Christopher Dix – CS-03
NET-13-L1: Computer Networking Final Project

Lab Task 1: Design an IP Address Scheme

1. The network 172.16.10.0/24 was divided into eight subnets, as outlined below:
2. The value of the new subnet mask is 255.255.255.224.
3. 30 usable hosts exist per subnet.
4.

Subnet Number	Network Address	Usable Host Address Range	Broadcast Address
1	172.16.10.0	172.16.10.1 - 172.16.10.30	172.16.10.31
2	172.16.10.32	172.16.10.33 - 172.16.10.62	172.16.10.63
3	172.16.10.64	172.16.10.65 - 172.16.10.94	172.16.10.95
4	172.16.10.96	172.16.10.97 - 172.16.10.126	172.16.10.127
5	172.16.10.128	172.16.10.129 - 172.16.10.158	172.16.10.159
6	172.16.10.160	172.16.10.161 - 172.16.10.190	172.16.10.191
7	172.16.10.192	172.16.10.193 - 172.16.10.222	172.16.10.223
8	172.16.10.224	172.16.10.225 - 172.16.10.254	172.16.10.255

Lab Task 2: Implement VLANs and Trunk

(Listed commands were executed on S1-Office1 and S2-Office1.)

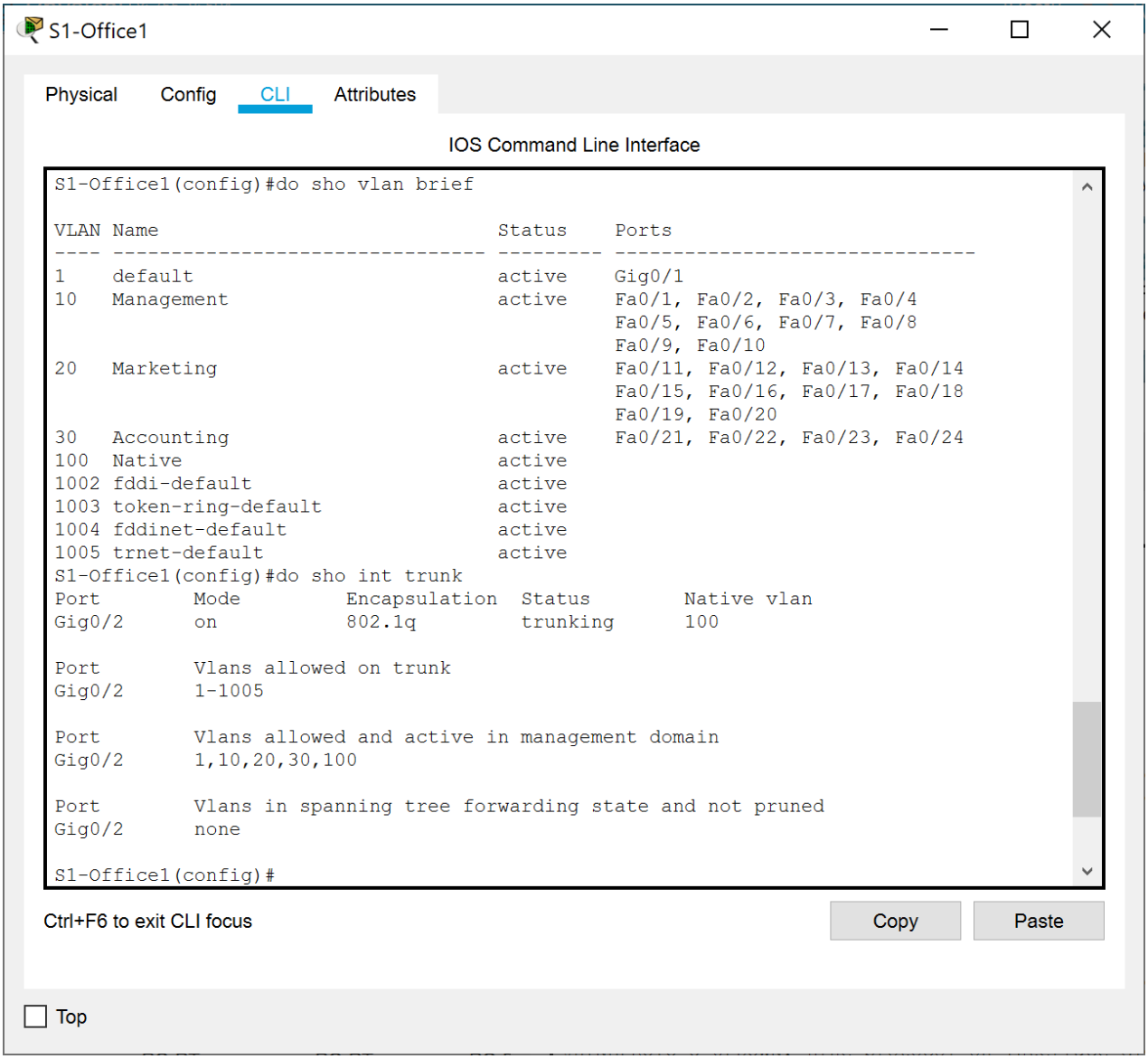
1. ```
   en
   conf t
   vlan 10
   name Management
   exit
   vlan 20
   name Marketing
   exit
   vlan 30
   name Accounting
   exit
   vlan 100
   name Native
   exit
   ```

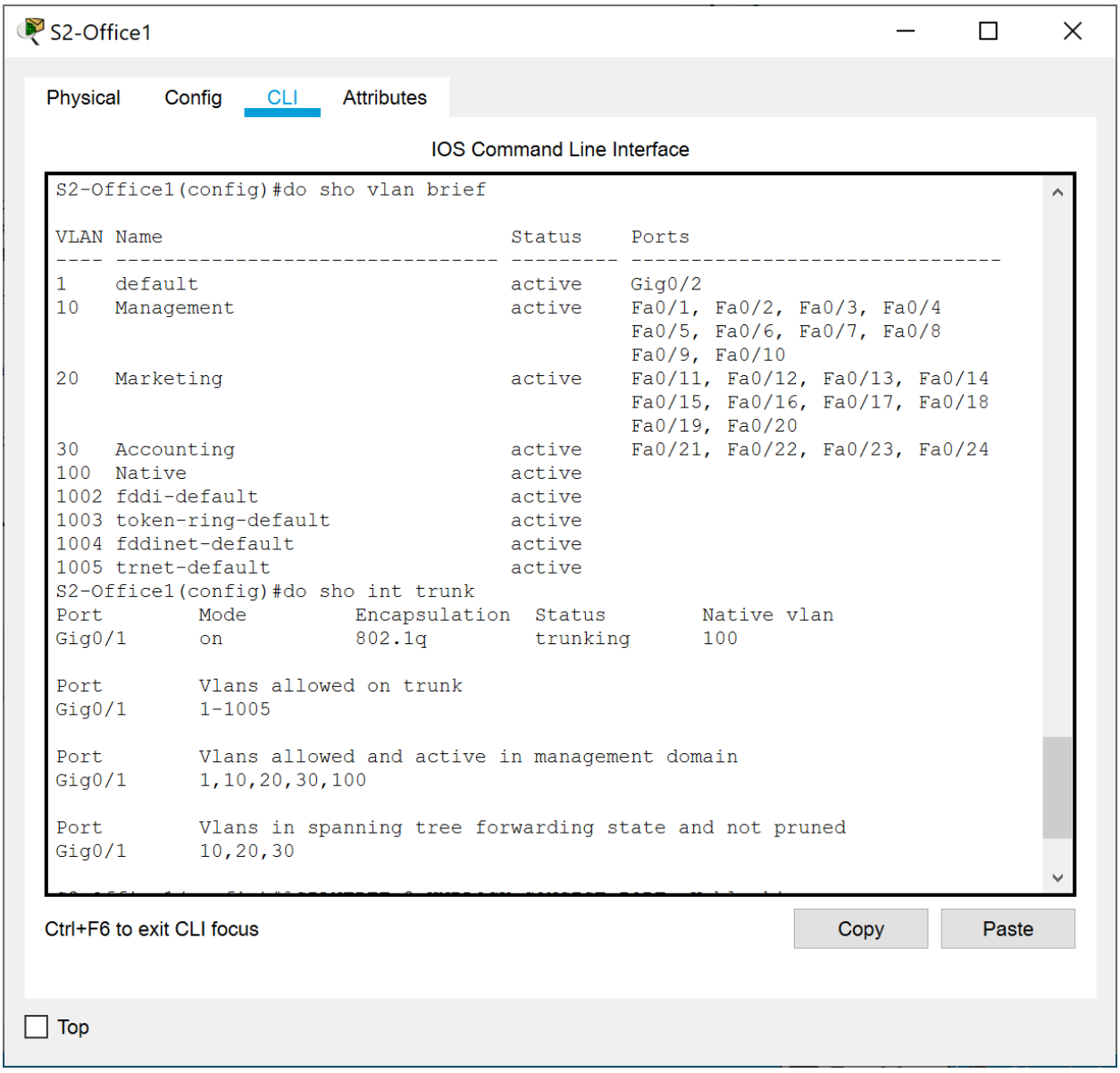
2. ```
   int range fa0/1-10
   switchport mode access
   switchport access vlan 10
   exit
   int range fa0/11-20
   switchport mode access
   switchport access vlan 20
   exit
   int range fa0/21-24
   switchport mode access
   switchport access vlan 30
   exit
   ```

