Documentation

A. Configuration Part

1. Connect the Core to the Distribution layer using redundancy.
2. rename all the devices
3. on all switches we gave hostnames , console password, enable password, banner messages and disabled IP domain lookup
4. enabled ssh on layer 2 and layer 3 devices (routers and mulitlayer switches)
5. any link between layer 2 and layer 3 switch is trunk layer (on VLAN Configuration)
6. any link between access and layer 2 is access interface (on VLAN Configuration)
7. Assign VLAN port on the Switch that connects the end devices
8. Assign VLAN PORTS ON MULTILAYER SWITCHES
9. Configuring port security for the serve site department switch to allow only one device to connect to a switch port, using sticky method to obtain mac-address and violation mode shutdown … i will do it layer
10. Subnetting and IP Addressing

Base network: 192.168.100.0

Head Quarter

Department	Network Address	Subnet Mask	Host Address Range	BroadCast Address
Executive Leader	192.168.100.0	255.255.255.192/26	192.168.100.1 TO 192.168.100.62	192.168.100.63
HR	192.168.100.64	255.255.255.192/26	192.168.100.65 TO 192.168.100.126	192.168.100.127
FinAcc	192.168.100.128	255.255.255.192/26	192.168.100.129 TO 192.168.100.190	192.168.100.191
Strategic Plan	192.168.100.192	255.255.255.192/26	192.168.100.193 TO 192.168.100.254	192.168.100.255
R & D	192.168.101.0	255.255.255.192/26	192.168.101.1 TO 192.168.101.62	192.168.101.63
IT	192.168.101.64	255.255.255.192/26	192.168.101.64 TO 192.168.101.126	192.168.101.127

Office Branch 1

Department	Network Address	Subnet Mask	Host Address Range	BroadCast Address
Supply Chain Management	192.168.101.128	255.255.255.192/26	192.168.101.129 TO 192.168.101.190	192.168.101.191
Branch Leader	192.168.101.192	255.255.255.192/26	192.168.101.193 TO 192.168.101.254	192.168.101.255
Customer Support	192.168.102.0	255.255.255.192/26	192.168.102.1 TO 192.168.101.62	192.168.102.63
Marketing	192.168.102.64	255.255.255.192/26	192.168.102.65 TO 192.168.101.126	192.168.102.127
Finance	192.168.102.128	255.255.255.192/26	192.168.102.129 TO 192.168.102.190	192.168.102.191
IT	192.168.102.192	255.255.255.192/26	192.168.102.193 TO 192.168.102.254	192.168.102.255

Office Branch 2

Department	Network Address	Subnet Mask	Host Address Range	BroadCast Address
Supply Chain Management	192.168.108.0	255.255.255.192/26	192.168.108.1 TO 192.168.108.62	192.168.108.63
Branch Leader	192.168.108.64	255.255.255.192/26	192.168.108.65 TO 192.168.108.126	192.168.108.127
Customer Support	192.168.108.128	255.255.255.192/26	192.168.108.129 TO 192.168.108.190	192.168.108.191
Marketing	192.168.108.192	255.255.255.192/26	192.168.108.193 TO 192.168.108.254	192.168.108.255
Finance	192.168.109.0	255.255.255.192/26	192.168.109.1 TO 192.168.109.62	192.168.109.63
IT	192.168.109.64	255.255.255.192/26	192.168.109.65 TO 192.168.109.126	192.168.109.127

Office Branch 3

Department	Network Address	Subnet Mask	Host Address Range	BroadCast Address
Supply Chain Management	192.168.105.0	255.255.255.192/26	192.168.105.1 TO 192.168.105.62	192.168.105.63
Branch Leader	192.168.105.64	255.255.255.192/26	192.168.105.65 TO 192.168.105.126	192.168.105.127
Customer Support	192.168.105.128	255.255.255.192/26	192.168.105.129 TO 192.168.10.190	192.168.105.191
Marketing	192.168.105.192	255.255.255.192/26	192.168.105.193 TO 192.168.105.254	192.168.105.255
Finance	192.168.106.0	255.255.255.192/26	192.168.106.1 TO 192.168.106.62	192.168.106.63
IT	192.168.106.64	255.255.255.192/26	192.168.106.65 TO 192.168.106.126	192.168.106.127

