet0/0/0
Port Status
On
Bandwidth
1000 Mbps
100 Mbps
10 Mbps
Auto
Duplex
Half Duplex
Full Duplex
Auto
MAC Address
00E0.B0B0.0E01
IP Configuration
IPv4 Address
192.168.2.2
Subnet Mask
255.255.255.0
Tx Ring Limit
10
Equivalent IOS Commands
Router#
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#router rip
Router(config-router)#
Router(config-router)#end
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface GigabitEthernet0/0/0
Router(config-if)#
%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
GigabitEthernet0/0/0
GigabitEthernet0/0/1
GigabitEthernet0/0/2
GigabitEthernet0/0/1
Port Status
On
Bandwidth
1000 Mbps
100 Mbps
10 Mbps
Auto
Duplex
Half Duplex
Full Duplex
Auto
MAC Address
00E0.B0B0.0E02
IP Configuration
IPv4 Address
192.168.3.1
Subnet Mask
255.255.255.0
Tx Ring Limit
10
Equivalent IOS Commands
Router(config)#router rip
Router(config-router)#
Router(config-router)#end
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface GigabitEthernet0/0/0
Router(config-if)#
%SYS-5-CONFIG_I: Configured from console by console

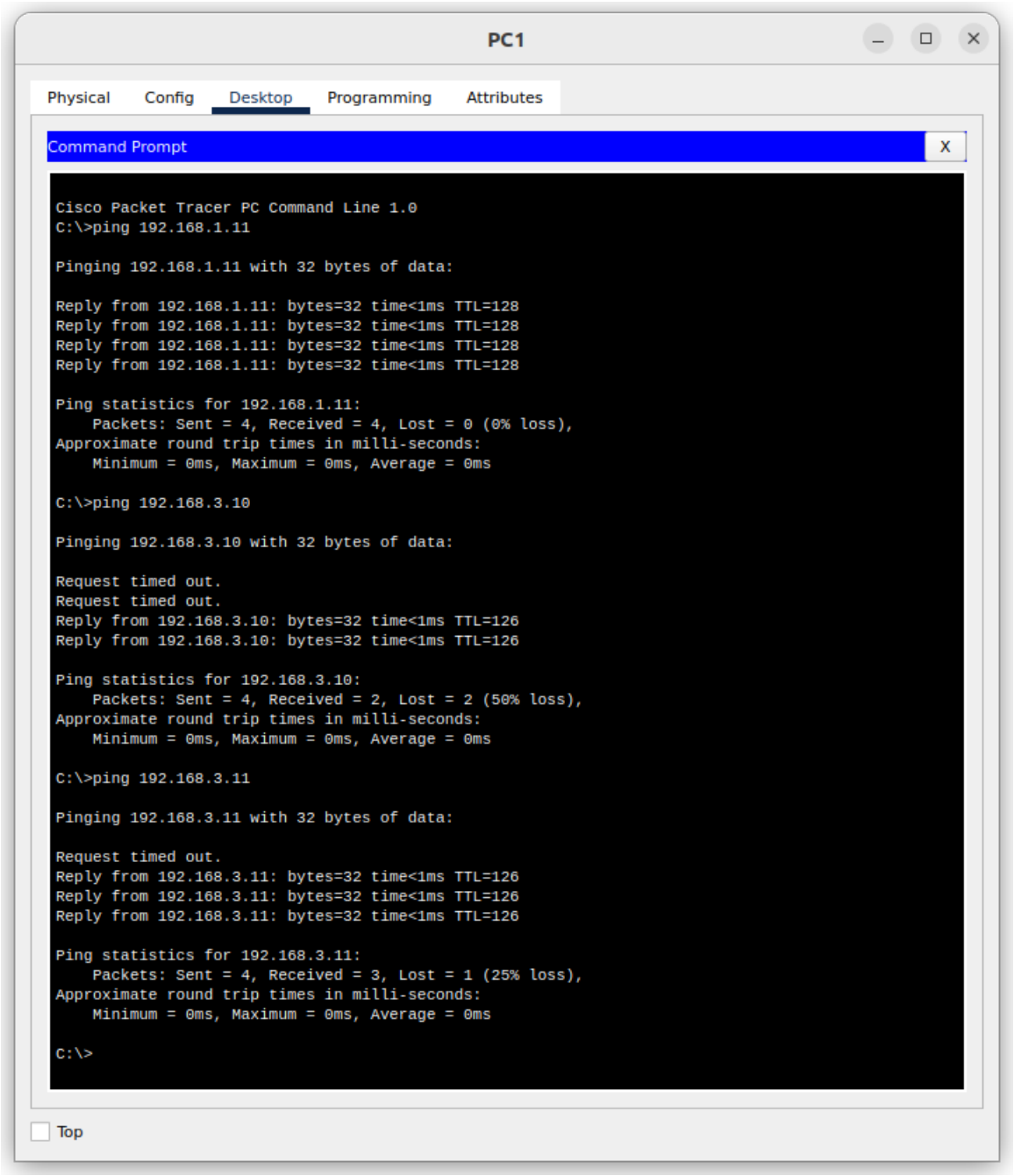



where interface `GigabitEthernet0/0/0` connects to Switch1 and `GigabitEthernet0/0/1`.

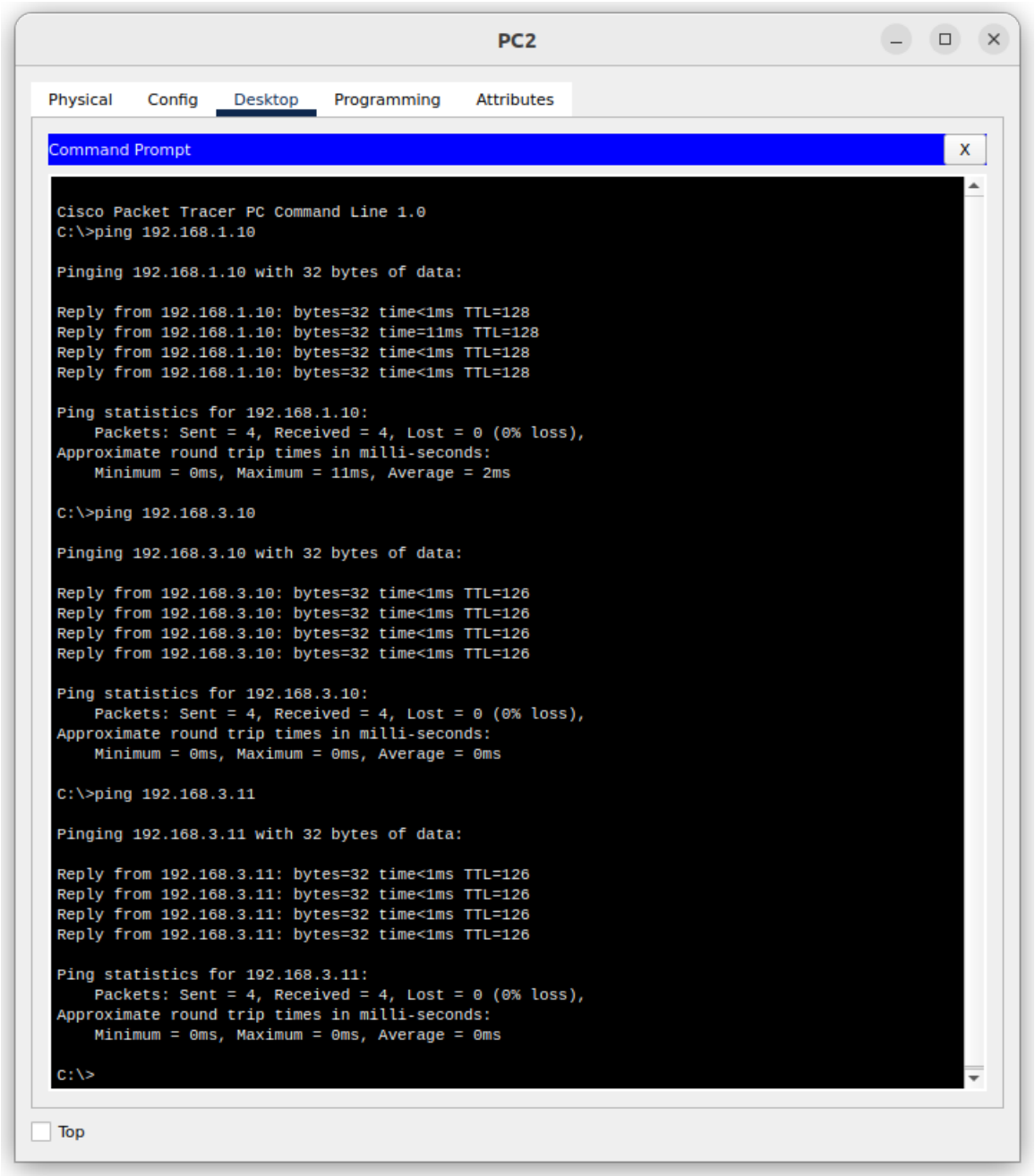
## II. Network test

We test the network connection between PCs by `ping` command.

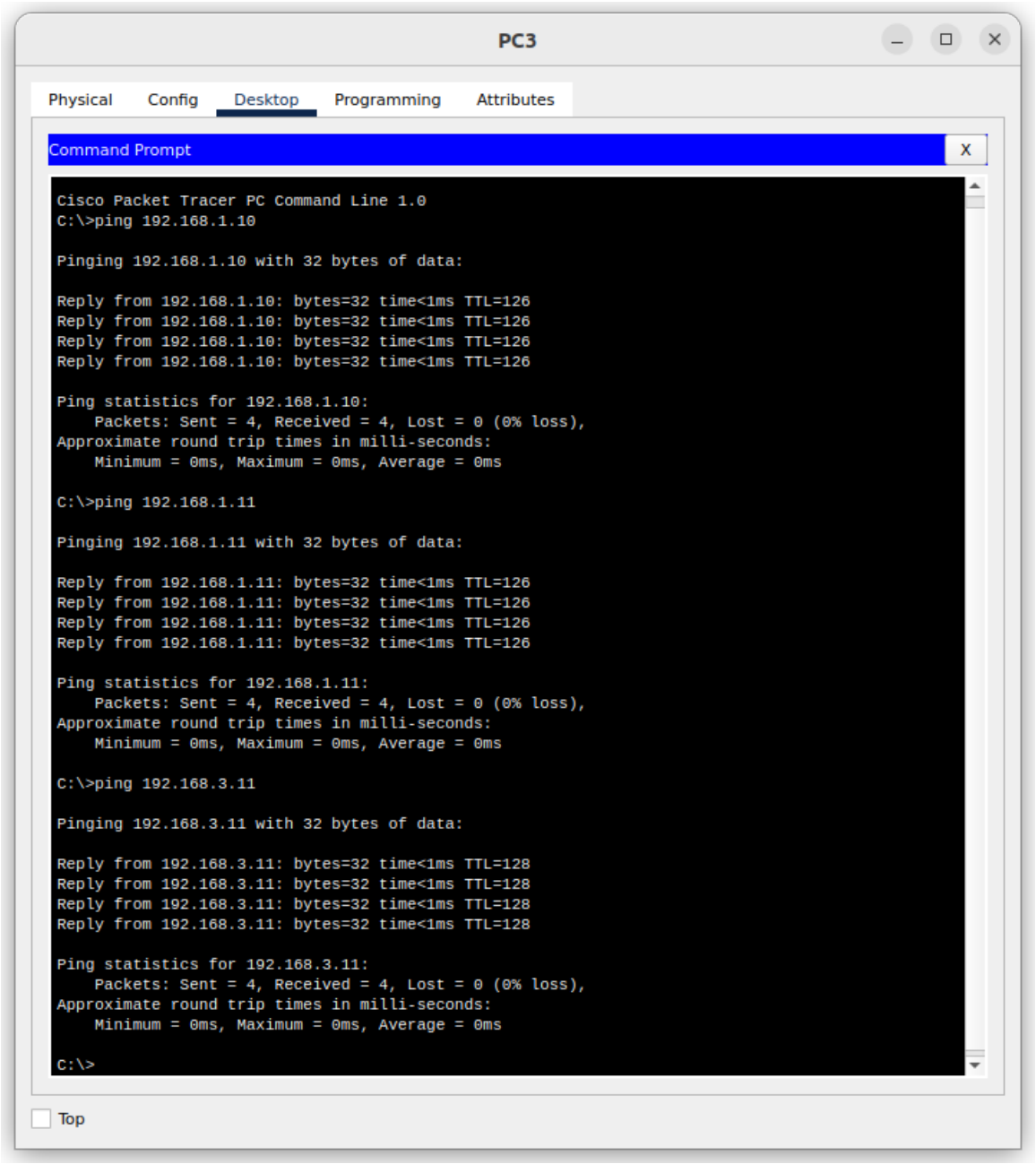
- PC1 pinging PC2/3/4:



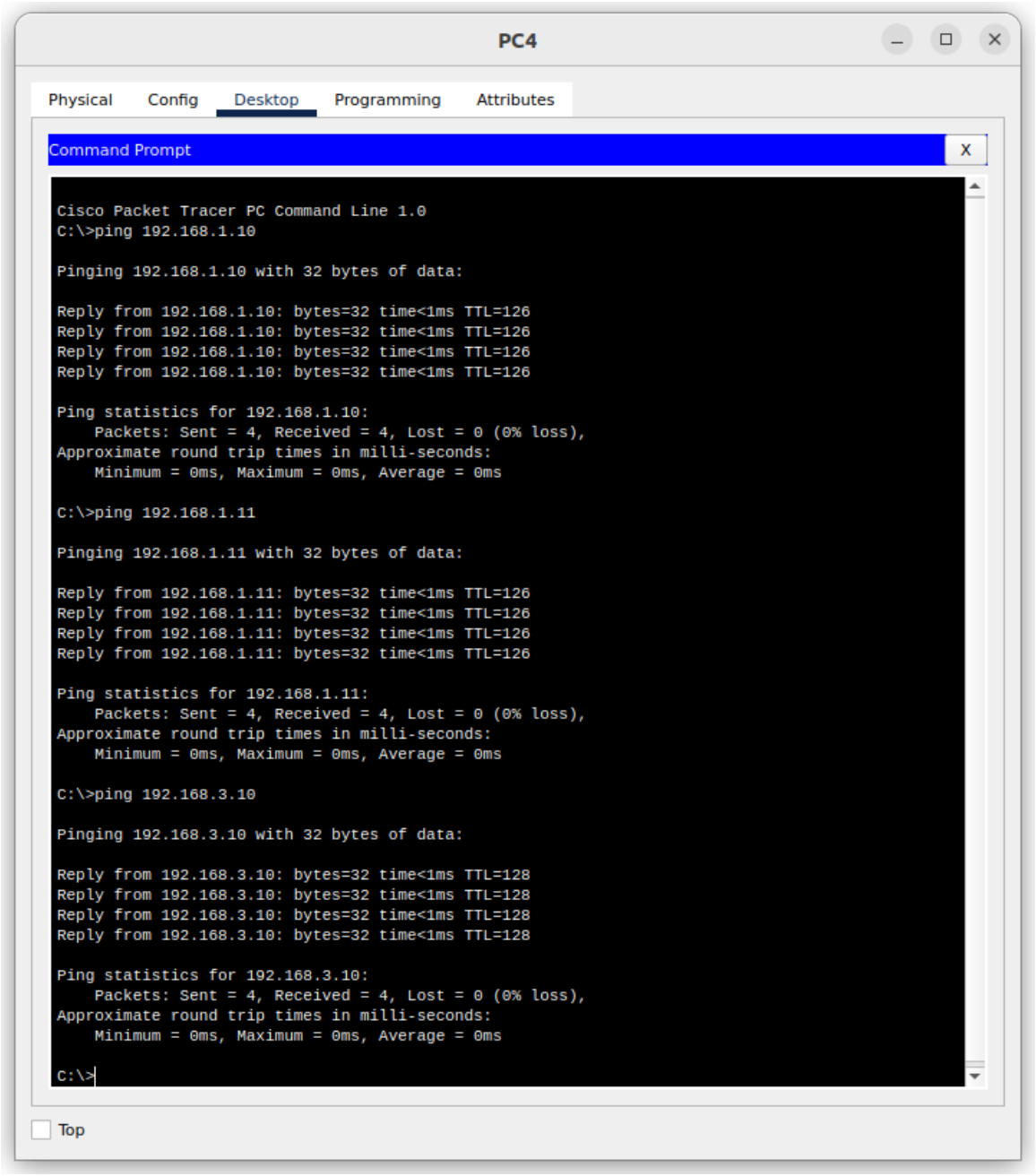
- PC2 pinging PC1/3/4:



- PC3 pinging PC1/2/4:



- PC4 pinging PC1/2/3:

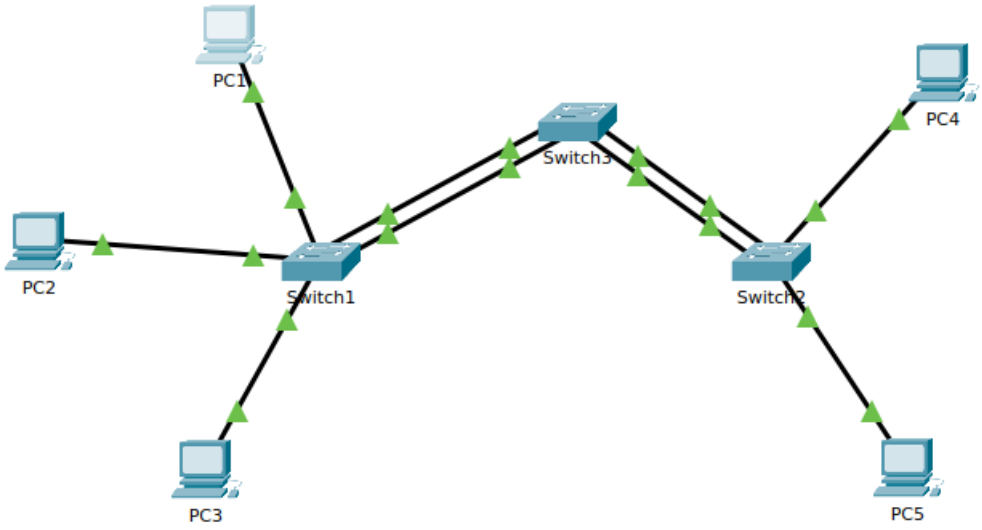



Time out may occur when first few times we ping from `192.168.1.*` to `192.168.3.*`. The reason of first ping lost is the device has no entries in its ARP table for the destination. It needs to send an ARP request to destination MAC address in order to properly forward the packet.

## Task 2

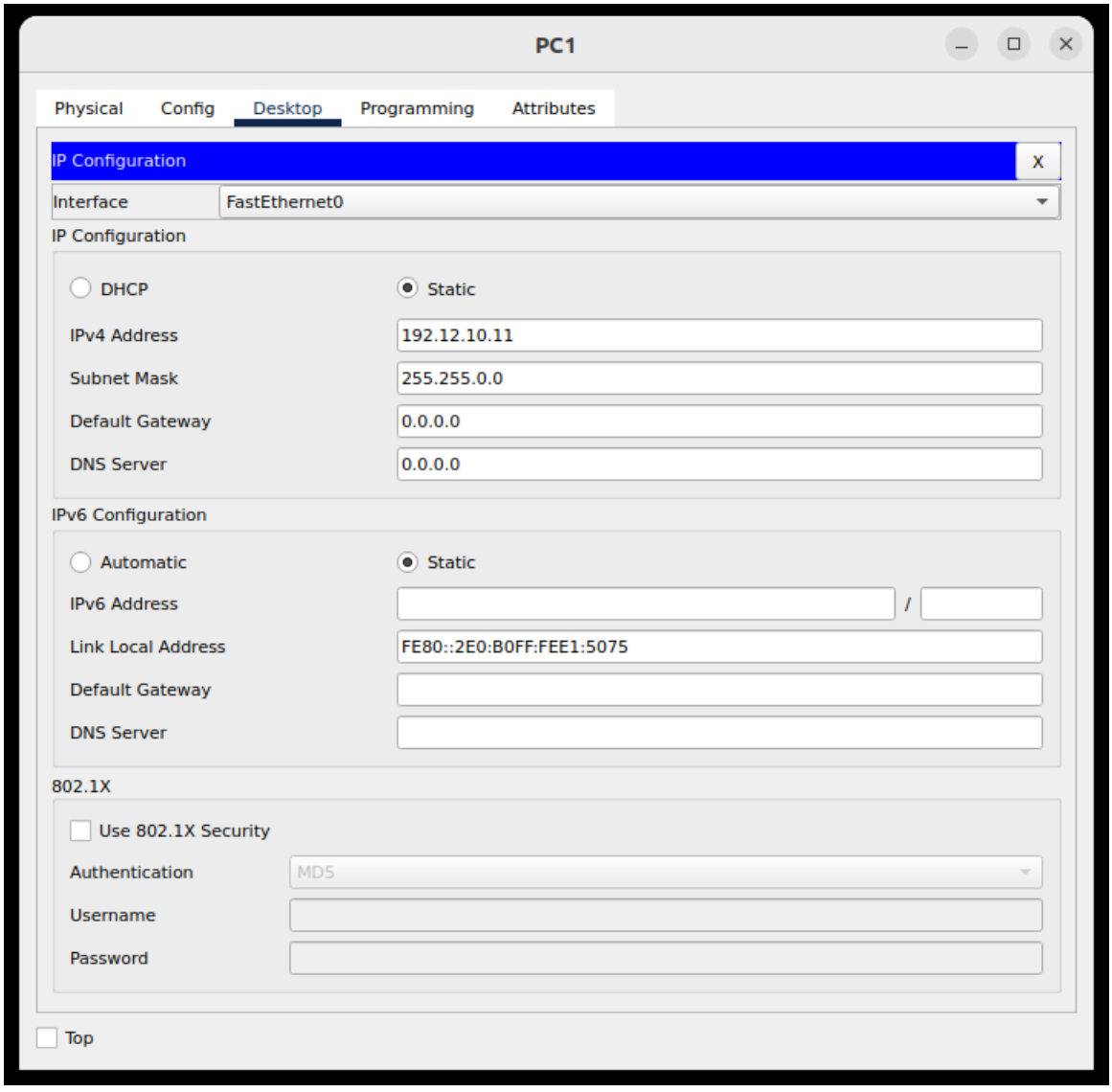
### I. Configuration

In this task, we have 5 PCs and 3 Switches. The topology of this task is as following:



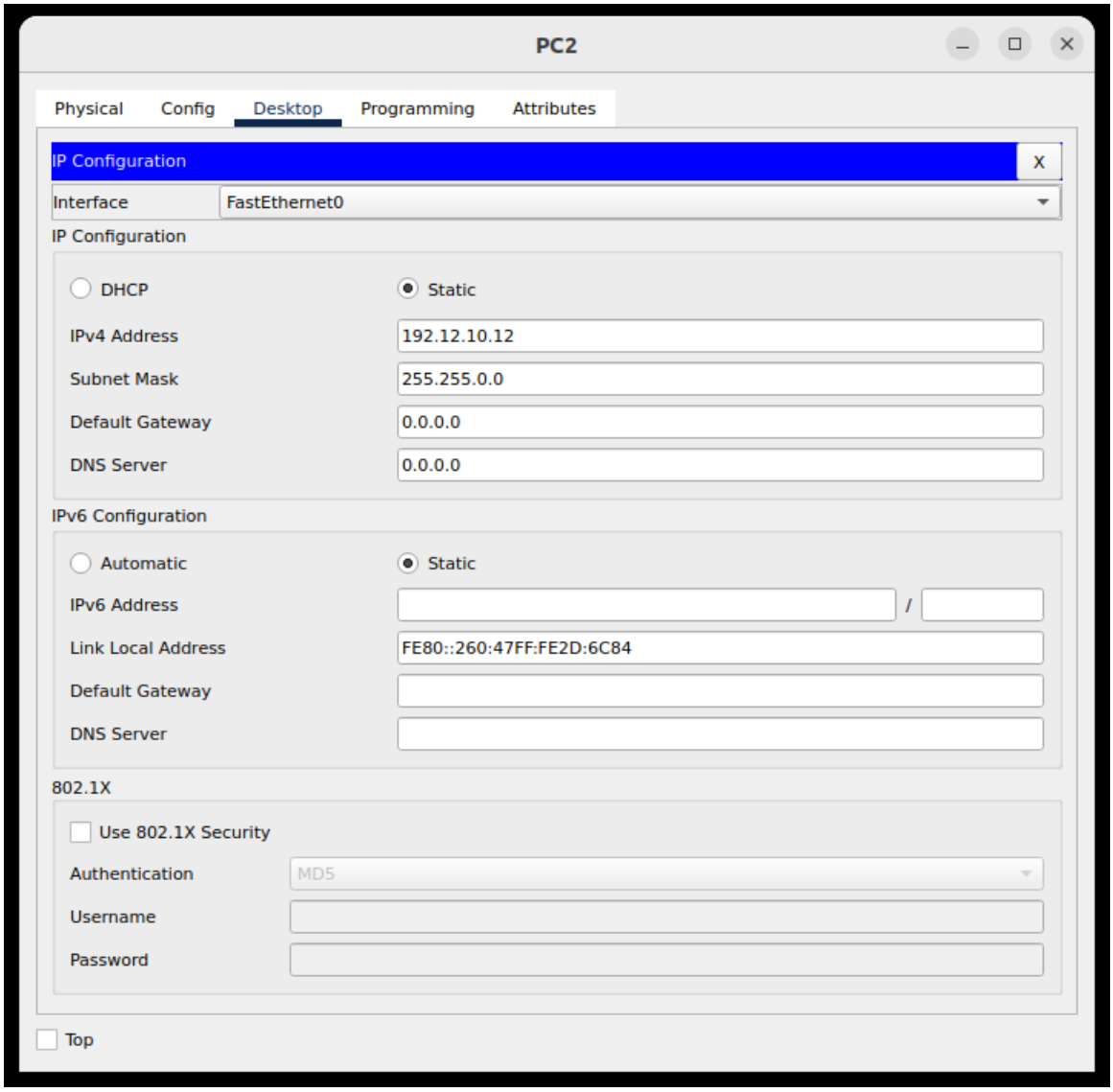

For **PCs**, configuration of **IPv4 Address and Subnet Mask** is needed.