3.
   a. *On S1-Office1:*
      ```
      int gi0/2
      switchport mode trunk
      switchport trunk native vlan 100
      exit
      do sho vlan brief
      do sho int trunk
      ```
   b. *On S2-Office1:*
      ```
      int gi0/1
      ```

```
switchport mode trunk
switchport trunk native vlan 100
exit
do sho vlan brief
do sho int trunk
```

4.
```
int range fa0/1-24
switchport nonegotiate
exit
do wr
```




S2-Office1
Physical
Config
CLI
Attributes
IOS Command Line Interface
S2-Office1(config)#do sho vlan brief
VLAN Name Status Ports
---- -------------------------------- --------- -------------------------------
1 default active Gig0/2
10 Management active Fa0/1, Fa0/2, Fa0/3, Fa0/4
Fa0/5, Fa0/6, Fa0/7, Fa0/8
Fa0/9, Fa0/10
20 Marketing active Fa0/11, Fa0/12, Fa0/13, Fa0/14
Fa0/15, Fa0/16, Fa0/17, Fa0/18
Fa0/19, Fa0/20
30 Accounting active Fa0/21, Fa0/22, Fa0/23, Fa0/24
100 Native active
1002 fddi-default active
1003 token-ring-default active
1004 fddinet-default active
1005 trnet-default active
S2-Office1(config)#do sho int trunk
Port Mode Encapsulation Status Native vlan
Gig0/1 on 802.1q trunking 100
Port Vlans allowed on trunk
Gig0/1 1-1005
Port Vlans allowed and active in management domain
Gig0/1 1,10,20,30,100
Port Vlans in spanning tree forwarding state and not pruned
Gig0/1 10,20,30
Ctrl+F6 to exit CLI focus
Copy
Paste
Top

Lab Task 3: Assign IP Addresses

1. Address 172.16.10.1 (from subnet 1) was assigned to the R3 / S1-Office3 link.
   On R3:
   ```
   en
   conf t
   int gi0/0
   ip address 172.16.10.1 255.255.255.224
   desc To S1-Office3
   no shut
   exit
   ```

2. Address 172.16.10.33 (from subnet 2) was assigned to the R3 / S1-Office2 link.
   On R3:
   ```
   int gi0/1
   ip address 172.16.10.33 255.255.255.224
   desc To S1-Office2
   no shut
   exit
   ```

3. For the R1 / R2 WAN link, addresses from subnet 3 were used. Address 172.16.10.65 was assigned on the R1 side, and address 172.16.10.66 was assigned on the R2 side.
   On R1:
   ```
   en
   conf t
   int se0/0/1
   ip addr 172.16.10.65 255.255.255.224
   desc To R2
   no shut
   ex
   ```
   On R2:
   ```
   en
   conf t
   int se0/0/1
   ip addr 172.16.10.66 255.255.255.224
   desc To R1
   no shut
   ex
   ```

4. For the R1 / R3 WAN link, addresses from subnet 4 were used. Address 172.16.10.97 was assigned on the R1 side, and address 172.16.10.98 was assigned on the R3 side.
   On R1:

```
int se0/0/0
ip addr 172.16.10.97 255.255.255.224
desc To R3
no shut
ex
do wr
```
On R3:
```
int se0/0/0
ip addr 172.16.10.98 255.255.255.224
desc To R1
no shut
ex
```

5. For the R2 / R3 WAN link, addresses from subnet 5 were used. Address 172.16.10.129 was assigned on the R2 side, and address 172.16.10.130 was assigned on the R3 side.
   On R2:
   ```
   int se0/0/0
   ip addr 172.16.10.129 255.255.255.224
   desc To R3
   no shut
   ex
   do wr
   ```
   On R3:
   ```
   int se0/0/1
   ip addr 172.16.10.130 255.255.255.224
   desc To R2
   no shut
   ex
   do wr
   ```

6. The last usable addresses on subnet 6 were assigned to end devices on VLAN 10 on the Office 1 LAN. The first usable address in subnet 6, 172.16.10.161, was set as the default gateway.
   a. CEO1: 172.16.10.189
   b. CEO2: 172.16.10.190

7. The last usable addresses on subnet 7 were assigned to end devices on VLAN 20 on the Office 1 LAN. The first usable address in subnet 7, 172.16.10.193, was set as the default gateway.
   a. Copywriter1: 172.16.10.221
   b. Copywriter2: 172.16.10.222

8. The last usable addresses on subnet 8 were assigned to end devices on VLAN 30 on the Office 1 LAN. The first usable address in subnet 8, 172.16.10.225, was set as the default gateway.
    a. Dialer1: 172.16.10.253
    b. Dialer2: 172.16.10.254

9. IP addresses were assigned to end devices in Offices 2 and 3:
    a. The last usable addresses on subnet 2 were assigned to end devices on the Office 2 LAN. The first usable address in subnet 2, 172.16.10.33, was set as the default gateway.
        i. Employee 1: 172.16.10.60
        ii. Employee 2: 172.16.10.61
        iii. Guest: 172.16.10.62
    b. The last usable addresses on subnet 1 were assigned to end devices on the Office 3 LAN. The first usable address in subnet 1, 172.16.10.1, was set as the default gateway (as configured in step 1).
        i. Email Server: 172.16.10.28
        ii. Syslog / NTP Server: 172.16.10.29
        iii. Admin: 172.16.10.30