Office Branch 4

Department	Network Address	Subnet Mask	Host Address Range	BroadCast Address
Supply Chain Management	192.168.106.128	255.255.255.192/26	192.168.106.129 TO 192.168.106.190	192.168.106.191
Branch Leader	192.168.106.192	255.255.255.192/26	192.168.106.193 TO 192.168.106.254	192.168.106.255
Customer Support	192.168.107.0	255.255.255.192/26	192.168.107.1 TO 192.168.107.62	192.168.107.63
Marketing	192.168.107.64	255.255.255.192/26	192.168.107.65 TO 192.168.107.126	192.168.107.127
Finance	192.168.107.128	255.255.255.192/26	192.168.107.129 TO 192.168.107.190	192.168.107.191
IT	192.168.107.192	255.255.255.192/26	192.168.107.193 TO 192.168.107.254	192.168.107.255

Server-Side Site

Department	Network Address	Subnet Mask	Host Address Range	Broadcast Address
SSS	192.168.103.0	255.255.255.240/28	192.168.103.1 TO 192.168.103.14	192.168.103.15

Between The Routers and Layer-3 Switches and ISP’S

No.	Network Address	No.	Network Address	No	Network Address
HQ-R1 - HQ-MLS1	192.168.103.16/30	B1-ISP2	195.136.17.12/30	HQ-B4	192.168.103.44/30
HQ-R1 - HQ-MLS2	192.168.103.20/30	B2-ISP1	195.136.17.16/30	HQ-B2	192.168.103.40/30
B1-R1- B1-MLS1	192.168.103.24/30	B2-ISP2	195.136.17.20/30	B1-B3	192.168.103.48/30
B1-R1 - B1-MLS2	192.168.103.28/30	B3-ISP1	195.136.17.24/30	B1-B4	192.168.103.56/30
HQ - B1	192.168.103.32/30	B3-ISP2	195.136.17.28/30	B1-B2	192.168.103.52/30
HQ-ISP1	195.136.17.0/30	B4-ISP1	195.136.17.32/30	B4-B2	192.168.103.92/30
HQ-ISP2	**195.136.17.4/30**	B4-ISP2	195.136.17.36/30	B3-B2	192.168.103.84/30
B1-ISP1	195.136.17.8/30	HQ-B3	192.168.103.36/30	B3-B4	192.168.103.88/30

12. Each Departments will have 60 hosts minimum if there need for expansion
13. configuring default static routing to enable routers and multilayer switches forward any traffic that doesnt match routing table entries using next-hop IP addresses.
14. OSPF for the sites on the routers and 13 switches
15. Static IP address to serverroom devices
16. Configuring DHCP
17. Inter-VLAN Routing on the L3 switches
18. Connecting end to end devices using dhcp
19. WLAN Configuration on the laptops and smart phones
20. PAT
21. ACL

1. On all switches we gave hostnames , console password, enable password, banner messages and disabled IP domain lookup

Switches on HQ Site:

▼ Executive Leader Switch

hostname EL

enable password

no ip domain lookup

banner motd #No Unauthorised Access!!!! #

line console 0

password cisco

login

ex

service password-encryption

▼ HR Department Switch

hostname HR

enable password

no ip domain lookup

banner motd #No Unauthorised Access!!!! #

line console 0

password cisco

login

ex

service password-encryption

▼ Finance & Accounting D. Switch

hostname FinAcc

enable password

no ip domain lookup

banner motd #No Unauthorised Access!!!! #

line console 0

password cisco

login

ex

service password-encryption

▼ Strategic Plan D. Switch

hostname SP

enable password

no ip domain lookup

banner motd #No Unauthorised Access!!!! #

line console 0

password cisco

login

ex

service password-encryption

▼ Research and Development D. Switch

hostname RAD

enable password

no ip domain lookup

banner motd #No Unauthorised Access!!!! #

line console 0

password cisco

login

ex

service password-encryption

▼ IT D. Switch

hostname IT

enable password

no ip domain lookup

banner motd #No Unauthorised Access!!!! #

line console 0

password cisco

login

ex

service password-encryption

- Multilayer- Switches

hostname MLS1/2

enable password

no ip domain lookup

banner motd #No Unauthorised Access!!!! #

line console 0

password cisco

login

ex

service password-encryption

Switches on Branch 1 Site:

- Supply Chain Management D. Switch

hostname SCM

enable password

no ip domain lookup

banner motd #No Unauthorised Access!!!! #

line console 0

password cisco

login

ex

service password-encryption

- Branch Leader D. Switch

hostname BL

enable password

no ip domain lookup

banner motd #No Unauthorised Access!!!! #

line console 0

password cisco

login

ex

service password-encryption

▼ Customer Support D. Switch

hostname CS

enable password

no ip domain lookup

banner motd #No Unauthorised Access!!!! #

line console 0

password cisco

login

ex

service password-encryption

▼ Marketing D. Switch

hostname MK

enable password

no ip domain lookup

banner motd #No Unauthorised Access!!!! #

line console 0

password cisco

login

ex

service password-encryption

▼ Finance D. Switch

hostname Fin

enable password

no ip domain lookup

banner motd #No Unauthorised Access!!!! #

line console 0

password cisco

login

ex

service password-encryption

▼ IT D. Switch

hostname IT

enable password

no ip domain lookup

banner motd #No Unauthorised Access!!!! #

line console 0

password cisco

login

ex

service password-encryption

▼ Multilayer- Switches

hostname MLS1/2

enable password

no ip domain lookup

banner motd #No Unauthorised Access!!!! #

line console 0

password cisco

login

ex

service password-encryption

Switches on Branch 2 Site:

▼ Supply Chain Management D. Switch

hostname SCM

enable password

no ip domain lookup

banner motd #No Unauthorised Access!!!! #

line console 0

password cisco

login

ex

service password-encryption

▼ Branch Leader D. Switch

hostname BL

enable password

no ip domain lookup

banner motd #No Unauthorised Access!!!! #

line console 0

password cisco

login

ex

service password-encryption

▼ Customer Support D. Switch

hostname CS

enable password

no ip domain lookup

banner motd #No Unauthorised Access!!!! #

line console 0

password cisco

login

ex

service password-encryption

▼ Marketing D. Switch

hostname MK

enable password

no ip domain lookup

banner motd #No Unauthorised Access!!!! #

line console 0

password cisco

login

ex

service password-encryption

▼ Finance D. Switch

hostname Fin

enable password

no ip domain lookup

banner motd #No Unauthorised Access!!!! #

line console 0

password cisco

login

ex

service password-encryption

▼ IT D. Switch

hostname IT

enable password

no ip domain lookup

banner motd #No Unauthorised Access!!!! #

line console 0

password cisco

login

ex

service password-encryption

▼ Multilayer- Switches

hostname MLS1/2

enable password

no ip domain lookup

banner motd #No Unauthorised Access!!!! #

line console 0

password cisco

login

ex

service password-encryption

Switches on Branch 3 Site:

▼ Supply Chain Management D. Switch

hostname SCM

enable password

no ip domain lookup

banner motd #No Unauthorised Access!!!! #

line console 0

password cisco

login

ex

service password-encryption

▼ Branch Leader D. Switch

hostname BL

enable password

no ip domain lookup

banner motd #No Unauthorised Access!!!! #

line console 0

password cisco

login

ex

service password-encryption

▼ Customer Support D. Switch

hostname CS

enable password

no ip domain lookup

banner motd #No Unauthorised Access!!!! #

line console 0

password cisco

login

ex

service password-encryption

▼ Marketing D. Switch

hostname MK

enable password

no ip domain lookup

banner motd #No Unauthorised Access!!!! #

line console 0

password cisco

login

ex

service password-encryption

▼ Finance D. Switch

hostname Fin

enable password

no ip domain lookup

banner motd #No Unauthorised Access!!!! #

line console 0

password cisco

login

ex

service password-encryption

▼ IT D. Switch

hostname IT

enable password

no ip domain lookup

banner motd #No Unauthorised Access!!!! #

line console 0

password cisco

login

ex

service password-encryption

▼ Multilayer- Switches

hostname MLS1/2

enable password

no ip domain lookup

banner motd #No Unauthorised Access!!!! #

line console 0

password cisco

login

ex

service password-encryption

Switches on Branch 4 Site:

▼ Supply Chain Management D. Switch

hostname SCM

enable password

no ip domain lookup

banner motd #No Unauthorised Access!!!! #

line console 0

password cisco

login

ex

service password-encryption

▼ Branch Leader D. Switch

hostname BL

enable password

no ip domain lookup

banner motd #No Unauthorised Access!!!! #

line console 0

password cisco

login

ex

service password-encryption

▼ Customer Support D. Switch

hostname CS

enable password

no ip domain lookup

banner motd #No Unauthorised Access!!!! #

line console 0

password cisco

login

ex

service password-encryption

▼ Marketing D. Switch

hostname MK

enable password

no ip domain lookup

banner motd #No Unauthorised Access!!!! #

line console 0

password cisco

login

ex

service password-encryption

▼ Finance D. Switch

hostname Fin

enable password

no ip domain lookup

banner motd #No Unauthorised Access!!!! #

line console 0

password cisco

login

ex

service password-encryption

▼ IT D. Switch

hostname IT

enable password

no ip domain lookup

banner motd #No Unauthorised Access!!!! #

line console 0

password cisco

login

ex

service password-encryption

▼ Multilayer- Switches

hostname MLS1/2

enable password

no ip domain lookup

banner motd #No Unauthorised Access!!!! #

line console 0

password cisco

login

ex

service password-encryption

Server side :

