Final Project
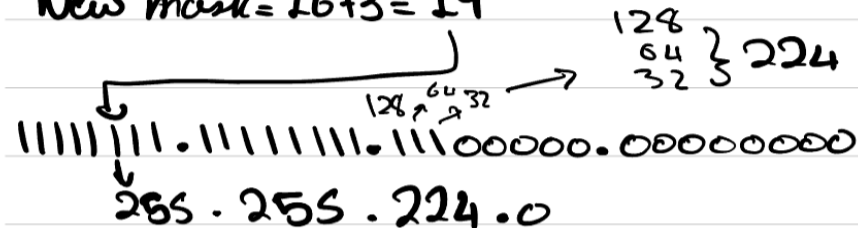**Lab Task 1: Design an IP Address Scheme site24x7**

1. The network 172.16.10.0/16 was divided into seven subnets, as outlined below:

Subnet Processing:

1. Divide 172.16.10.0/16, to creat 7 Subnet we needs 3 additinal bits ($2^3 = 8$)

New mask = 16+3 = 19

$$128$$
$$64$$
$$32$$ } 224

$128, 64, 32$

11111111.11111111.11100000.00000000

255.255.224.0

2. Calculating Usable host:

Host bit = 32-19 = 13 bits

Usable add Per subnet = $2^{13} - 2 = 8190$

we sub by 2 because there is

two spasific addres in each subnet are Reserved & cannot be assigned to individual hosts.

1. Network Addres   2. Broadcast Addres.

2. The value of the new subnet mask is 255.255.224.0
3. 2^19=8190 usable hosts exist per subnet.
4.

Subnet ID	Network address	Host Address Range	Broadcast Address	Subnet mask
1	172.16.0.0	172.16.0.1 - 172.16.31.254	172.16.31.255	255.255.224.0
2	172.16.32.0	172.16.32.1 - 172.16.63.254	172.16.63.255	255.255.224.0
3	172.16.64.0	172.16.64.1 - 172.16.95.254	172.16.95.255	255.255.224.0
4	172.16.96.0	172.16.96.1 - 172.16.127.254	172.16.127.255	255.255.224.0
5	172.16.128.0	172.16.128.1 - 172.16.159.254	172.16.159.255	255.255.224.0
6	172.16.160.0	172.16.160.1 - 172.16.191.254	172.16.191.255	255.255.224.0
7	172.16.192.0	172.16.192.1 - 172.16.223.254	172.16.223.255	255.255.224.0

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.

- ***On S1-Office1:***

   int gi0/2
   switchport mode trunk
   switchport trunk native vlan 100
   exit
   show vlan brief
   show int trunk

- ***On S2-Office1:***

   int gi0/1
   switchport mode trunk
   switchport trunk native vlan 100
   exit
   show vlan brief
   show int trunk

4. Interface gig0/1
   switchport nonegotiate
   exit
   wr

S1-Office1# show vlan brief

```
wr
Building configuration...
[OK]
S1-Office1#show vlan brief

VLAN Name                             Status    Ports
---- -------------------------------- ---------
------------------------------
1    default                          active    Gig0/1
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
S1-Office1#
```

S2-Office1# show vlan brief

```
S2-Office1#
%SYS-5-CONFIG_I: Configured from console by console

S2-Office1#show 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#
```

S1-Office1#show int trunk

```
1005 trnet-default                    active
S1-Office1(config)#exit
S1-Office1#
%SYS-5-CONFIG_I: Configured from console by console

S1-Office1#show int trunk
Port        Mode            Encapsulation Status         Native
vlan
Gig0/2      on              802.1q        trunking       100

Port        Vlans allowed on trunk
Gig0/2      1-1005

Port        Vlans allowed and active in management domain
Gig0/2      1,10,20,30,100

Port        Vlans in spanning tree forwarding state and not
pruned
Gig0/2      1,10,20,30,100

S1-Office1#
```

S2-Office1#show int trunk

```
100  Native                           active
1002 fddi-default                     active
1003 token-ring-default               active
1004 fddinet-default                  active
1005 trnet-default                    active
S2-Office1#show 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      1,10,20,30,100

S2-Office1#
```