IP Address Usage Summary	
Subnet	**Use**
1	Office 3 LAN
2	Office 2 LAN
3	R1 / R2 WAN link
4	R1 / R3 WAN link
5	R2 / R3 WAN link
6	VLAN 10 (Management)
7	VLAN 20 (Marketing)
8	VLAN 30 (Accounting)

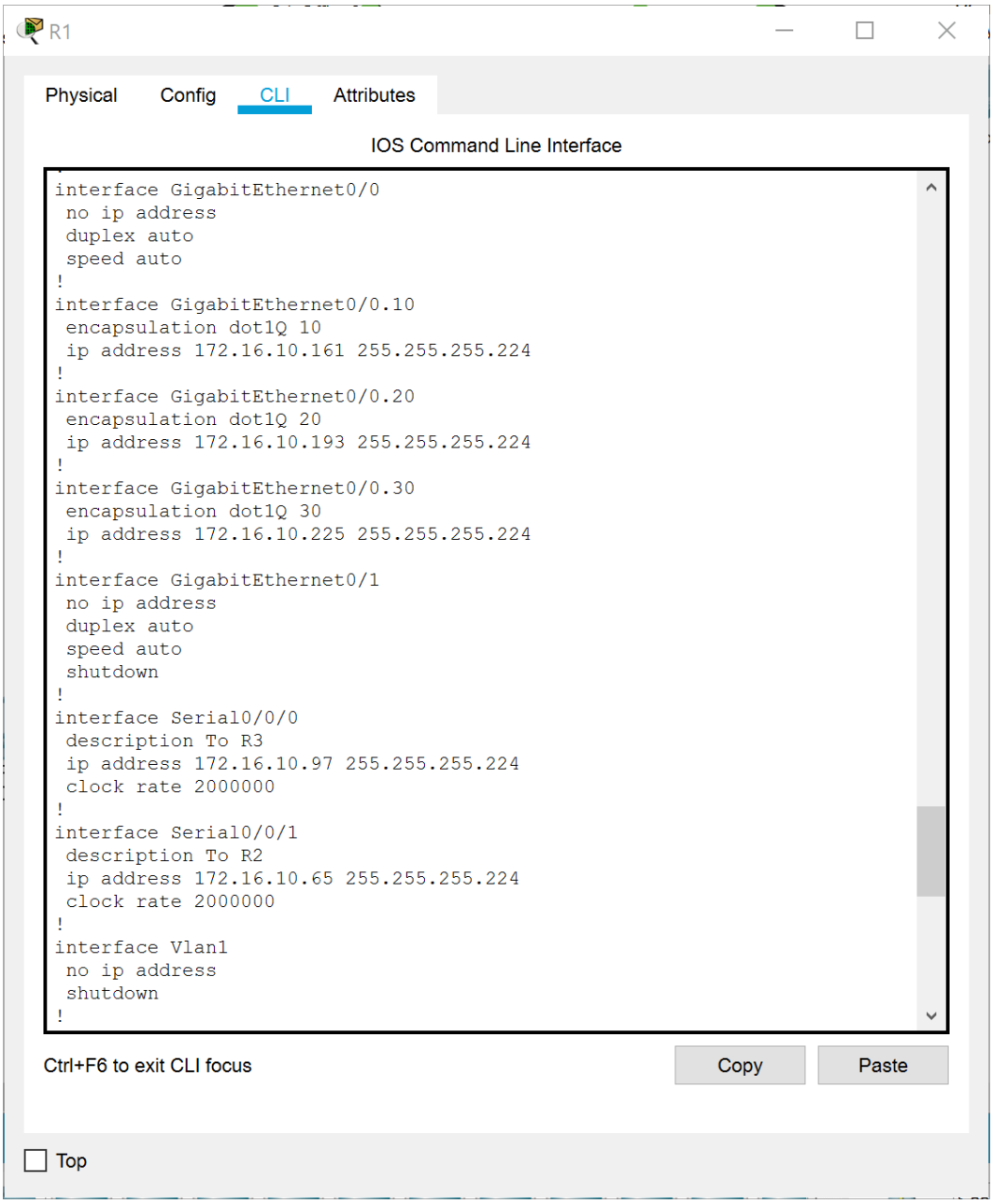
Lab Task 4: Configure R1 for Inter-VLAN Routing

(Listed commands were executed on R1, unless otherwise stated.)

1.
```
en
conf t
int gi0/0
no shut
ex
```

2. *(The commands below cover lab steps 2 through 4)*
```
int gi0/0.10
encapsulation dot1q 10
ip addr 172.16.10.161 255.255.255.224
ex
int gi0/0.20
encapsulation dot1q 20
ip addr 172.16.10.193 255.255.255.224
ex
int gi0/0.30
encapsulation dot1q 30
ip addr 172.16.10.225 255.255.255.224
ex
```