▼ Server Config

hostname Server

enable password

no ip domain lookup

banner motd #No Unauthorised Access!!!! #

line console 0

password cisco

login

ex

service password-encryption

2. VLAN Configuration

▼ HQ

▼ Executive Leader D. ——— VLAN 12

vlan 12

name EL

ex

int range fa0/1-2

switchport mode trunk

ex

int range fa0/3-24

switchport mode access

switchport access vlan 12

ex

▼ HR D. ——— VLAN 24

vlan 24

name HR

ex

int range fa0/1-2

switchport mode trunk

ex

int range fa0/3-24

switchport mode access

switchport access vlan 24

ex

▼ Fin D. ——— VLAN 48

vlan 48

name Fin

ex

int range fa0/1-2

switchport mode trunk

ex

int range fa0/3-24

switchport mode access

switchport access vlan 48

ex

▼ SP D. ——— VLAN 60

vlan 60

name SP

ex

int range fa0/1-2

switchport mode trunk

ex

int range fa0/3-24

switchport mode access

switchport access vlan 60

ex

▼ RAD D. ——— VLAN 72

vlan 72

name RAD

ex

int range fa0/1-2

switchport mode trunk

ex

int range fa0/3-24

switchport mode access

switchport access vlan 72

ex

▼ IT D. ——— VLAN 84

vlan 84

name IT

ex

int range fa0/1-2

switchport mode trunk

ex

int range fa0/3-24

switchport mode access

switchport access vlan 84

ex

- ▼ Multi-layer switches

vlan 12

vlan 24

vlan 48

vlan 60

vlan 72

vlan 84

int range gig1/0/2-7

switchport mode trunk

ex

- ▼ Branch 1
  - ▼ SCM D. ——— VLAN 11

vlan 11

name SCM

ex

int range fa0/1-2

switchport mode trunk

ex

int range fa0/3-24

switchport mode access

switchport access vlan 11

ex

▼ BL D. ——— VLAN 22

vlan 22

name BL

ex

int range fa0/1-2

switchport mode trunk

ex

int range fa0/3-24

switchport mode access

switchport access vlan 22

ex

▼ CS D. ——— VLAN 33

vlan 33

name CS

ex

int range fa0/1-2

switchport mode trunk

ex

int range fa0/3-24

switchport mode access

switchport access vlan 33

ex

▼ MK D. ——— VLAN 44

vlan 44

name SCM

ex

int range fa0/1-2

switchport mode trunk

ex

int range fa0/3-24

switchport mode access

switchport access vlan 44

ex

▼ Fin D. ——— VLAN 55

vlan 55

name Fin

ex

int range fa0/1-2

switchport mode trunk

ex

int range fa0/3-24

switchport mode access

switchport access vlan 55

ex

▼ IT D. ——— VLAN 66

vlan 66

name IT

ex

int range fa0/1-2

switchport mode trunk

ex

int range fa0/3-24

switchport mode access

switchport access vlan 66

ex

▼ Multi-layer switches

vlan 11

vlan 22

vlan 33

vlan 44

vlan 55

vlan 66

int range gig1/0/2-7

switchport mode trunk

ex

▼ Branch 2

▼ SCM D. ——— VLAN 8

vlan 8

name SCM

ex

int range fa0/1-2

switchport mode trunk

ex

int range fa0/3-24

switchport mode access

switchport access vlan 8

ex

▼ BL D. ——— VLAN 16

vlan 16

name BL

ex

int range fa0/1-2

switchport mode trunk

ex

int range fa0/3-24

switchport mode access

switchport access vlan 16

ex

▼ CS D. ——— VLAN 25

vlan 25

name CS

ex

int range fa0/1-2

switchport mode trunk

ex

int range fa0/3-24

switchport mode access

switchport access vlan 25

ex

▼ MK D. ——— VLAN 32

vlan 32

name SCM

ex

int range fa0/1-2

switchport mode trunk

ex

int range fa0/3-24

switchport mode access

switchport access vlan 32

ex

▼ Fin D. ——— VLAN 41

vlan 41

name Fin

ex

int range fa0/1-2

switchport mode trunk

ex

int range fa0/3-24

switchport mode access

switchport access vlan 41

ex

▼ IT D. ——— VLAN 49

vlan 49

name IT

ex

int range fa0/1-2

switchport mode trunk

ex

int range fa0/3-24

switchport mode access

switchport access vlan 49

ex

- ▼ Multi-layer switches

vlan 8

vlan 16

vlan 25

vlan 32

vlan 41

vlan 49

int range gig1/0/2-7

switchport mode trunk

ex

- ▼ Branch 3
  - ▼ SCM D. ——— VLAN 9

vlan 9

name SCM

ex

int range fa0/1-2

switchport mode trunk

ex

int range fa0/3-24

switchport mode access

switchport access vlan 9

ex

▼ BL D. ——— VLAN 18

vlan 18

name BL

ex

int range fa0/1-2

switchport mode trunk

ex

int range fa0/3-24

switchport mode access

switchport access vlan 18

ex

▼ CS D. ——— VLAN 27

vlan 27

name CS

ex

int range fa0/1-2

switchport mode trunk

ex

int range fa0/3-24

switchport mode access

switchport access vlan 27

ex

▼ MK D. ——— VLAN 36

vlan 36

name SCM

ex

int range fa0/1-2

switchport mode trunk

ex

int range fa0/3-24

switchport mode access