- PC1:

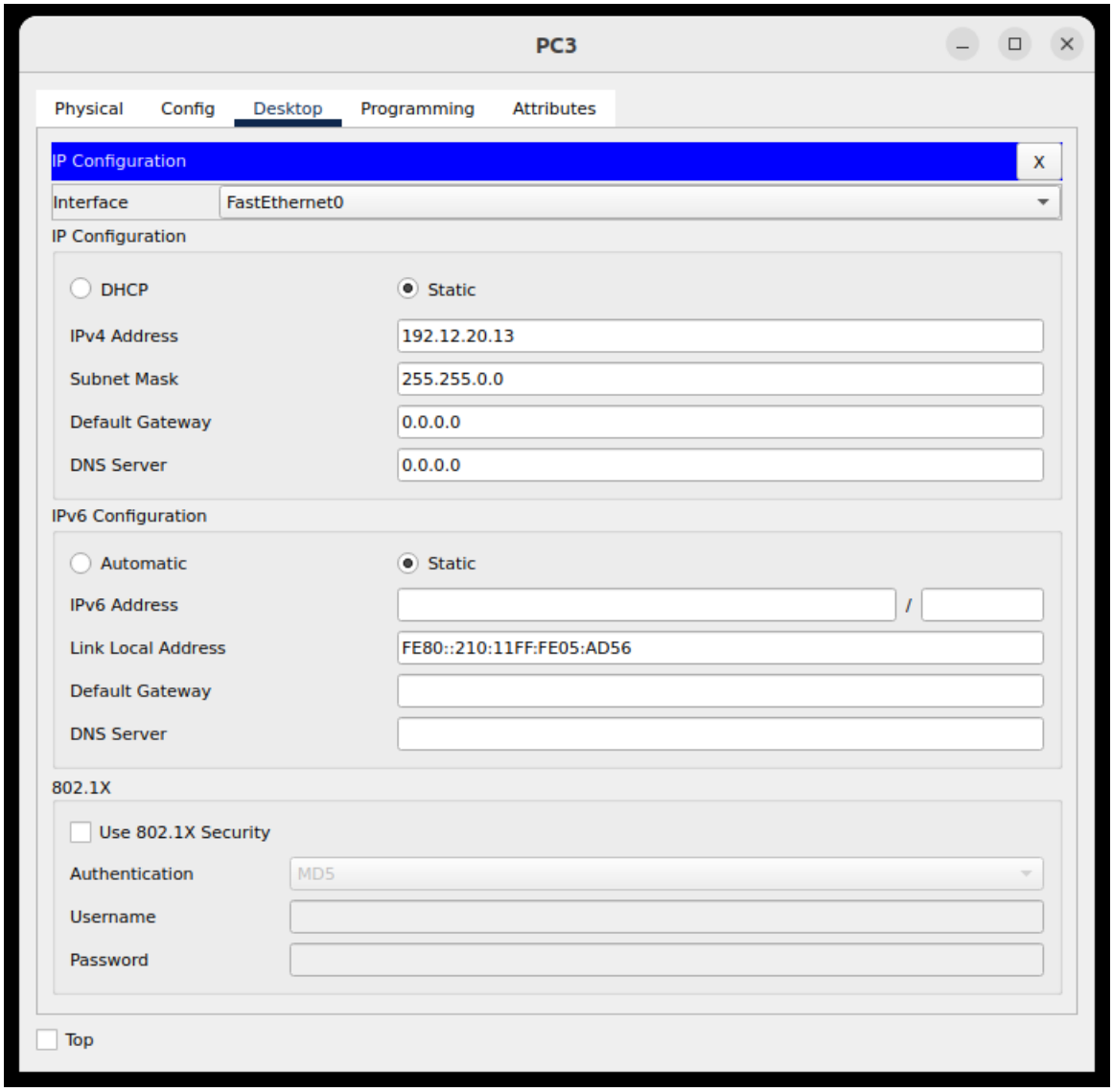



**

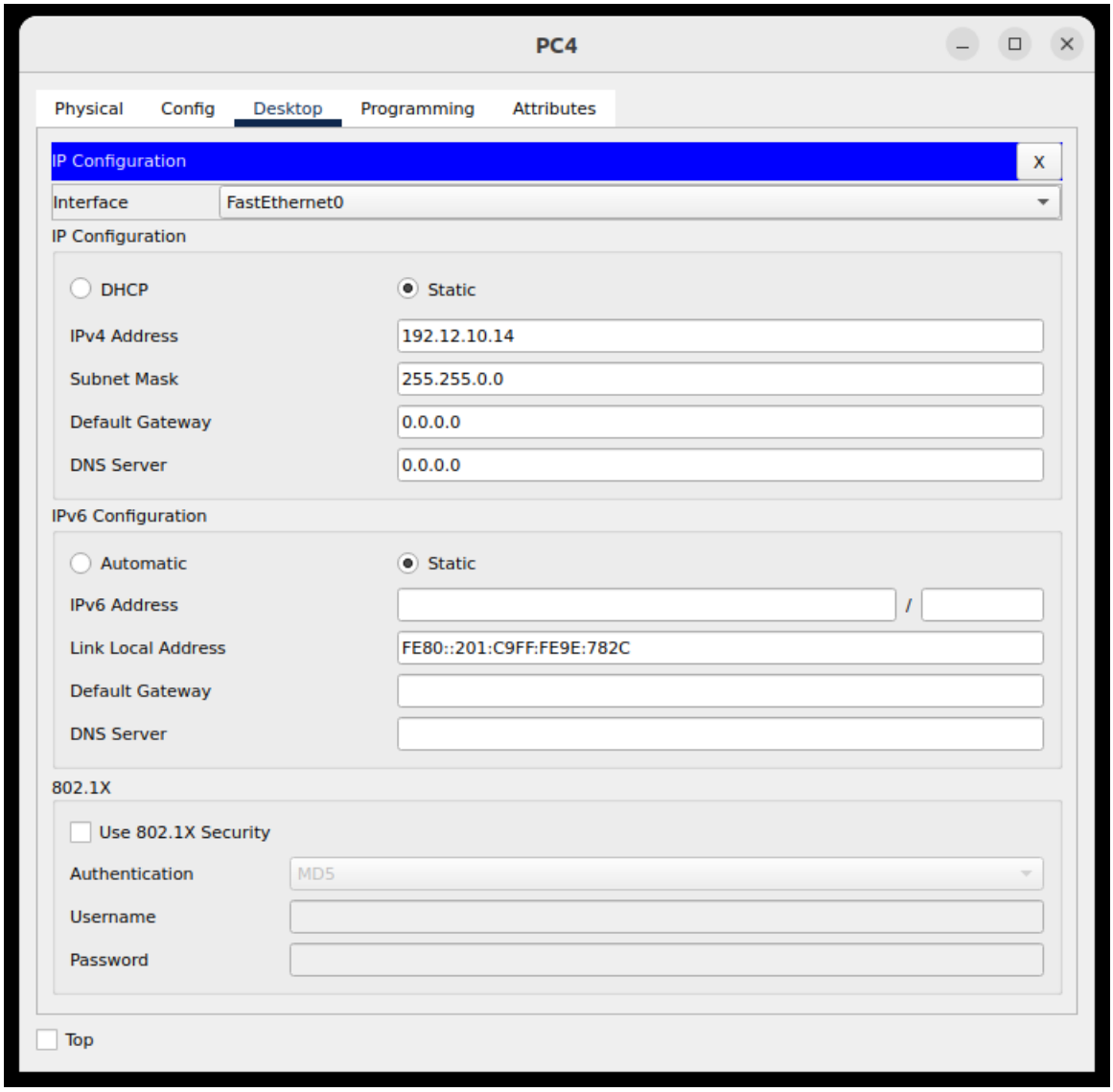
- PC2:


PC2
Physical
Config
Desktop
Programming
Attributes
IP Configuration
X
Interface
FastEthernet0
IP Configuration
DHCP
Static
IPv4 Address
192.12.10.12
Subnet Mask
255.255.0.0
Default Gateway
0.0.0.0
DNS Server
0.0.0.0
IPv6 Configuration
Automatic
Static
IPv6 Address
/
Link Local Address
FE80::260:47FF:FE2D:6C84
Default Gateway
DNS Server
802.1X
Use 802.1X Security
Authentication
MD5
Username
Password
Top

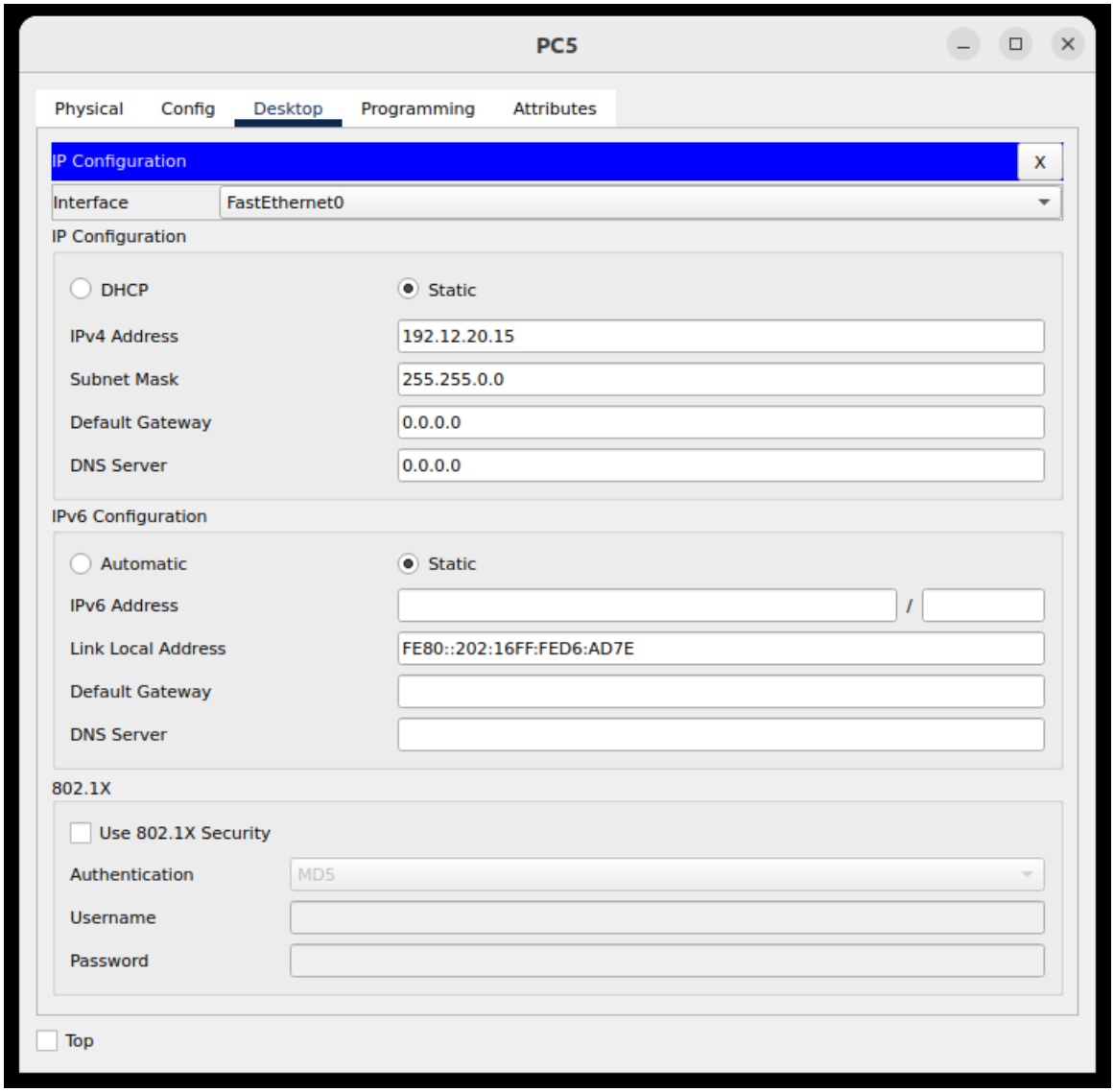
- PC3:


PC3
Physical
Config
Desktop
Programming
Attributes
IP Configuration
X
Interface
FastEthernet0
IP Configuration
DHCP
Static
IPv4 Address
192.12.20.13
Subnet Mask
255.255.0.0
Default Gateway
0.0.0.0
DNS Server
0.0.0.0
IPv6 Configuration
Automatic
Static
IPv6 Address
/
Link Local Address
FE80::210:11FF:FE05:AD56
Default Gateway
DNS Server
802.1X
Use 802.1X Security
Authentication
MD5
Username
Password
Top

- PC4:

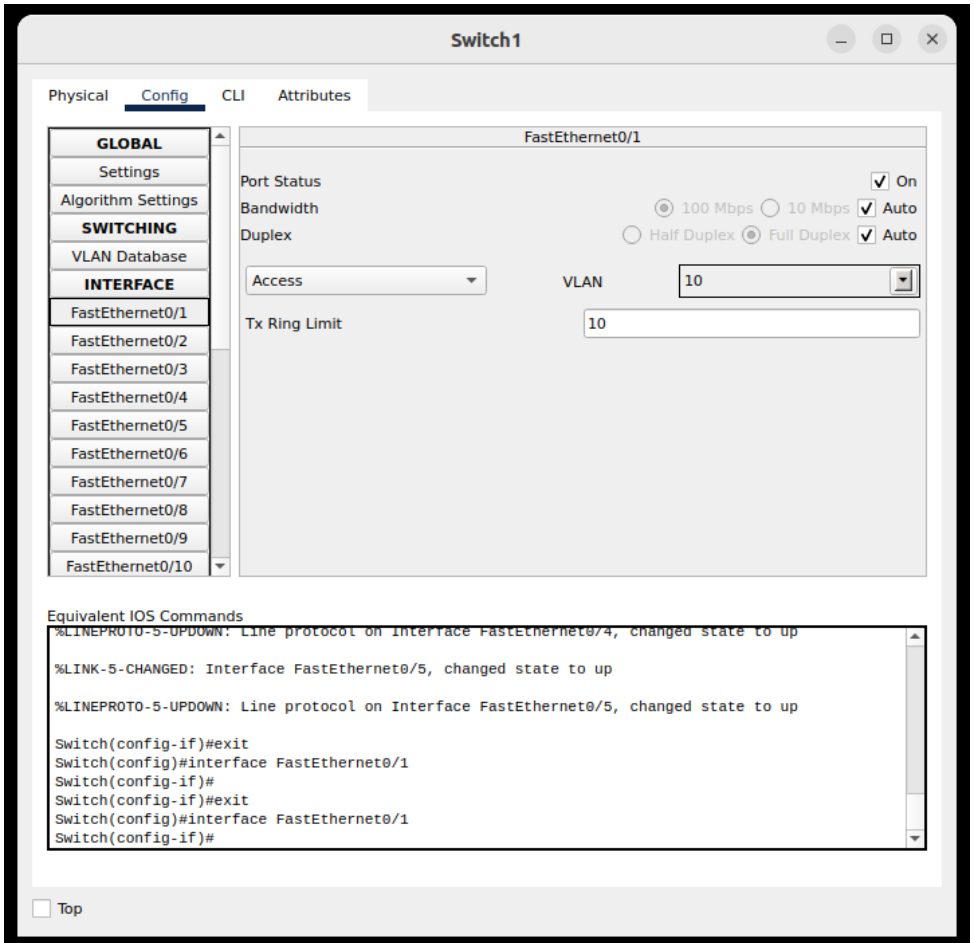

PC4
Physical
Config
Desktop
Programming
Attributes
IP Configuration
X
Interface
FastEthernet0
IP Configuration
DHCP
Static
IPv4 Address
192.12.10.14
Subnet Mask
255.255.0.0
Default Gateway
0.0.0.0
DNS Server
0.0.0.0
IPv6 Configuration
Automatic
Static
IPv6 Address
/
Link Local Address
FE80::201:C9FF:FE9E:782C
Default Gateway
DNS Server
802.1X
Use 802.1X Security
Authentication
MD5
Username
Password
Top

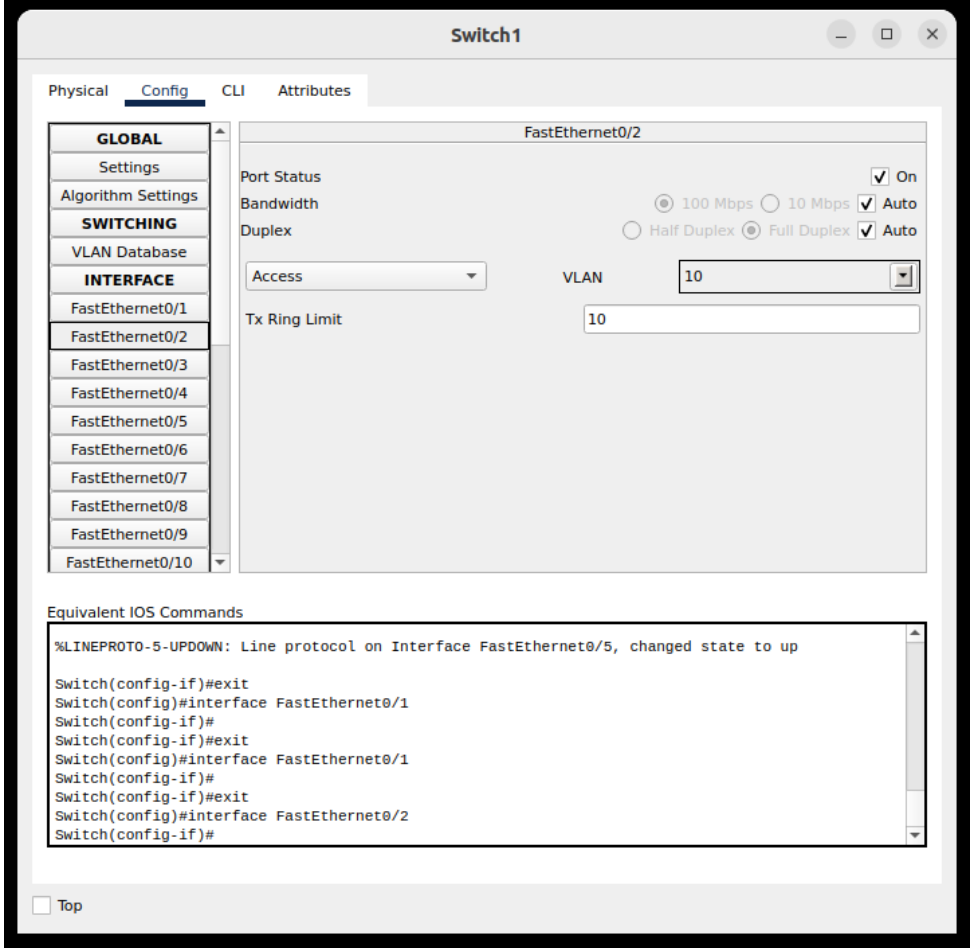
- PC5:

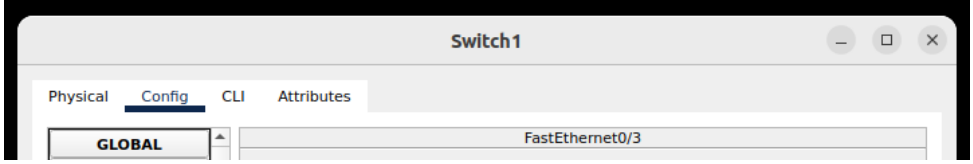


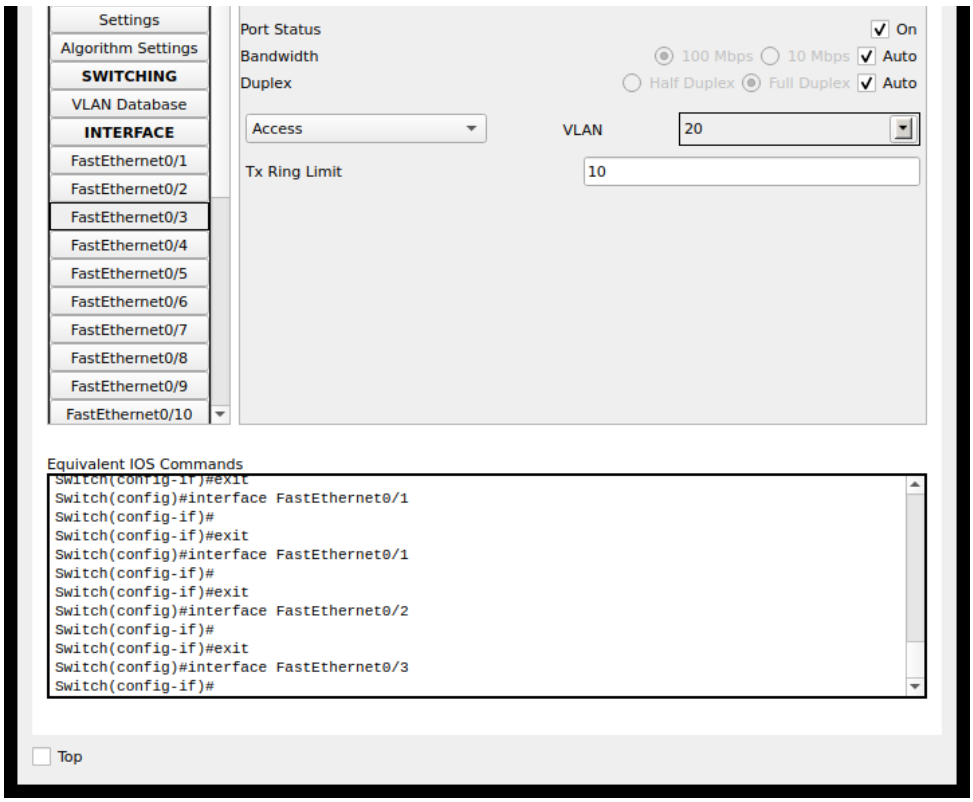

For Switches, the modification of VLAN database and interfaces is needed.

- Switch1:

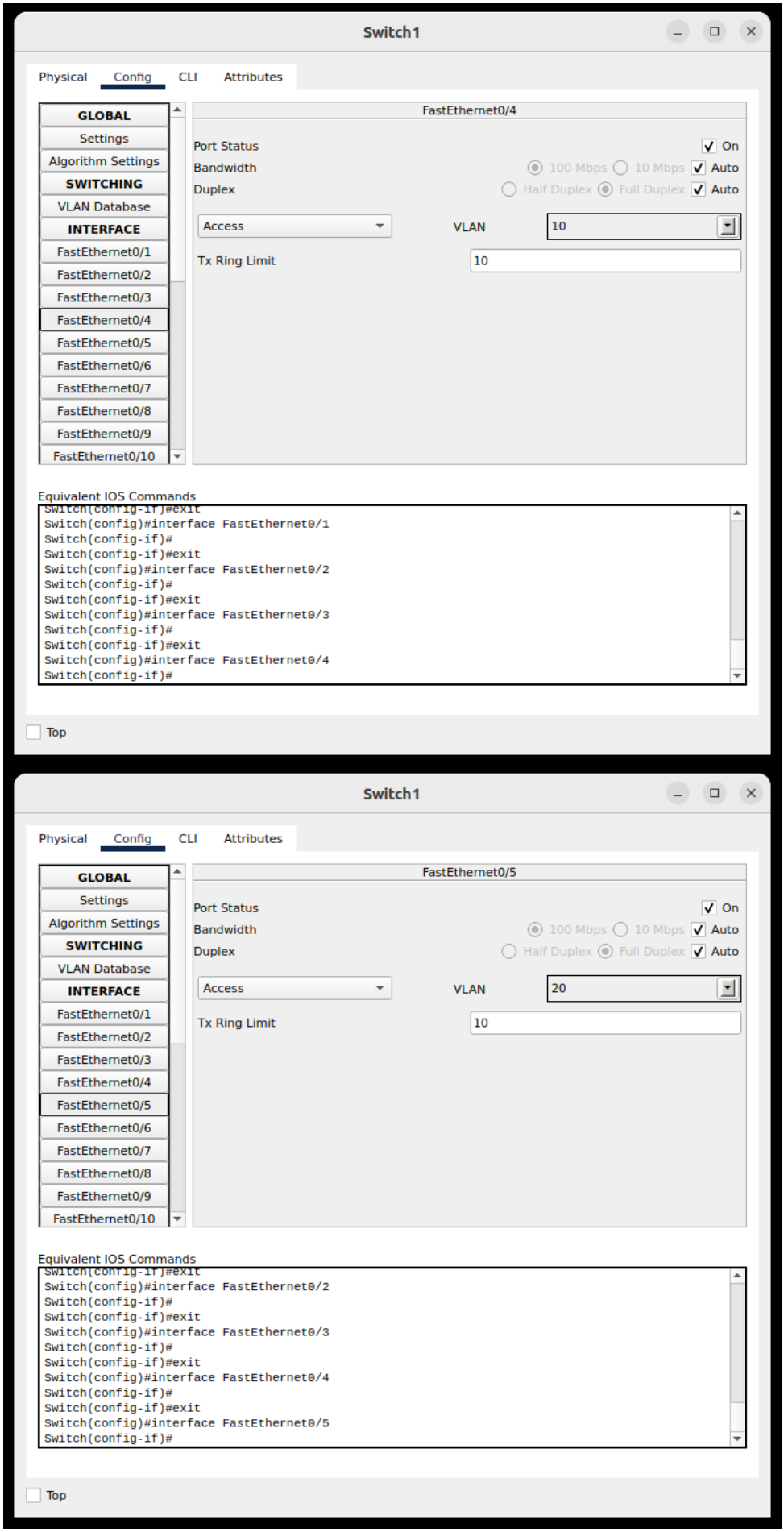

Switch1
Physical
Config
CLI
Attributes
GLOBAL
Settings
Algorithm Settings
SWITCHING
VLAN Database
INTERFACE
FastEthernet0/1
FastEthernet0/2
FastEthernet0/3
FastEthernet0/4
FastEthernet0/5
FastEthernet0/6
FastEthernet0/7
FastEthernet0/8
FastEthernet0/9
FastEthernet0/10
FastEthernet0/1
Port Status
On
Bandwidth
100 Mbps
10 Mbps
Auto
Duplex
Half Duplex
Full Duplex
Auto
Access
VLAN
10
Tx Ring Limit
10
Equivalent IOS Commands
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/4, changed state to up
%LINK-5-CHANGED: Interface FastEthernet0/5, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/5, changed state to up
Switch(config-if)#exit
Switch(config)#interface FastEthernet0/1
Switch(config-if)#
Switch(config-if)#exit
Switch(config)#interface FastEthernet0/1
Switch(config-if)#
Top