Lab Task 3: Assign IP Addresses

Device	Interface	Address	Subnet Mask	Default Gateway
R1	Gig0/0/0	---	255.255.224.0	---
	Serial0/1/0	172.16.128.1	255.255.224.0	---
	Serial0/1/1	172.16.160.1	255.255.224.0	---
	Gig0/0/0.10	172.16.0.1	255.255.224.0	---
	Gig0/0/0.20	172.16.32.1	255.255.224.0	---
	Gig0/0/0.30	172.16.64.1	255.255.224.0	---
R2-Edge_router	Serial0/1/0	172.16.96.2	255.255.224.0	---
	Serial0/1/1	172.16.160.2	255.255.224.0	---
R3	Gig0/0/0	172.16.192.1	255.255.224.0	---
	Serial0/1/0	172.16.128.2	255.255.224.0	---
	Serial0/1/1	172.16.96.1	255.255.224.0	---
S1-Office1	VLAN 10 (Management)	---	255.255.224.0	172.16.32.1
	VLAN 20 (Marketing)	---	255.255.224.0	172.16.32.1
	VLAN 30 (Accounting)	---	255.255.224.0	172.16.32.1
S2-Office1	VLAN 10 (Management)	---	255.255.224.0	172.16.160.1
	VLAN 20 (Marketing)	---	255.255.224.0	172.16.160.1
	VLAN 30 (Accounting)	---	255.255.224.0	172.16.160.1
CEO1	FastEthernet0/0	172.16.0.2	255.255.224.0	172.16.0.1
CEO2	FastEthernet0/1	172.16.0.3	255.255.224.0	172.16.0.1
Dialer1	FastEthernet0/2	172.16.32.2	255.255.224.0	172.16.32.1
Dialer2	FastEthernet0/0	172.16.32.3	255.255.224.0	172.16.32.1
Copywriter1	FastEthernet0/1	172.16.64.9	255.255.224.0	172.16.64.1
Copywriter2	FastEthernet0/2	172.16.64.2	255.255.224.0	172.16.64.1
Emp1	FastEthernet0/0	172.16.192.2	255.255.224.0	172.16.192.1
Emp2	FastEthernet0/1	172.16.192.3	255.255.224.0	172.16.192.1
guest	FastEthernet0/2	172.16.192.4	255.255.224.0	172.16.192.1

Configure R2:

- **Seiral 0/1/0:**
    En
    Conf t
    Interface se0/1/0
    Ip address 172.16.96.2 255.255.224.0
    No shutdown
    Exit
- **Seiral 0/1/1:**
    Interface se0/1/1
    Ip address 172.16.160.2 255.255.224.0
    No shutdown
    Exit
    Exit
    wr

Configure R3:

- **Seiral 0/1/0:**
  En
  Conf t
  Interface se0/1/0
  Ip address 172.16.128.2 255.255.224.0
  No shutdown
  Exit

- **Seiral 0/1/1:**
  Interface se0/1/1
  Ip address 172.16.96.1 255.255.224.0
  No shutdown
  Exit

- **Gig 0/0/0:**
  Interface gig0/0/0
  Ip address 172.16.192.1 255.255.224.0
  No shutdown
  Exit
  Exit
  wr

Configure R1:

- **Seiral 0/1/0:**
  En
  Conf t
  Interface se0/1/0
  Ip address 172.16.128.1 255.255.224.0
  No shutdown
  Exit

- **Seiral 0/1/1:**
  Interface se0/1/1
  Ip address 172.16.160.1 255.255.224.0
  No shutdown
  Exit

- **Gig 0/0/0:**
  Interface gig0/0/0
  No shutdown
  Exit

Lab Task 4: Configure R1 for Inter-VLAN Routing

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

- **Gig0/0/0.10**
  int g0/0/0.10
  encapsulation dot1q 10
  ip add 172.16.0.1 255.255.224.0
  exit

- **Gig0/0/0.20**
  int g0/0/0.20
  encapsulation dot1q 20
  ip add 172.16.32.1 255.255.224.0
  exit

- **Gig0/0/0.30**
  int g0/0/0.30
 encapsulation dot1q 30
  ip add 172.16.64.1 255.255.224.0
  exit


```
R1-Office 1
   Physical   Config   CLI   Attributes
            IOS Command Line Interface

interface GigabitEthernet0/0/0
 no ip address
 duplex auto
 speed auto
!
interface GigabitEthernet0/0/0.10
 encapsulation dot1Q 10
 ip address 172.16.0.1 255.255.224.0
!
interface GigabitEthernet0/0/0.20
 encapsulation dot1Q 20
 ip address 172.16.32.1 255.255.224.0
!
interface GigabitEthernet0/0/0.30
 encapsulation dot1Q 30
 ip address 172.16.64.1 255.255.224.0
!
interface GigabitEthernet0/0/1
 no ip address
 duplex auto
 speed auto
!
interface GigabitEthernet0/0/2
 no ip address

R1-Office1#
                              Copy    Paste

  Top
```