5.
```
do sho run
```

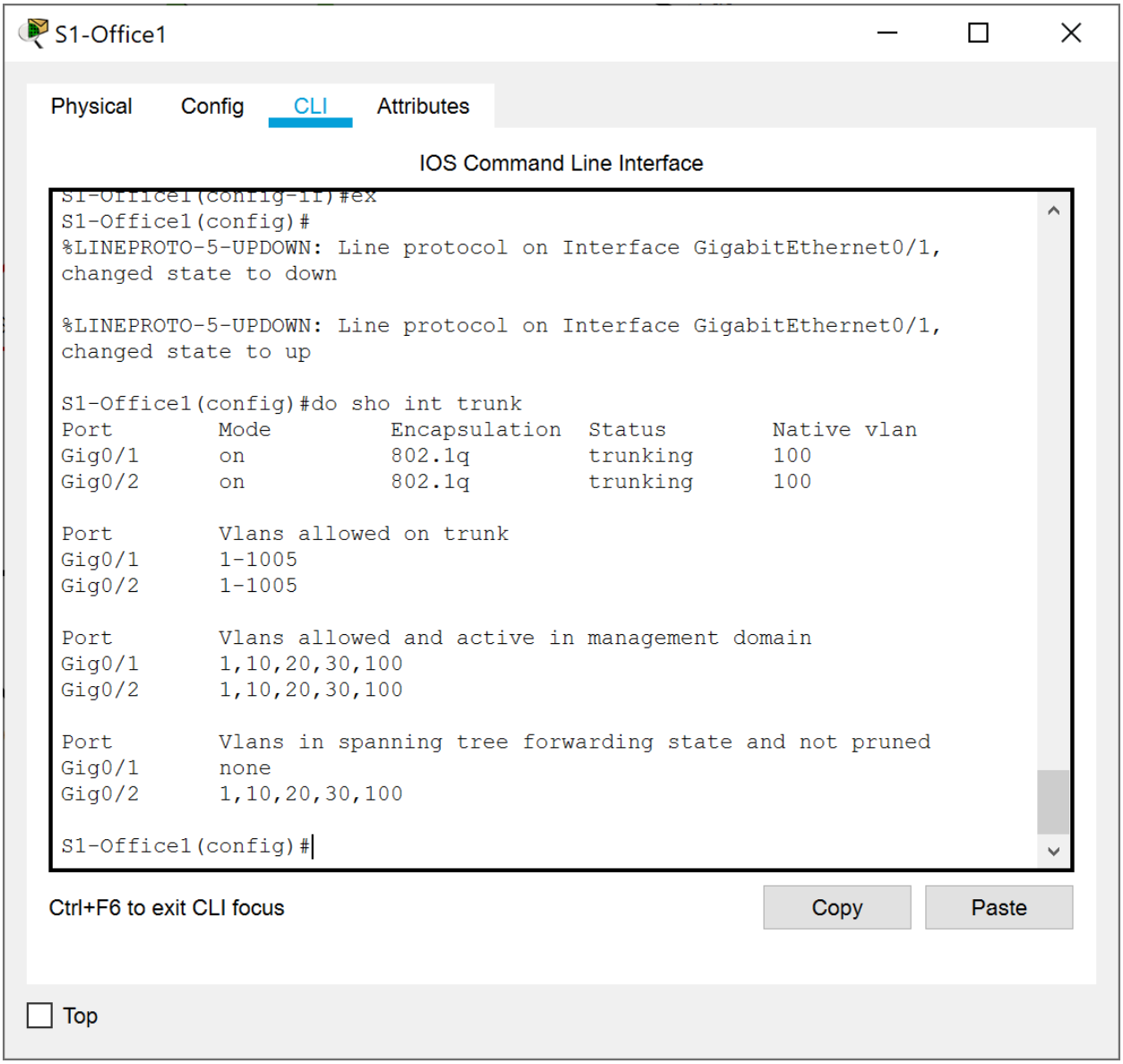


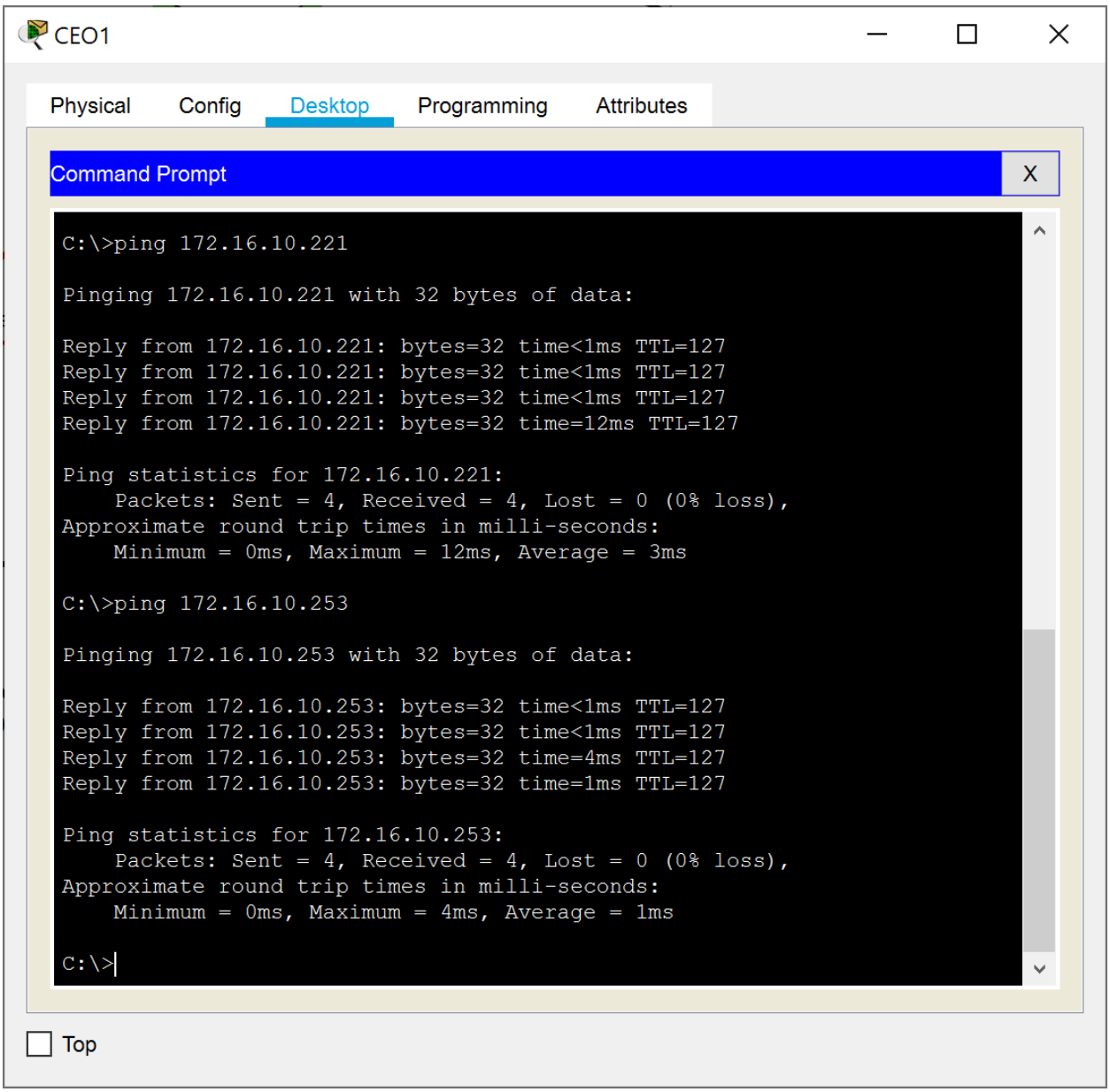
6. *On S1-Office1:*

```
en
conf t
int gi0/1
switchport mode trunk
switchport trunk native vlan 100
no shut
ex
```

7. *On S1-Office1:* `do sho int trunk`

8. I was able to successfully ping Copywriter1 and Dialer1 from the CEO1 PC.




CEO1
Physical
Config
Desktop
Programming
Attributes
Command Prompt
X
C:\>ping 172.16.10.221
Pinging 172.16.10.221 with 32 bytes of data:
Reply from 172.16.10.221: bytes=32 time<1ms TTL=127
Reply from 172.16.10.221: bytes=32 time<1ms TTL=127
Reply from 172.16.10.221: bytes=32 time<1ms TTL=127
Reply from 172.16.10.221: bytes=32 time=12ms TTL=127
Ping statistics for 172.16.10.221:
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
Minimum = 0ms, Maximum = 12ms, Average = 3ms
C:\>ping 172.16.10.253
Pinging 172.16.10.253 with 32 bytes of data:
Reply from 172.16.10.253: bytes=32 time<1ms TTL=127
Reply from 172.16.10.253: bytes=32 time<1ms TTL=127
Reply from 172.16.10.253: bytes=32 time=4ms TTL=127
Reply from 172.16.10.253: bytes=32 time=1ms TTL=127
Ping statistics for 172.16.10.253:
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
Minimum = 0ms, Maximum = 4ms, Average = 1ms
C:\>
Top