Switch1
Physical
Config
CLI
Attributes
GLOBAL
Settings
Algorithm Settings
SWITCHING
VLAN Database
INTERFACE
FastEthernet0/1
FastEthernet0/2
FastEthernet0/3
FastEthernet0/4
FastEthernet0/5
FastEthernet0/6
FastEthernet0/7
FastEthernet0/8
FastEthernet0/9
FastEthernet0/10
FastEthernet0/2
Port Status
On
Bandwidth
100 Mbps
10 Mbps
Auto
Duplex
Half Duplex
Full Duplex
Auto
Access
VLAN
10
Tx Ring Limit
10
Equivalent IOS Commands
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/5, changed state to up
Switch(config-if)#exit
Switch(config)#interface FastEthernet0/1
Switch(config-if)#
Switch(config-if)#exit
Switch(config)#interface FastEthernet0/1
Switch(config-if)#
Switch(config-if)#exit
Switch(config)#interface FastEthernet0/2
Switch(config-if)#
Top


Switch1
Physical
Config
CLI
Attributes
GLOBAL
FastEthernet0/3

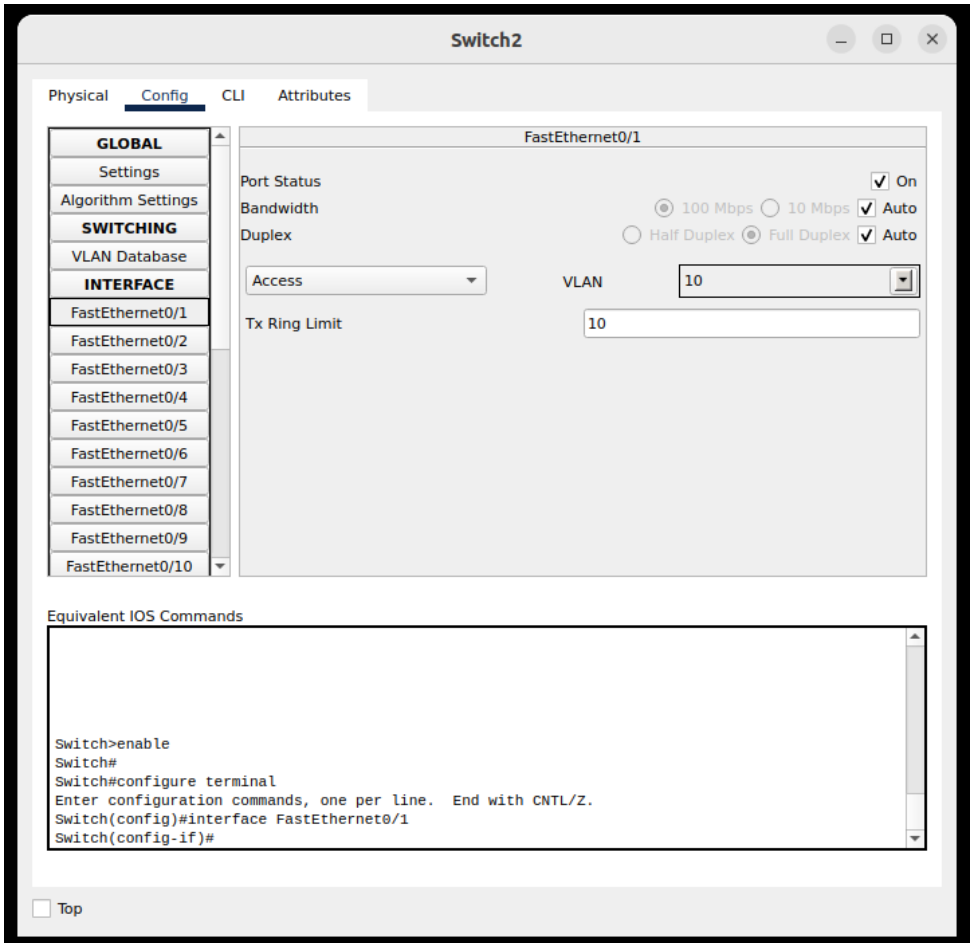

Settings
Algorithm Settings
SWITCHING
VLAN Database
INTERFACE
FastEthernet0/1
FastEthernet0/2
FastEthernet0/3
FastEthernet0/4
FastEthernet0/5
FastEthernet0/6
FastEthernet0/7
FastEthernet0/8
FastEthernet0/9
FastEthernet0/10
Port Status
On
Bandwidth
100 Mbps
10 Mbps
Auto
Duplex
Half Duplex
Full Duplex
Auto
Access
VLAN
20
Tx Ring Limit
10
Equivalent IOS Commands
Switch(config-if)#exit
Switch(config)#interface FastEthernet0/1
Switch(config-if)#
Switch(config-if)#exit
Switch(config)#interface FastEthernet0/1
Switch(config-if)#
Switch(config-if)#exit
Switch(config)#interface FastEthernet0/2
Switch(config-if)#
Switch(config-if)#exit
Switch(config)#interface FastEthernet0/3
Switch(config-if)#
Top

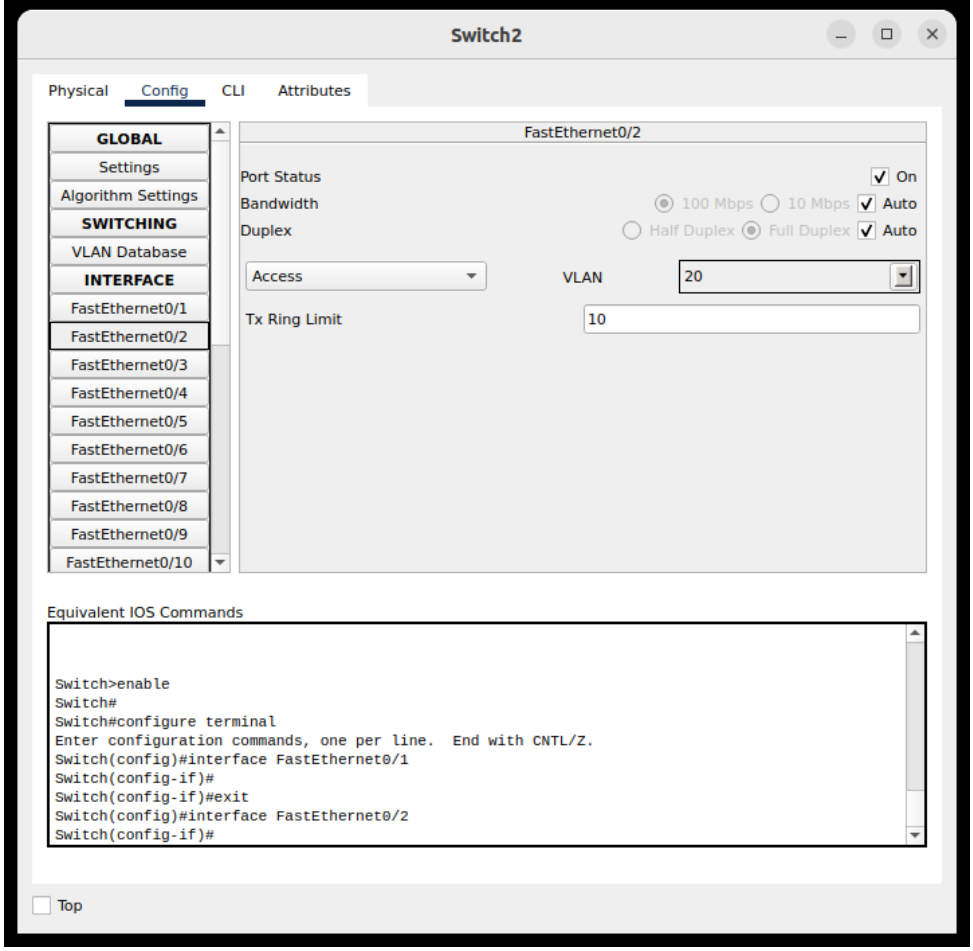
These three interfaces are connected to PC1, PC2 and PC3



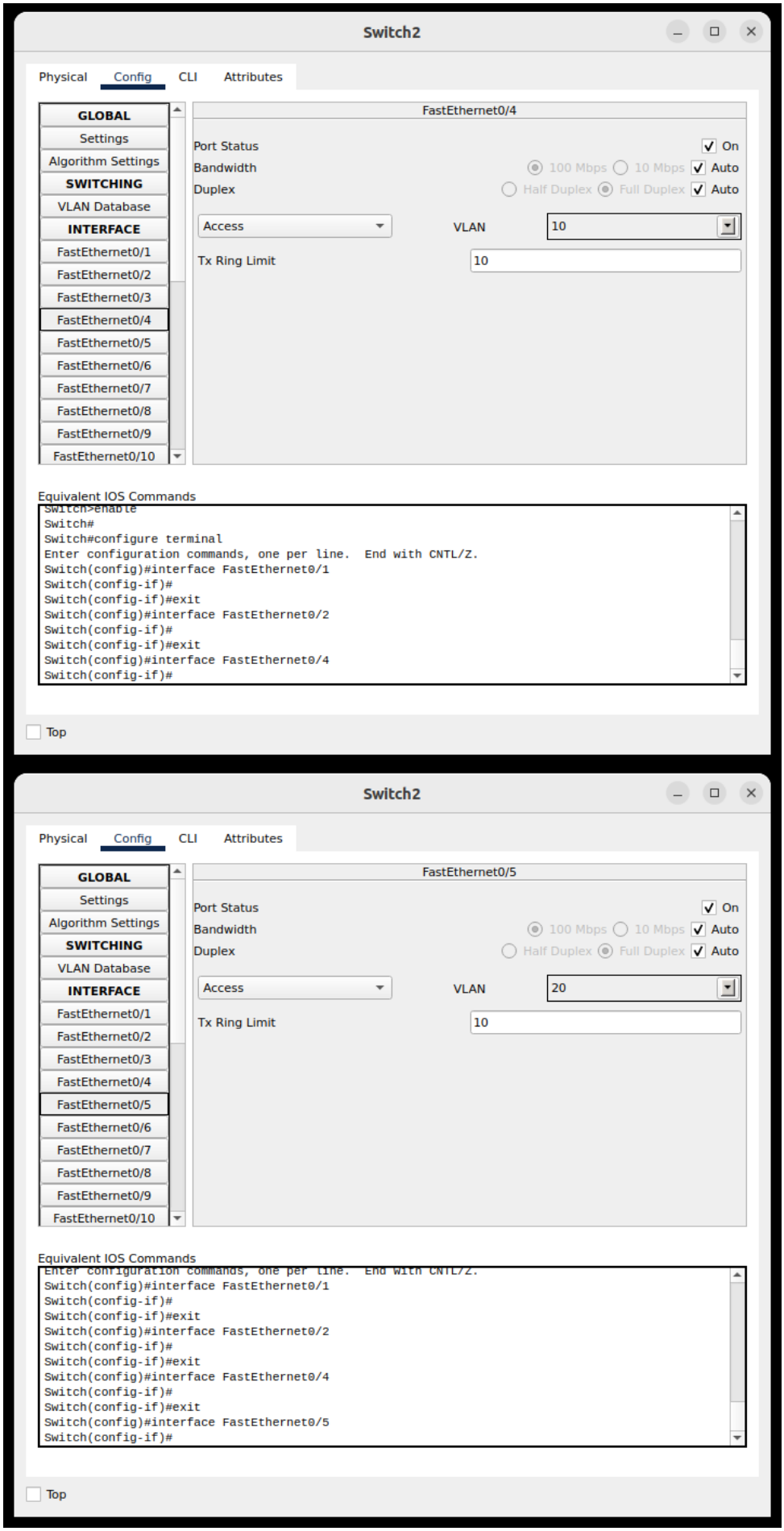

These two interfaces are connected to Switch3.