- **On S1-Office1 & S2-Office2, set GigabitEthernet 0/1 as Trunk, with appropriate Native VLAN.**

  en
  conf t
  int gig0/1
  switchport mode trunk
  switchport trunk native vlan 100
  no shutdown
  exit
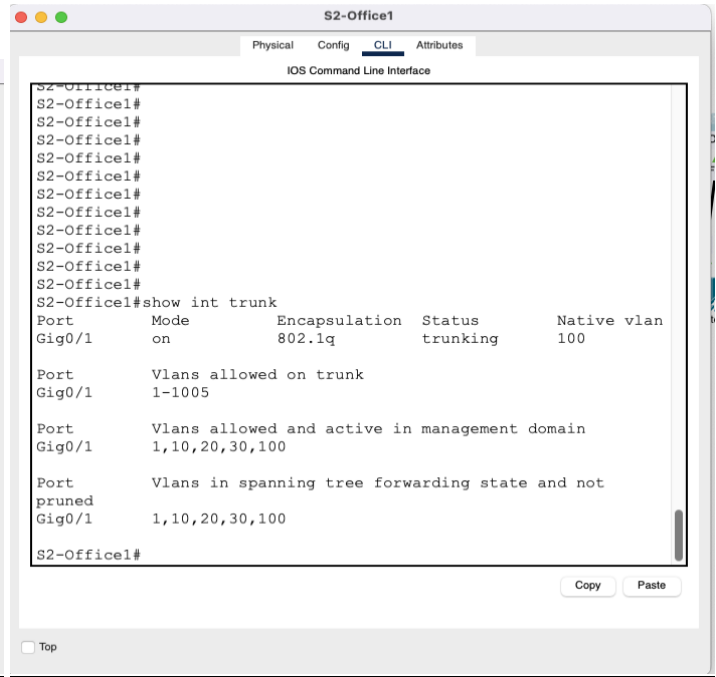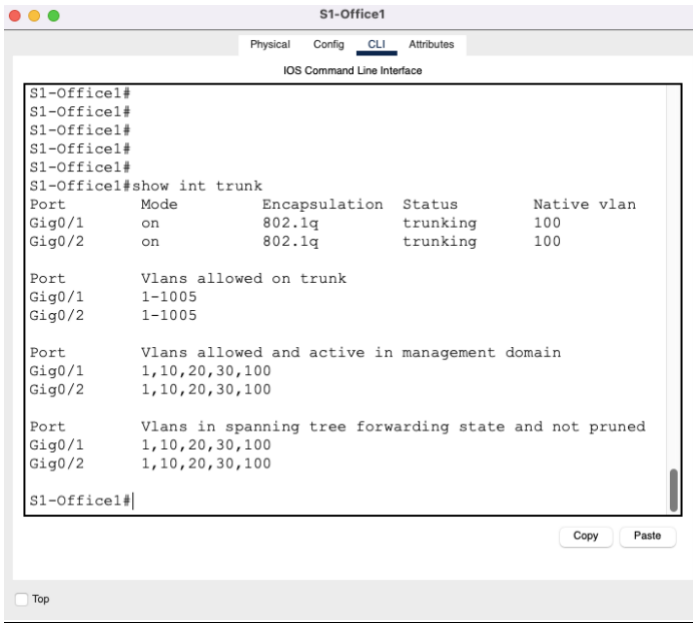
Lab Task 5: Static Routing for network devices

- **R3-Office 2:**
  En
  Conf t
  ip route 172.16.0.0 255.255.224.0 172.16.128.1
  ip route 172.16.32.0 255.255.224.0 172.16.128.1
  ip route 172.16.64.0 255.255.224.0 172.16.128.1
  ip route 172.16.96.0 255.255.224.0 172.16.96.2
  ip route 172.16.160.0 255.255.224.0 172.16.96.2
  exit
  wr
- **R2-Edge_router:**
  En
  Conf t
  ip route 172.16.0.0 255.255.224.0 172.16.160.1
  ip route 172.16.32.0 255.255.224.0 172.16.160.1
  ip route 172.16.64.0 255.255.224.0 172.16.160.1
  ip route 172.16.128.0 255.255.224.0 172.16.96.1
  ip route 172.16.192.0 255.255.224.0 172.16.96.1
  exit
  wr