switchport access vlan 36

ex

▼ Fin D. ——— VLAN 45

vlan 45

name Fin

ex

int range fa0/1-2

switchport mode trunk

ex

int range fa0/3-24

switchport mode access

switchport access vlan 45

ex

▼ IT D. ——— VLAN 54

vlan 54

name IT

ex

int range fa0/1-2

switchport mode trunk

ex

int range fa0/3-24

switchport mode access

switchport access vlan 54

ex

▼ Multi-layer switches

vlan 9

vlan 18

vlan 27

vlan 36

vlan 45

vlan 54

int range gig1/0/2-7

switchport mode trunk

ex

▼ Branch 4

▼ SCM D. ——— VLAN 10

vlan 10

name SCM

ex

int range fa0/1-2

switchport mode trunk

ex

int range fa0/3-24

switchport mode access

switchport access vlan 10

ex

▼ BL D. ——— VLAN 20

vlan 20

name BL

ex

int range fa0/1-2

switchport mode trunk

ex

int range fa0/3-24

switchport mode access

switchport access vlan 20

ex

▼ CS D. ——— VLAN 30

vlan 30

name CS

ex

int range fa0/1-2

switchport mode trunk

ex

int range fa0/3-24

switchport mode access

switchport access vlan 30

ex

▼ MK D. ——— VLAN 40

vlan 40

name SCM

ex

int range fa0/1-2

switchport mode trunk

ex

int range fa0/3-24

switchport mode access

switchport access vlan 40

ex

▼ Fin D. ——— VLAN 50

vlan 50

name Fin

ex

int range fa0/1-2

switchport mode trunk

ex

int range fa0/3-24

switchport mode access

switchport access vlan 50

ex

▼ IT D. ——— VLAN 61

vlan 61

name IT

ex

int range fa0/1-2

switchport mode trunk

ex

int range fa0/3-24

switchport mode access

switchport access vlan 61

ex

- Multi-layer switches

vlan 10

vlan 20

vlan 30

vlan 40

vlan 50

vlan 61

int range gig1/0/2-7

switchport mode trunk

ex

- Server Side

vlan 13

name SSW

ex

int range fa0/1-2

switchport mode trunk

ex

int range fa0/3-24

switchport mode access

switchport access vlan 13

ex

OSFP Configuration

▼ **For HQ router**

router ospf 10

network 192.168.103.16 0.0.0.3 area 0
network 192.168.103.20 0.0.0.3 area 0
network 192.168.103.32 0.0.0.3 area 0
network 192.168.103.0 0.0.0.15 area 0
network 195.136.17.0 0.0.0.3 area 0
network 195.136.17.4 0.0.0.3 area 0
network 192.168.103.36 0.0.0.3 area 0
network 192.168.103.40 0.0.0.3 area 0
network 192.168.103.44 0.0.0.3 area 0

do wr

ex

ip route 0.0.0.0 0.0.0.0 195.136.17.2

ip route 0.0.0.0 0.0.0.0 195.136.17.6 70

▼ **For HQ MLSWs**

ip routing

router ospf 10

network 192.168.100.0 0.0.0.63 area 0
network 192.168.100.64 0.0.0.63 area 0
network 192.168.100.128 0.0.0.63 area 0
network 192.168.100.192 0.0.0.63 area 0
network 192.168.101.0 0.0.0.63 area 0
network 192.168.101.64 0.0.0.63 area 0
network 192.168.103.16 0.0.0.3 area 0

do wr

ex

ip route 0.0.0.0 0.0.0.0 192.168.103.18

▼ **For branch 1 router**:

router ospf 10

network 192.168.103.28 0.0.0.3 area 0
network 192.168.103.24 0.0.0.3 area 0
network 192.168.103.32 0.0.0.3 area 0

network 195.136.17.12 0.0.0.3 area 0
network 195.136.17.8 0.0.0.3 area 0
network 192.168.103.56 0.0.0.3 area 0
network 192.168.103.52 0.0.0.3 area 0
network 192.168.103.48 0.0.0.3 area 0
network 192.168.103.0 0.0.0.15 area 0

ex

ip route 0.0.0.0 0.0.0.0 195.136.17.2

ip route 0.0.0.0 0.0.0.0 195.136.17.6 70

do wr

▼ **For branch 1 MLSWs**

ip routing

router ospf 10

network 192.168.101.128 0.0.0.63 area 0
network 192.168.101.192 0.0.0.63 area 0
network 192.168.102.0 0.0.0.63 area 0
network 192.168.102.64 0.0.0.63 area 0
network 192.168.102.128 0.0.0.63 area 0
network 192.168.102.192 0.0.0.63 area 0
network 192.168.103.24 0.0.0.3 area 0

do wr

ex

ip route 0.0.0.0 0.0.0.0 192.168.103.26

▼ **For branch 2 router**:

router ospf 10

network 192.168.103.84 0.0.0.3 area 0
network 192.168.103.76 0.0.0.3 area 0
network 192.168.103.80 0.0.0.3 area 0
network 192.168.103.0 0.0.0.15 area 0
network 192.168.103.92 0.0.0.3 area 0
network 192.168.103.52 0.0.0.3 area 0

network 195.136.17.16 0.0.0.3 area 0

network 195.136.17.20 0.0.0.3 area 0

ex

ip route 0.0.0.0 0.0.0.0 195.136.17.17

ip route 0.0.0.0 0.0.0.0 195.136.17.22 70

do wr

▼ **For branch 2 MLSWs**

ip routing

router ospf 10

network 192.168.108.0 0.0.0.63 area 0
network 192.168.108.64 0.0.0.63 area 0
network 192.168.108.128 0.0.0.63 area 0
network 192.168.108.192 0.0.0.63 area 0
network 192.168.109.0 0.0.0.63 area 0
network 192.168.109.64 0.0.0.63 area 0
network 192.168.103.80 0.0.0.3 area 0