- Switch2



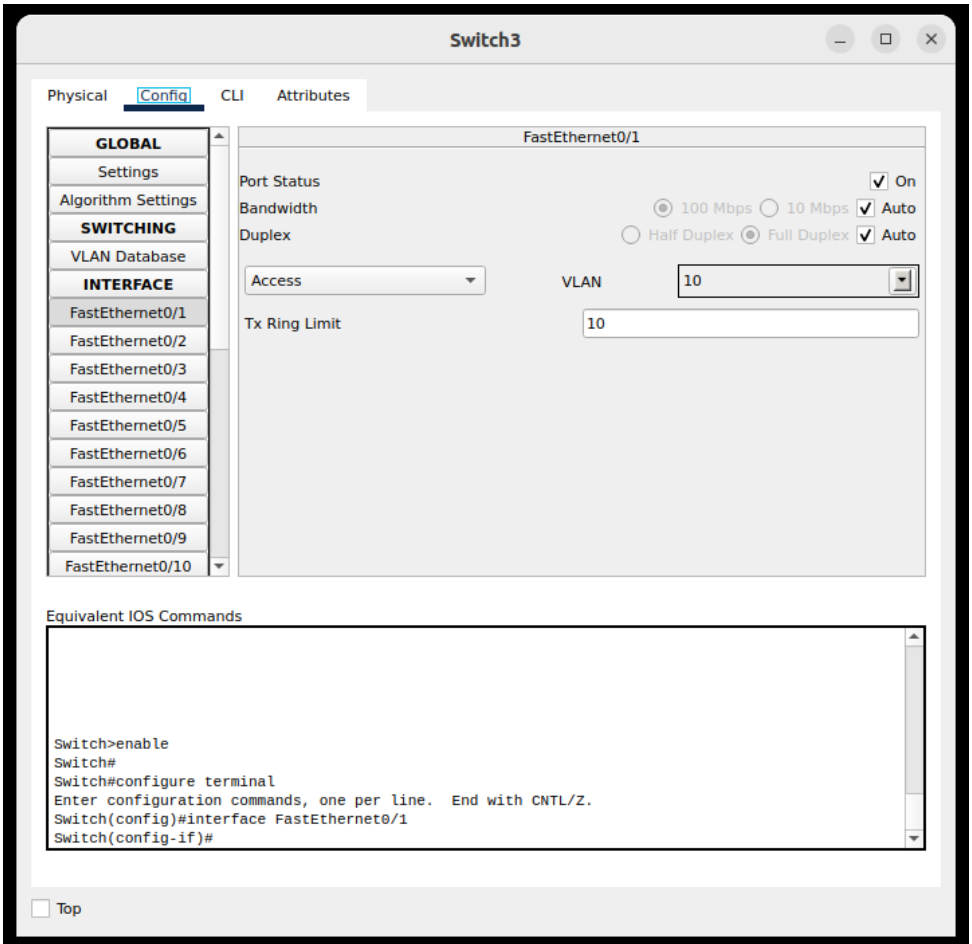



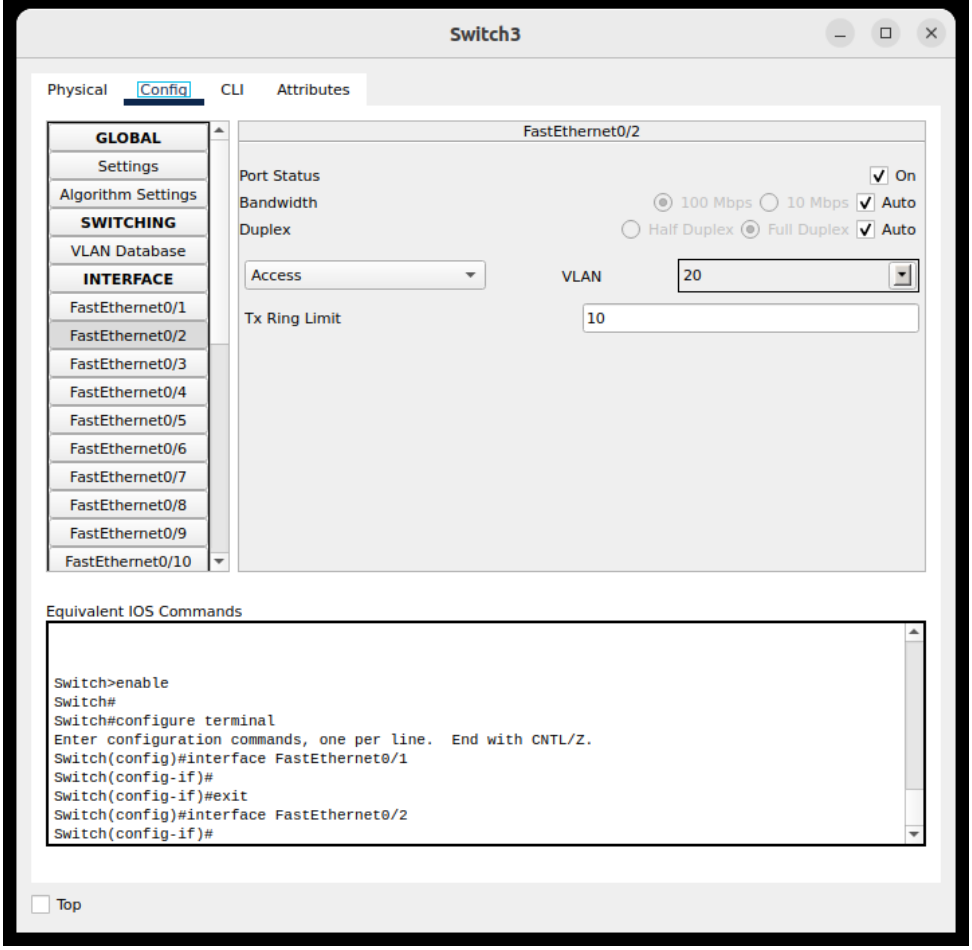

These two interfaces are connected to Switch3.

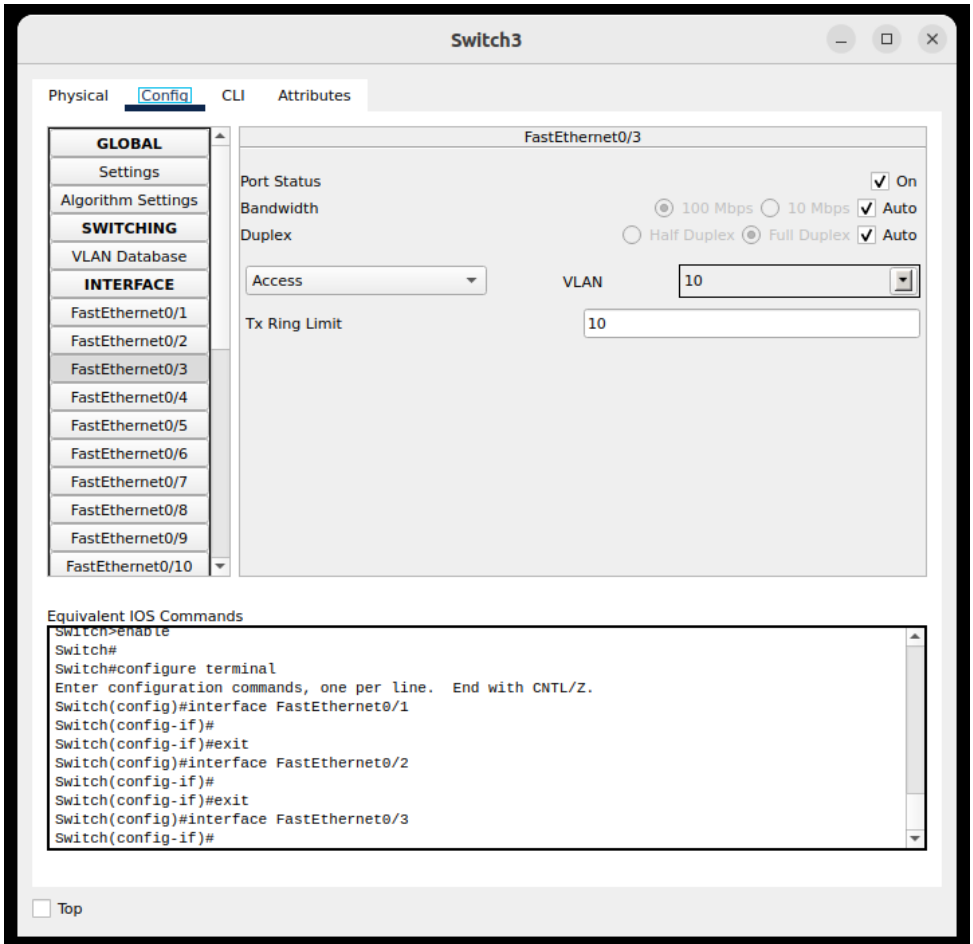


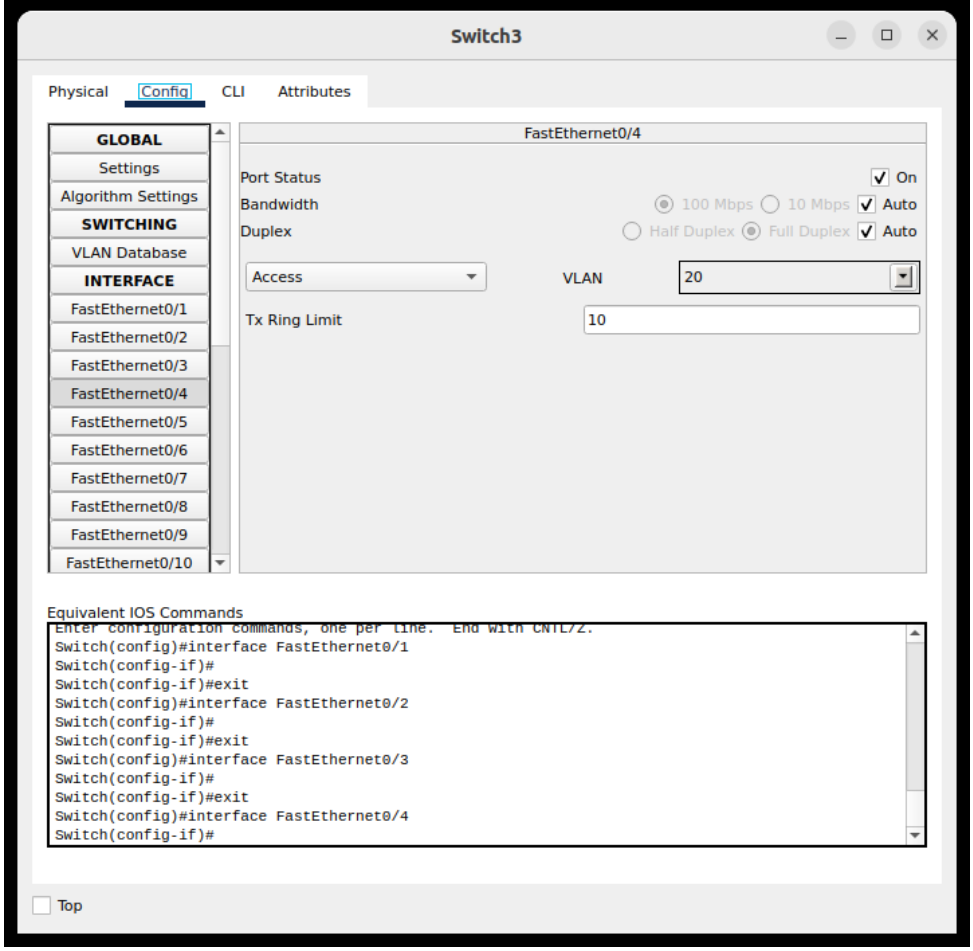

These two interfaces are connected to PC4 and PC5.

- Switch3
  In Switch3, we have 4 interfaces, 2 of them have VLAN 10 and 2 of them have VLAN 20, connected to Switch1 and Switch2 respectively.