- **R1-Office 1:**
  en
  conf t
  ip route 172.16.96.0 255.255.224.0 172.16.96.2
  ip route 172.16.192.0 255.255.224.0 172.16.128.2
  ip route 0.0.0.0 0.0.0.0 172.16.160.2
  exit

Lab Task 6: Initial and Security Settings for Network Devices
(Listed commands were executed on all routers and switches)
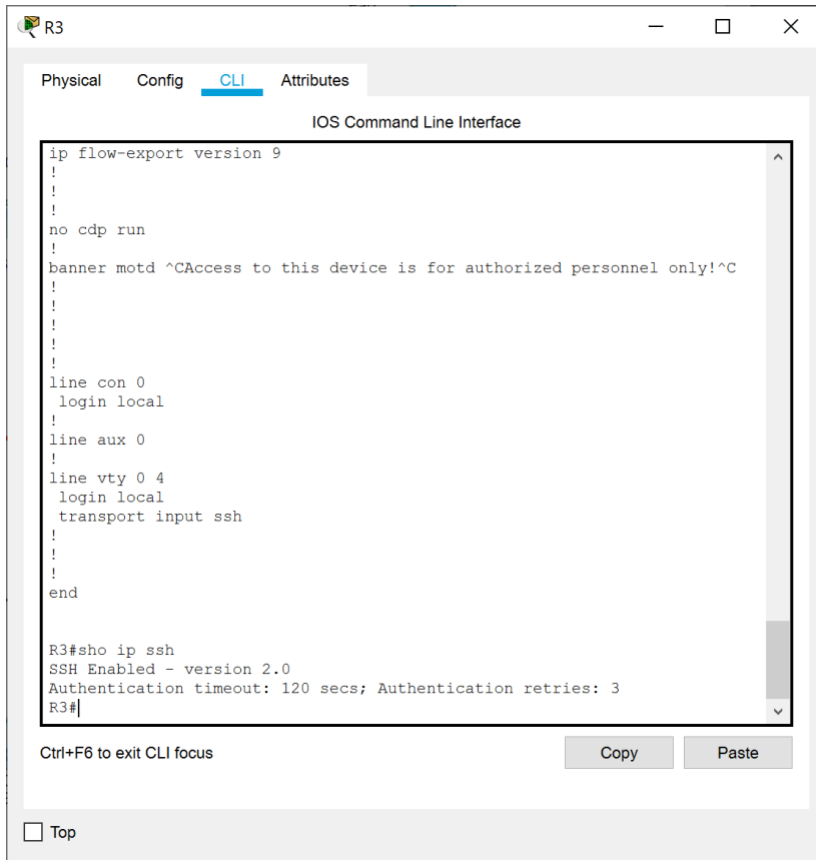
1. en
   conf t
   username Admin password ACDC1973