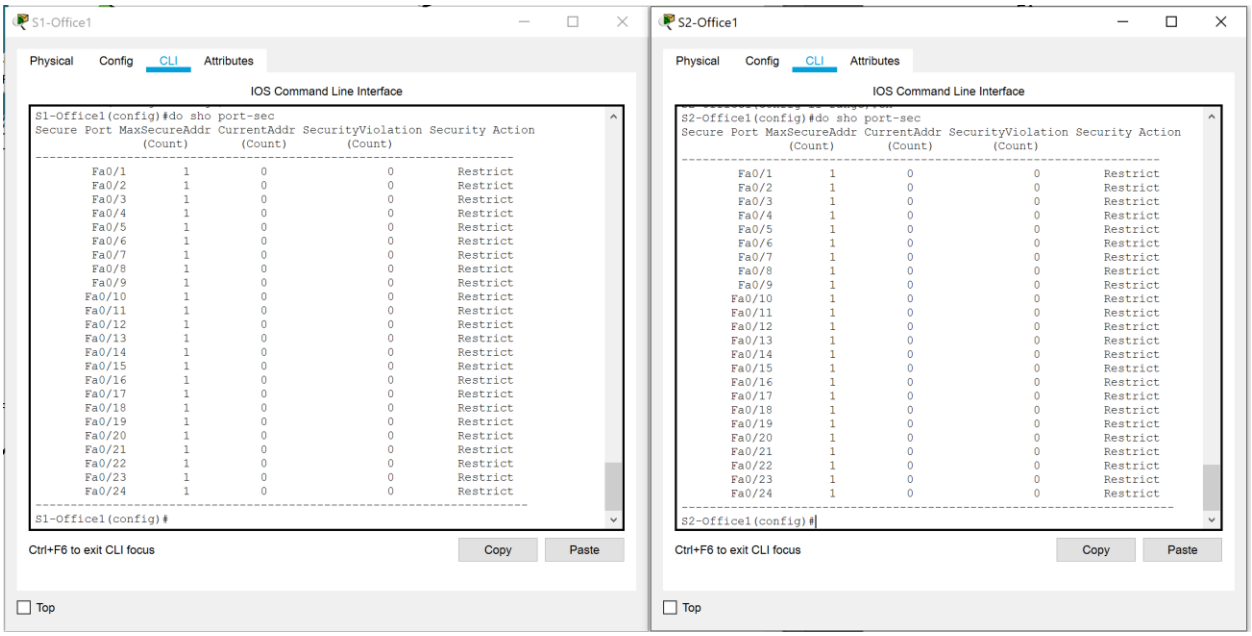
Lab Task 5: Secure Switch Physical Ports

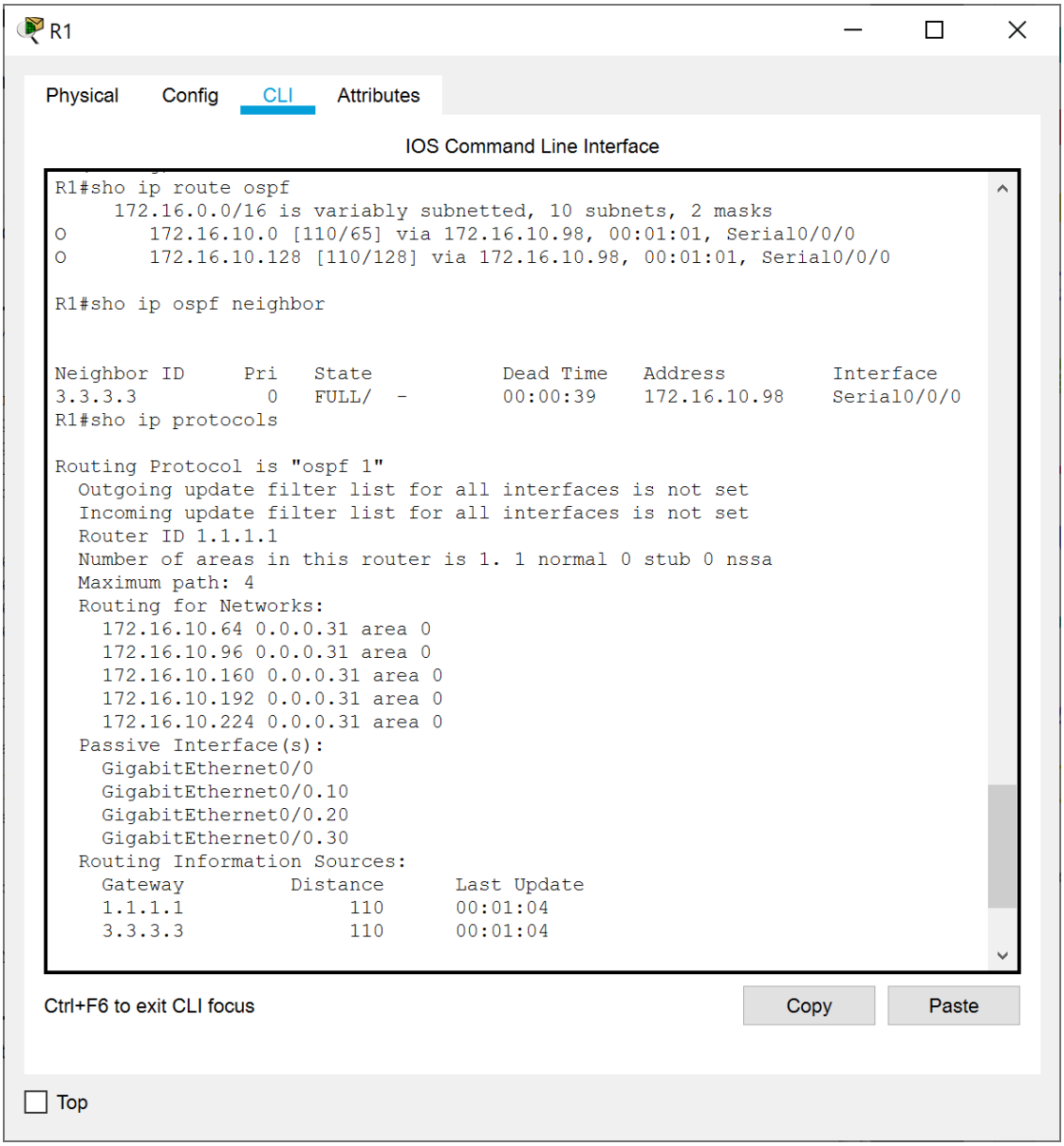
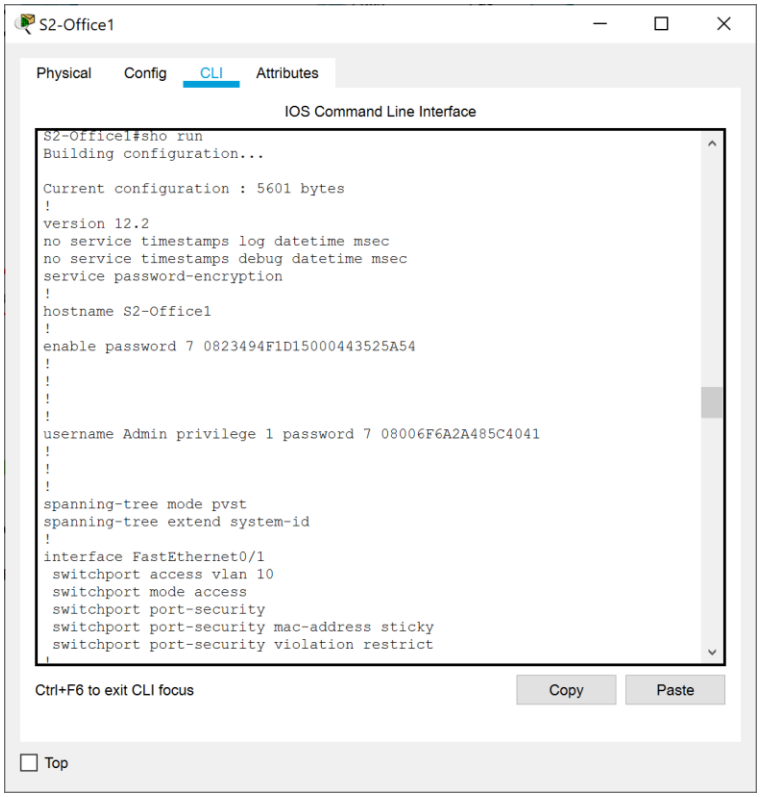
(Listed commands were executed on both S1-Office1 and S2-Office1, unless otherwise stated)