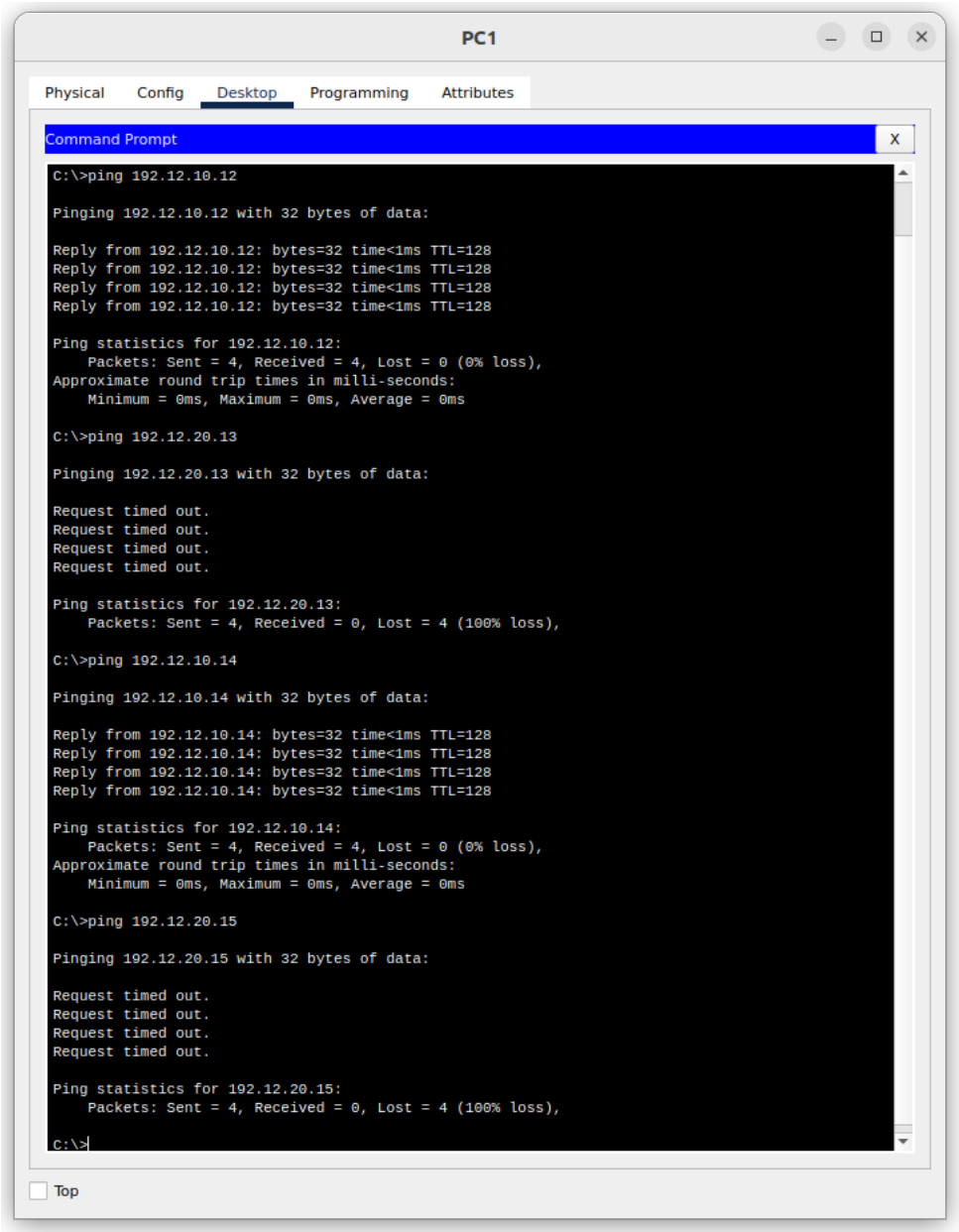

Switch3
Physical
Config
CLI
Attributes
GLOBAL
Settings
Algorithm Settings
SWITCHING
VLAN Database
INTERFACE
FastEthernet0/1
FastEthernet0/2
FastEthernet0/3
FastEthernet0/4
FastEthernet0/5
FastEthernet0/6
FastEthernet0/7
FastEthernet0/8
FastEthernet0/9
FastEthernet0/10
FastEthernet0/3
Port Status
On
Bandwidth
100 Mbps
10 Mbps
Auto
Duplex
Half Duplex
Full Duplex
Auto
Access
VLAN
10
Tx Ring Limit
10
Equivalent IOS Commands
Switch>enable
Switch#
Switch#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#interface FastEthernet0/1
Switch(config-if)#
Switch(config-if)#exit
Switch(config)#interface FastEthernet0/2
Switch(config-if)#
Switch(config-if)#exit
Switch(config)#interface FastEthernet0/3
Switch(config-if)#
Top


Switch3
Physical
Config
CLI
Attributes
GLOBAL
Settings
Algorithm Settings
SWITCHING
VLAN Database
INTERFACE
FastEthernet0/1
FastEthernet0/2
FastEthernet0/3
FastEthernet0/4
FastEthernet0/5
FastEthernet0/6
FastEthernet0/7
FastEthernet0/8
FastEthernet0/9
FastEthernet0/10
FastEthernet0/4
Port Status
On
Bandwidth
100 Mbps
10 Mbps
Auto
Duplex
Half Duplex
Full Duplex
Auto
Access
VLAN
20
Tx Ring Limit
10
Equivalent IOS Commands
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#interface FastEthernet0/1
Switch(config-if)#
Switch(config-if)#exit
Switch(config)#interface FastEthernet0/2
Switch(config-if)#
Switch(config-if)#exit
Switch(config)#interface FastEthernet0/3
Switch(config-if)#
Switch(config-if)#exit
Switch(config)#interface FastEthernet0/4
Switch(config-if)#
Top

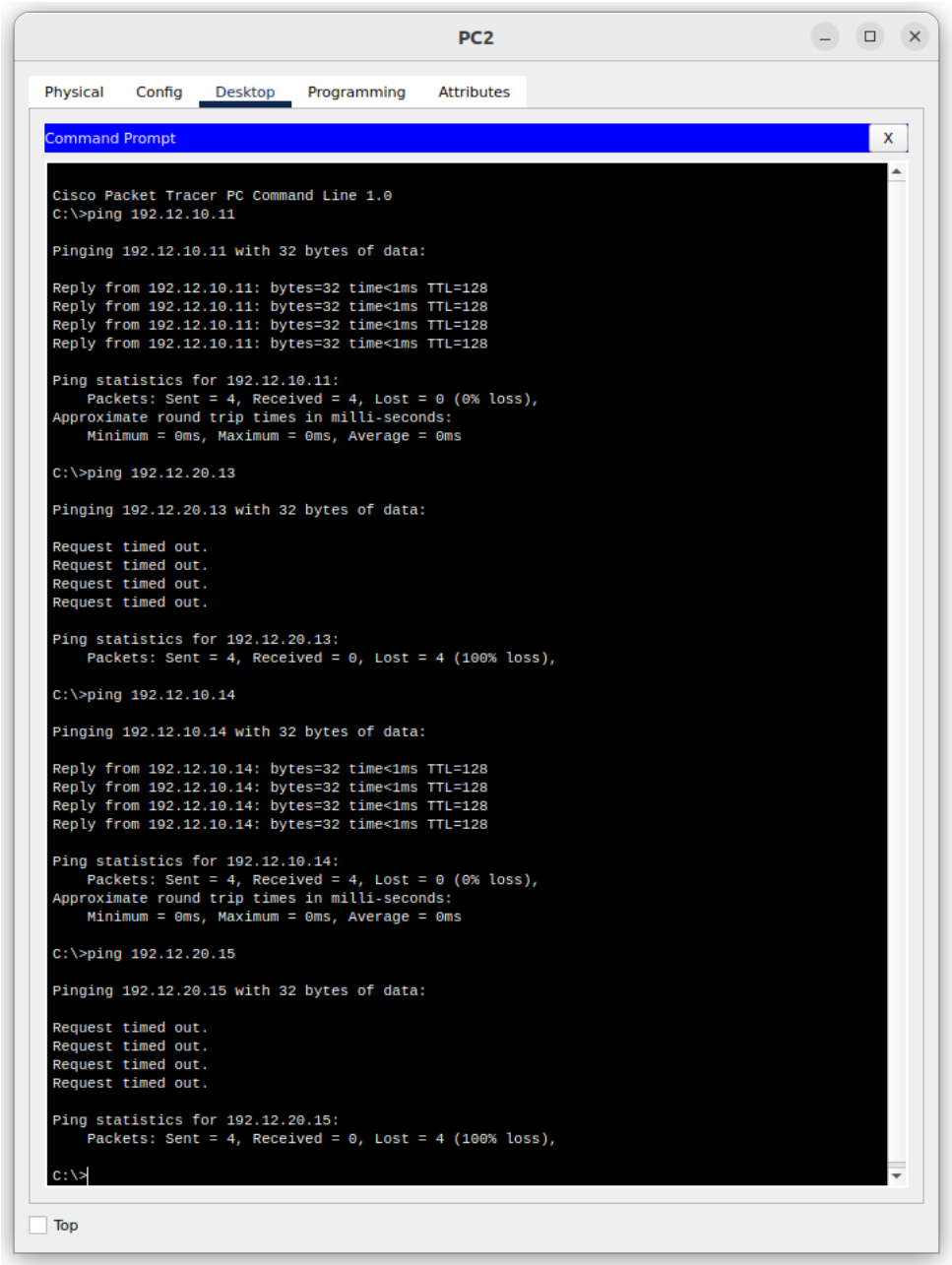
# II. Network test

We test network connection between PCs by `ping` command.