2. line console 0
   login local
   exit

3. enable password beatles1960

4. service password-encryption

5. banner motd #ONLY for admin's#
   ex
   wr
   ex

```
● ● ●                        R1-Office 1
                Physical    Config    CLI    Attributes
                        IOS Command Line Interface
  !
  version 15.4
  no service timestamps log datetime msec
  no service timestamps debug datetime msec
  service password-encryption
  !
  hostname R1-Office1
  !
  !
  !
  enable password 7 0823494F1D15000443525A54
  !
  !
  !
  !
  !|
  !
  ip cef
  no ipv6 cef
  !
  !
  !
  username Admin password 7 08006F6A2A485C4041
  !
  !
  !
  !
                                           Copy     Paste

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```
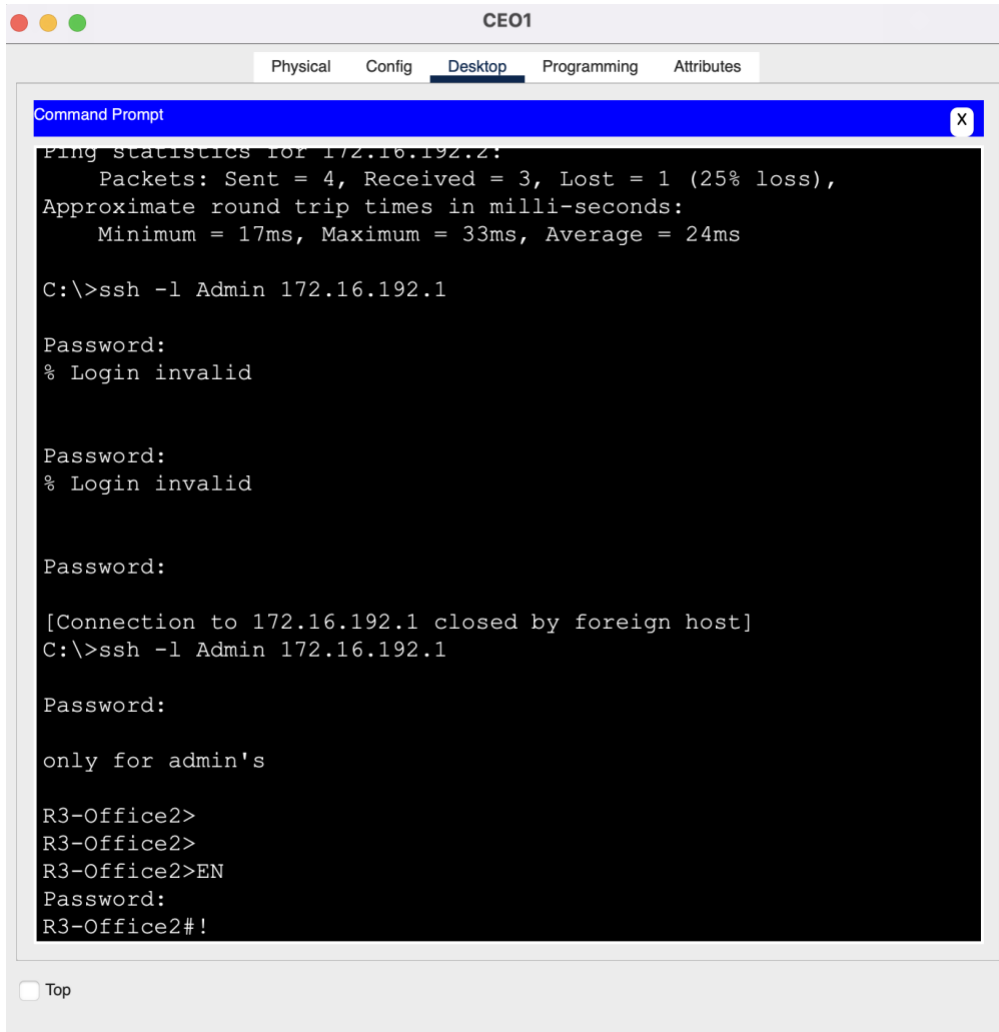
Lab Task 7: Secure Remote Access
(Listed commands were executed on R1, R2, and R3)

1. `ip domain-name aast.com`
2. `crypto key generate rsa`
3. `1024`
4. `ip ssh version 2`
5. `line vty 0 4`
   `login local`
   `transport input ssh`
   `exit`
6. `ex`
   `sho ip ssh`
   `sho run`
   `wr`

```
R3                                              —    □    ×

Physical    Config    CLI    Attributes

              IOS Command Line Interface

ip flow-export version 9
!
!
!
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 ip ssh
SSH Enabled - version 2.0
Authentication timeout: 120 secs; Authentication retries: 3
R3#

Ctrl+F6 to exit CLI focus                    Copy        Paste

□ Top
```

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

```
                                        CEO1

        Physical    Config    Desktop    Programming    Attributes

Command Prompt                                                          X

Ping statistics for 172.16.192.2:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
Approximate round trip times in milli-seconds:
    Minimum = 17ms, Maximum = 33ms, Average = 24ms

C:\>ssh -l Admin 172.16.192.1

Password:
% Login invalid


Password:
% Login invalid


Password:

[Connection to 172.16.192.1 closed by foreign host]
C:\>ssh -l Admin 172.16.192.1

Password:

only for admin's

R3-Office2>
R3-Office2>
R3-Office2>EN
Password:
R3-Office2#!

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```