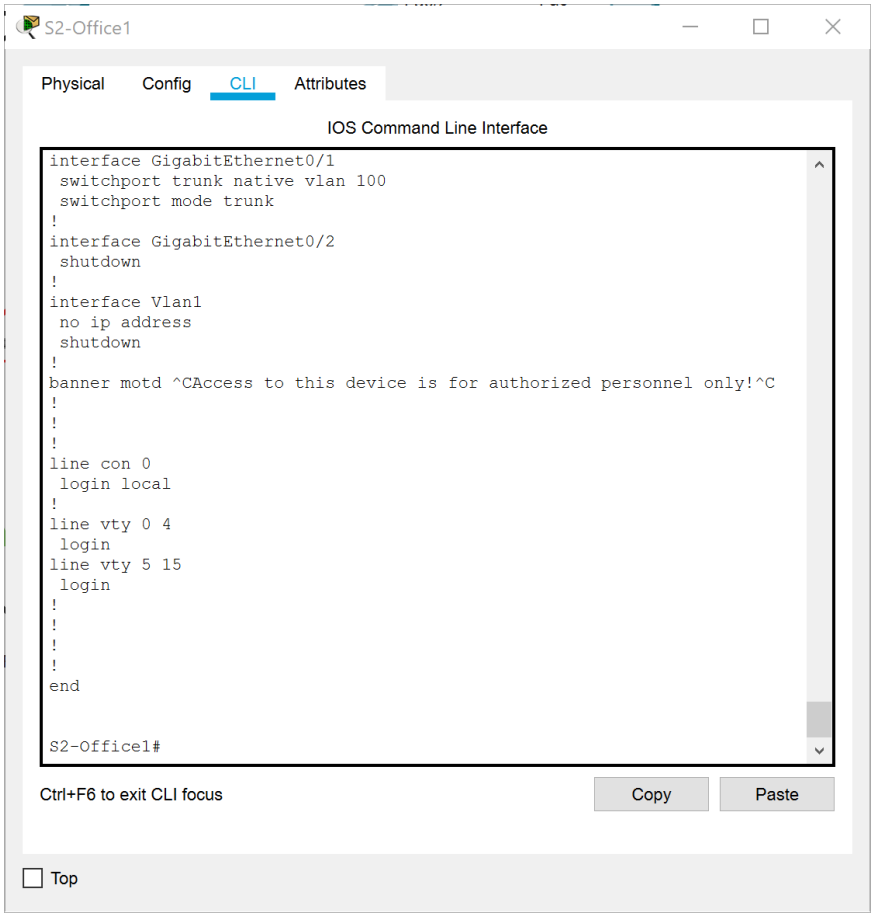
1. ```
   en
   conf t
   int range fa0/1-24
   switchport port-security
   switchport port-security violation restrict
   ```

2. ```
   switchport port-security mac-address sticky
   switchport port-security maximum 1
   ex
   ```

3. ```
   do sho port-sec
   ```



4. *On S1-Office1:*
   ```
   int range fa0/2-10
   shut
   ex
   int range fa0/12-20
   shut
   ex
   int range fa0/22-24
   shut
   ```
   ```

```
ex
do wr
```
On S2-Office1:
```
int range fa0/2-10
shut
ex
int range fa0/12-20
shut
ex
int range fa0/22-24
shut
ex
int gi0/2
shut
ex
do wr
```

Lab Task 6: Configure OSPF

(Listed commands were executed on R1, R2, and R3, unless otherwise stated)

1. ```
   en
   conf t
   int se0/0/0
   no shut
   ex
   int se0/0/1
   no shut
   ex
   ```

2. *On R3 only:*
   ```
   int range gi0/0-1
   no shut
   ex
   ```

3. ```
   router ospf 1
   auto-cost reference-bandwidth 1000
   ```
   On R1:
   ```
   router-id 1.1.1.1
   network 172.16.10.64 0.0.0.31 area 0
   network 172.16.10.96 0.0.0.31 area 0
   network 172.16.10.160 0.0.0.31 area 0
   network 172.16.10.192 0.0.0.31 area 0
   network 172.16.10.224 0.0.0.31 area 0
   ```
   On R2:
   ```
   router-id 2.2.2.2
   network 172.16.10.64 0.0.0.31 area 0
   network 172.16.10.128 0.0.0.31 area 0
   ```
   On R3:
   ```
   router-id 3.3.3.3
   network 172.16.10.96 0.0.0.31 area 0
   network 172.16.10.128 0.0.0.31 area 0
   network 172.16.10.32 0.0.0.31 area 0
   network 172.16.10.0 0.0.0.31 area 0
   ```

4. *On R1:*
   ```
   passive-int gi0/0
   passive-int gi0/0.10
   passive-int gi0/0.20
   passive-int gi0/0.30
   ```

On R3:

```
passive-int gi0/0
passive-int gi0/1
```

5.
```
ex
ex
sho ip route ospf
sho ip ospf neighbor
sho ip protocols
wr
```



Lab Task 7: Initial and Security Settings for Network Devices

(Listed commands were executed on all routers and switches)

1. ```
   en
   conf t
   username Admin password ACDC1973
   ```

2. ```
   line console 0
   login local
   exit
   ```

3. ```
   enable password beatles1960
   ```

4. ```
   service password-encryption
   ```

5. ```
   banner motd #Access to this device is for authorized personnel
   only!#
   ex
   wr
   ex
   ```


   ```


S2-Office1
Physical
Config
CLI
Attributes
IOS Command Line Interface
interface GigabitEthernet0/1
 switchport trunk native vlan 100
 switchport mode trunk
!
interface GigabitEthernet0/2
 shutdown
!
interface Vlan1
 no ip address
 shutdown
!
banner motd ^CAccess to this device is for authorized personnel only!^C
!
!
!
line con 0
 login local
!
line vty 0 4
 login
line vty 5 15
 login
!
!
!
!
end
S2-Office1#
Ctrl+F6 to exit CLI focus
Copy
Paste
Top

Lab Task 8: Secure Remote Access

(Listed commands were executed on R1, R2, and R3)