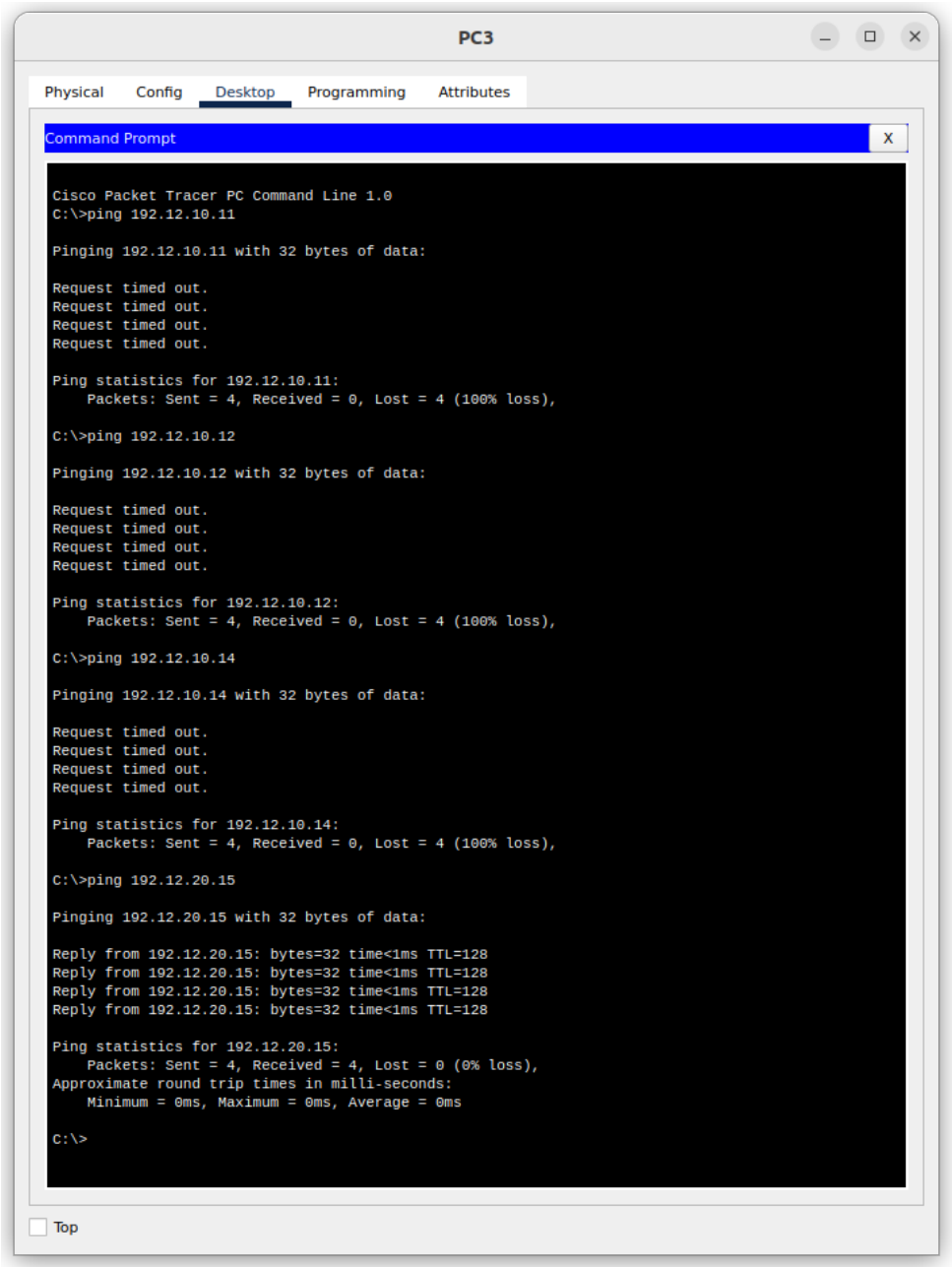
- PC1 pinging



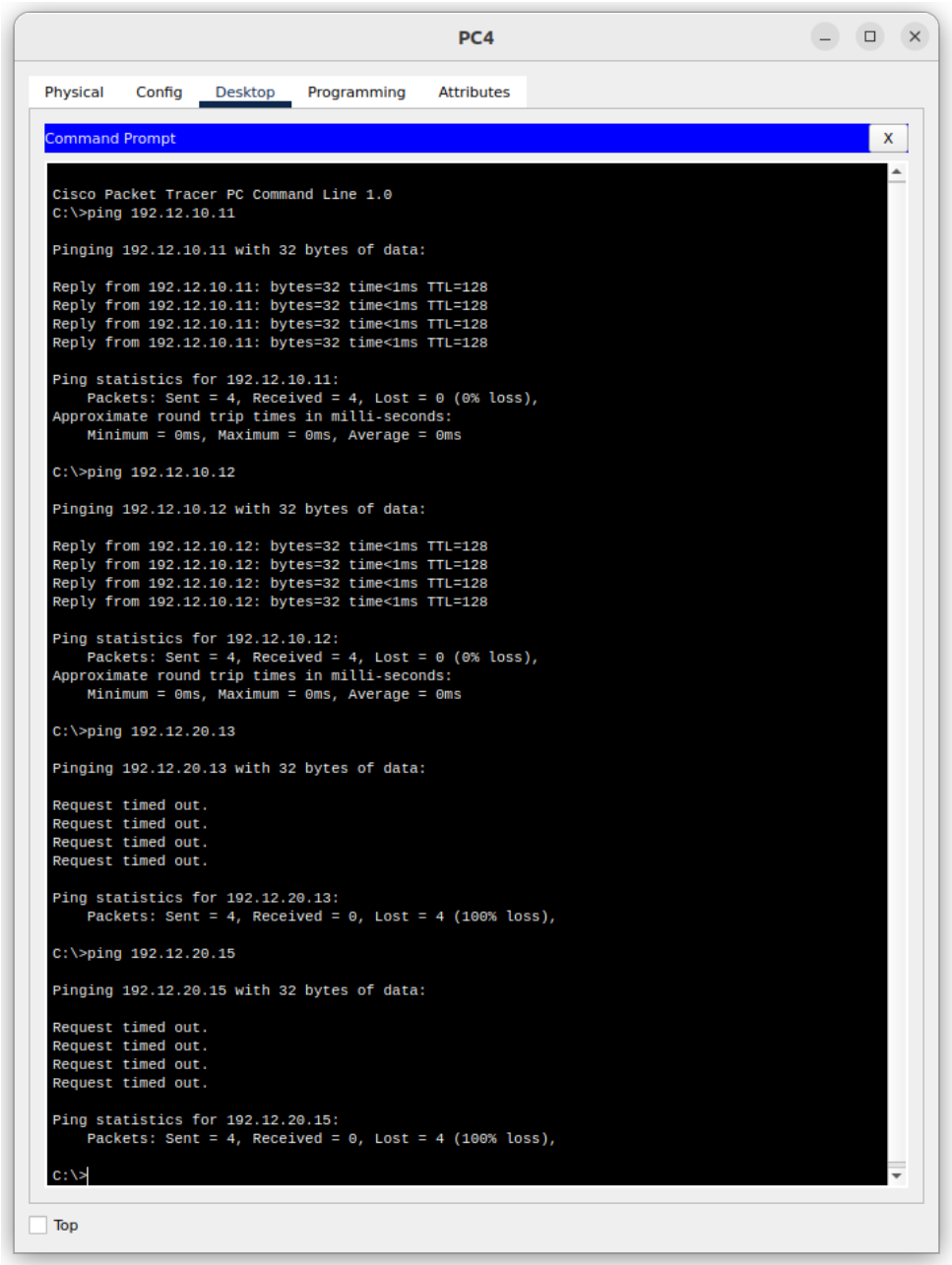
- PC2 pinging


PC2
Physical
Config
Desktop
Programming
Attributes
Command Prompt
X
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 192.12.10.11
Pinging 192.12.10.11 with 32 bytes of data:
Reply from 192.12.10.11: bytes=32 time<1ms TTL=128
Reply from 192.12.10.11: bytes=32 time<1ms TTL=128
Reply from 192.12.10.11: bytes=32 time<1ms TTL=128
Reply from 192.12.10.11: bytes=32 time<1ms TTL=128
Ping statistics for 192.12.10.11:
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
Minimum = 0ms, Maximum = 0ms, Average = 0ms
C:\>ping 192.12.20.13
Pinging 192.12.20.13 with 32 bytes of data:
Request timed out.
Request timed out.
Request timed out.
Request timed out.
Ping statistics for 192.12.20.13:
Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
C:\>ping 192.12.10.14
Pinging 192.12.10.14 with 32 bytes of data:
Reply from 192.12.10.14: bytes=32 time<1ms TTL=128
Reply from 192.12.10.14: bytes=32 time<1ms TTL=128
Reply from 192.12.10.14: bytes=32 time<1ms TTL=128
Reply from 192.12.10.14: bytes=32 time<1ms TTL=128
Ping statistics for 192.12.10.14:
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
Minimum = 0ms, Maximum = 0ms, Average = 0ms
C:\>ping 192.12.20.15
Pinging 192.12.20.15 with 32 bytes of data:
Request timed out.
Request timed out.
Request timed out.
Request timed out.
Ping statistics for 192.12.20.15:
Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
C:\>
Top

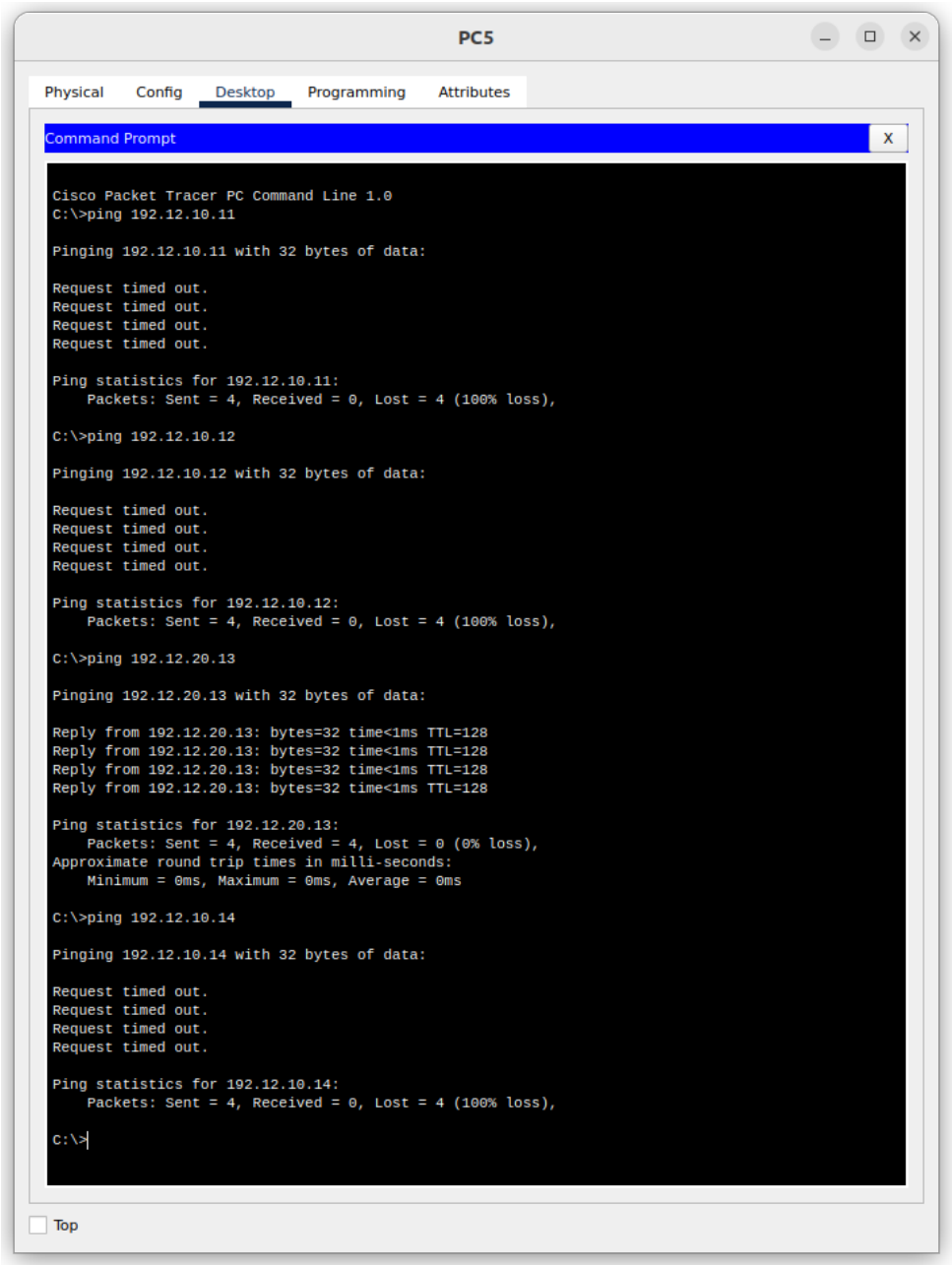
- PC3 pinging


PC3
Physical
Config
Desktop
Programming
Attributes
Command Prompt
X
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 192.12.10.11
Pinging 192.12.10.11 with 32 bytes of data:
Request timed out.
Request timed out.
Request timed out.
Request timed out.
Ping statistics for 192.12.10.11:
Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
C:\>ping 192.12.10.12
Pinging 192.12.10.12 with 32 bytes of data:
Request timed out.
Request timed out.
Request timed out.
Request timed out.
Ping statistics for 192.12.10.12:
Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
C:\>ping 192.12.10.14
Pinging 192.12.10.14 with 32 bytes of data:
Request timed out.
Request timed out.
Request timed out.
Request timed out.
Ping statistics for 192.12.10.14:
Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
C:\>ping 192.12.20.15
Pinging 192.12.20.15 with 32 bytes of data:
Reply from 192.12.20.15: bytes=32 time<1ms TTL=128
Reply from 192.12.20.15: bytes=32 time<1ms TTL=128
Reply from 192.12.20.15: bytes=32 time<1ms TTL=128
Reply from 192.12.20.15: bytes=32 time<1ms TTL=128
Ping statistics for 192.12.20.15:
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
Minimum = 0ms, Maximum = 0ms, Average = 0ms
C:\>
Top

- PC4 pinging


PC4
Physical
Config
Desktop
Programming
Attributes
Command Prompt
X
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 192.12.10.11
Pinging 192.12.10.11 with 32 bytes of data:
Reply from 192.12.10.11: bytes=32 time<1ms TTL=128
Reply from 192.12.10.11: bytes=32 time<1ms TTL=128
Reply from 192.12.10.11: bytes=32 time<1ms TTL=128
Reply from 192.12.10.11: bytes=32 time<1ms TTL=128
Ping statistics for 192.12.10.11:
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
Minimum = 0ms, Maximum = 0ms, Average = 0ms
C:\>ping 192.12.10.12
Pinging 192.12.10.12 with 32 bytes of data:
Reply from 192.12.10.12: bytes=32 time<1ms TTL=128
Reply from 192.12.10.12: bytes=32 time<1ms TTL=128
Reply from 192.12.10.12: bytes=32 time<1ms TTL=128
Reply from 192.12.10.12: bytes=32 time<1ms TTL=128
Ping statistics for 192.12.10.12:
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
Minimum = 0ms, Maximum = 0ms, Average = 0ms
C:\>ping 192.12.20.13
Pinging 192.12.20.13 with 32 bytes of data:
Request timed out.
Request timed out.
Request timed out.
Request timed out.
Ping statistics for 192.12.20.13:
Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
C:\>ping 192.12.20.15
Pinging 192.12.20.15 with 32 bytes of data:
Request timed out.
Request timed out.
Request timed out.
Request timed out.
Ping statistics for 192.12.20.15:
Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
C:\>
Top

- PC5 pinging




From the test results, we found that PC 1,2 and 4 can communicate with each other but cannot communicate with PC 3 and 5, while PC 3 and 5 can communicate with each other but cannot communicate with PC 1, 2 and 4.

PC 1, 2 and 4 have VLAN 10; PC 3 and 5 have VLAN 20.

In conclusion, only PCs with same VLAN can communicate with each other.