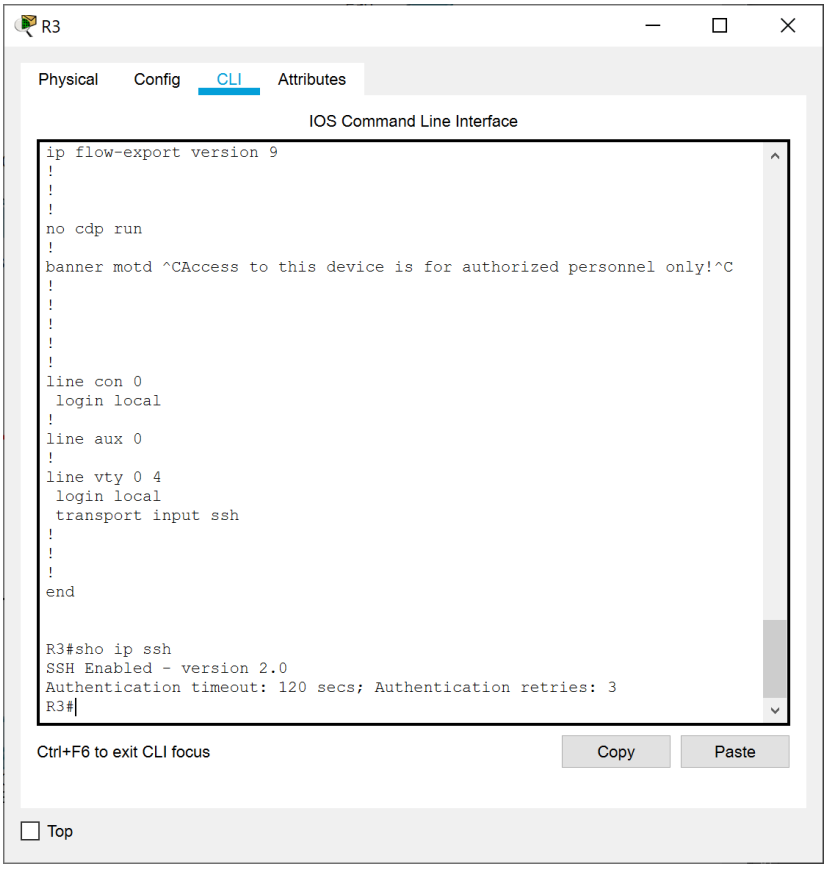
1. `ip domain-name Cyber.com`

2. `crypto key generate rsa`
   `2048`

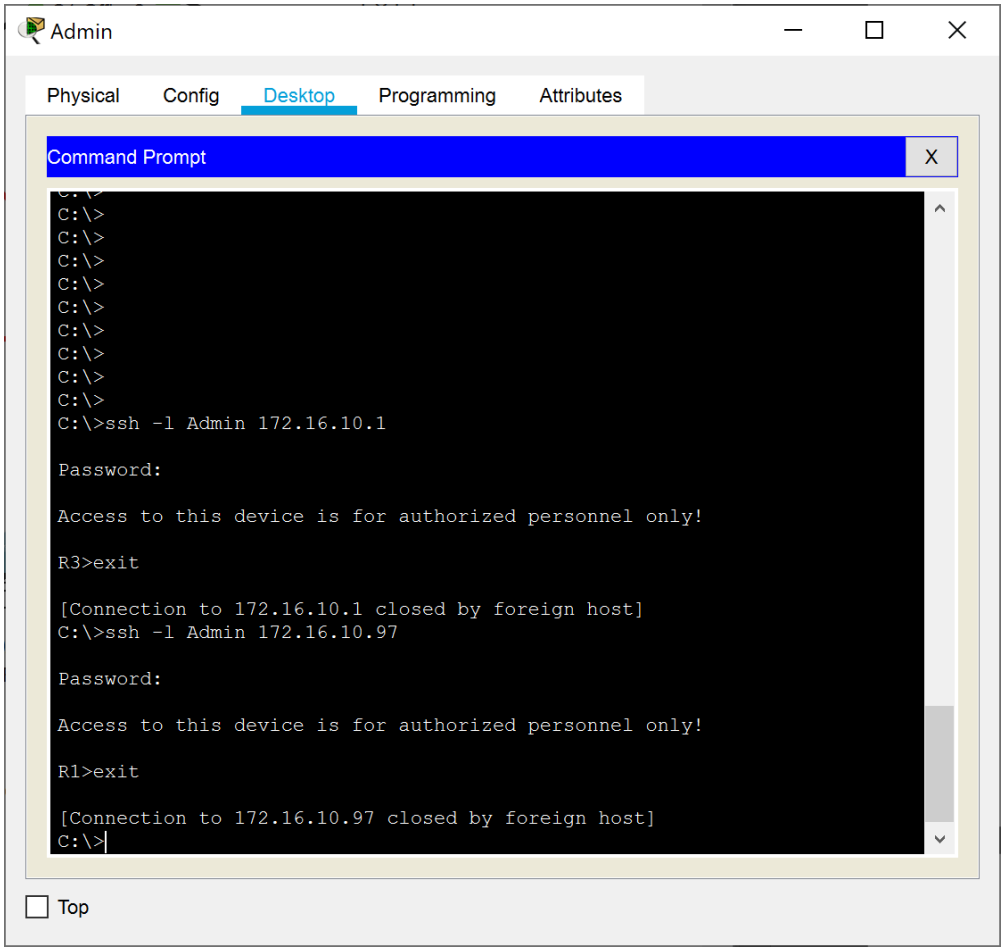
3. `ip ssh version 2`

4. `line vty 0 4`
   `login local`
   `motd-banner`
   `transport input ssh`
   `exit`

5. `ex`
   `sho ip ssh`
   `sho run`
   `wr`



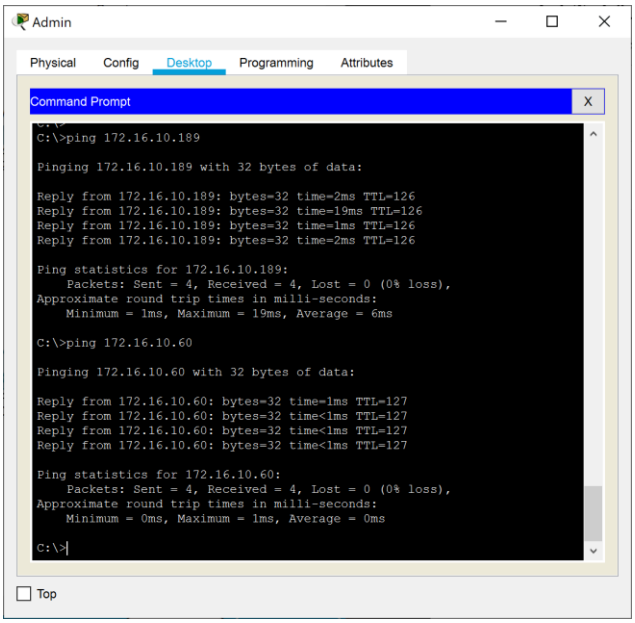
6. Using the command `ssh -l Admin` *`IP-Address`*, I was able to successfully SSH into the routers.



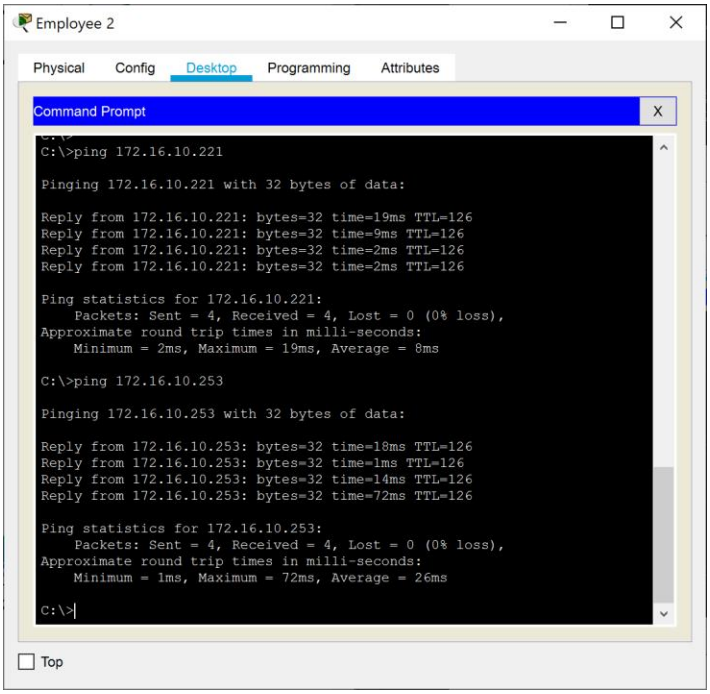
Lab Task 9: Full Connectivity Test

7. The configuration of IP addresses, subnet masks, default gateways, and wildcard masks were verified to be correct on all devices.

8. From the Admin PC, I was able to successfully ping CEO1 and Employee1.



9. From the Employee2 PC, I was able to successfully ping Copywriter1 and Dialer1.



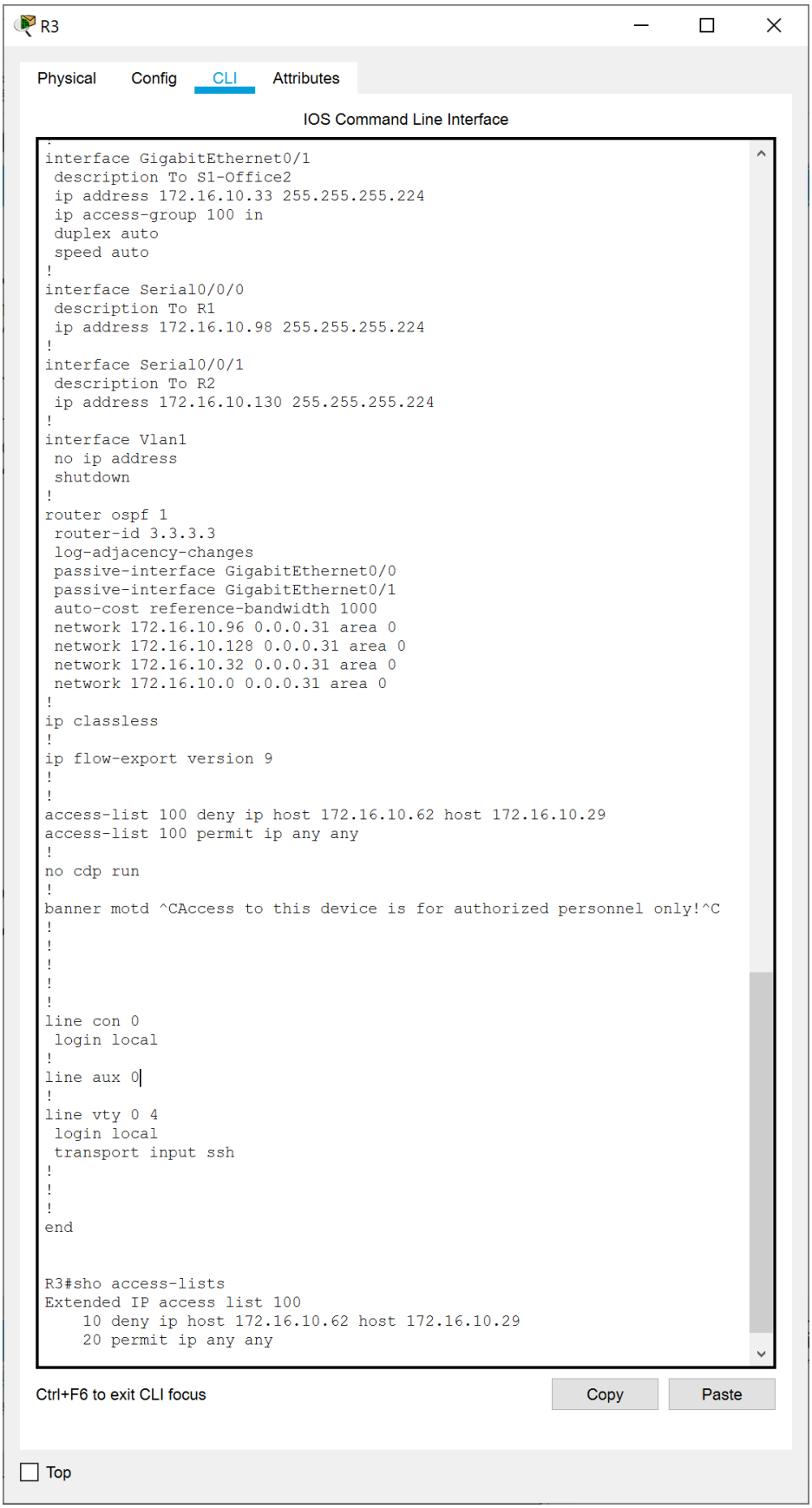
Lab Task 10: Extended ACL

(The below commands were executed on R3.)

1. ```
   en
   conf t
   access-list 100 deny ip host 172.16.10.62 host 172.16.10.29
   access-list 100 permit ip any any
   int gi0/1
   ip access-group 100 in
   ex
   ```

2. ```
   ex
   sho access-lists
   sho run
   wr
   ```

3. From the Guest PC, I was able to ping the email server but was not able to ping the NTP server.


R3
Physical
Config
CLI
Attributes
IOS Command Line Interface
interface GigabitEthernet0/1
 description To S1-Office2
 ip address 172.16.10.33 255.255.255.224
 ip access-group 100 in
 duplex auto
 speed auto
!
interface Serial0/0/0
 description To R1
 ip address 172.16.10.98 255.255.255.224
!
interface Serial0/0/1
 description To R2
 ip address 172.16.10.130 255.255.255.224
!
interface Vlan1
 no ip address
 shutdown
!
router ospf 1
 router-id 3.3.3.3
 log-adjacency-changes
 passive-interface GigabitEthernet0/0
 passive-interface GigabitEthernet0/1
 auto-cost reference-bandwidth 1000
 network 172.16.10.96 0.0.0.31 area 0
 network 172.16.10.128 0.0.0.31 area 0
 network 172.16.10.32 0.0.0.31 area 0
 network 172.16.10.0 0.0.0.31 area 0
!
ip classless
!
ip flow-export version 9
!
!
access-list 100 deny ip host 172.16.10.62 host 172.16.10.29
access-list 100 permit ip any any
!
no cdp run
!
banner motd ^CAccess to this device is for authorized personnel only!^C
!
!
!
!
!
line con 0
 login local
!
line aux 0
!
line vty 0 4
 login local
 transport input ssh
!
!
!
end
R3#sho access-lists
Extended IP access list 100
    10 deny ip host 172.16.10.62 host 172.16.10.29
    20 permit ip any any
Ctrl+F6 to exit CLI focus
Copy
Paste
Top