do wr

ex

ip route 0.0.0.0 0.0.0.0 192.168.103.82

▼ **For branch 3 router**:

router ospf 10

network 192.168.103.60 0.0.0.3 area 0
network 192.168.103.64 0.0.0.3 area 0
network 192.168.103.0 0.0.0.15 area 0
network 192.168.103.36 0.0.0.3 area 0
network 192.168.103.48 0.0.0.3 area 0
network 192.168.103.84 0.0.0.3 area 0

network 195.136.17.24 0.0.0.3 area 0

network 195.136.17.28 0.0.0.3 area 0

ex
ip route 0.0.0.0 0.0.0.0 195.136.17.26

ip route 0.0.0.0 0.0.0.0 195.136.17.30 70

do wr

▼ **For branch 3 MLSWs**

ip routing

router ospf 10

network 192.168.105.0 0.0.0.63 area 0
network 192.168.105.64 0.0.0.63 area 0
network 192.168.105.128 0.0.0.63 area 0
network 192.168.105.192 0.0.0.63 area 0
network 192.168.106.0 0.0.0.63 area 0
network 192.168.106.64 0.0.0.63 area 0
network 192.168.103.60 0.0.0.3 area 0

do wr

ex

ip route 0.0.0.0 0.0.0.0 192.168.103.62

▼ **For branch 4 router:**

router ospf 10

network 192.168.103.0 0.0.0.15 area 0
network 192.168.103.68 0.0.0.3 area 0
network 192.168.103.72 0.0.0.3 area 0
network 192.168.103.56 0.0.0.3 area 0
network 192.168.103.44 0.0.0.3 area 0
network 192.168.103.92 0.0.0.3 area 0

network 195.136.17.32 0.0.0.3 area 0

network 195.136.17.36 0.0.0.3 area 0

ex

ip route 0.0.0.0 0.0.0.0 195.136.17.33
ip route 0.0.0.0 0.0.0.0 195.136.17.37 70

▼ **For branch 4 MLSWs**

ip routing

router ospf 10

network 192.168.106.128 0.0.0.63 area 0
network 192.168.106.192 0.0.0.63 area 0
network 192.168.107.0 0.0.0.63 area 0
network 192.168.107.64 0.0.0.63 area 0
network 192.168.107.128 0.0.0.63 area 0
network 192.168.107.192 0.0.0.63 area 0
network 192.168.103.68 0.0.0.3 area 0

do wr

ex

ip route 0.0.0.0 0.0.0.0 192.168.103.70

Inter-Vlan Configuration

▼ **HQ- Router - the server is conencted using inter-vlan**

int gig0/2

no ip address

ex

int gig0/2.13

encapsulation dot1Q 13

ip address 192.168.103.1 255.255.255.240

ex

do wr

▼ **HQ-MLSWs**

interface Vlan 12
ip address 192.168.100.1 255.255.255.192
ip helper-address 192.168.103.4
ex
interface Vlan 24
ip address 192.168.100.65 255.255.255.192
ip helper-address 192.168.103.4

ex
interface Vlan 48
ip address 192.168.100.129 255.255.255.192
ip helper-address 192.186.103.4
ex
interface Vlan 60
ip address 192.168.100.193 255.255.255.192
ip helper-address 192.186.103.4

ex
interface Vlan 72
ip address 192.168.101.1 255.255.255.192
ip helper-address 192.186.103.4
ex

interface Vlan 84
ip address 192.168.101.193 255.255.255.192
ip helper-address 192.186.103.4

ex

do wr

▼ **B1-MLSWs**

interface Vlan 11
ip address 192.168.101.129 255.255.255.192
ip helper-address 192.168.103.4
ex
interface Vlan 22
ip address 192.168.101.193 255.255.255.192
ip helper-address 192.168.103.4
ex
interface Vlan 33
ip address 192.168.102.1 255.255.255.192
ip helper-address 192.168.103.4
ex
interface Vlan 44
ip address 192.168.102.65 255.255.255.192
ip helper-address 192.168.103.4
ex
interface Vlan55
ip address 192.168.102.129 255.255.255.192
ip helper-address 192.168.103.4

ex
interface Vlan66
ip address 192.168.102.193 255.255.255.192
ip helper-address 192.168.103.4

ex

do wr

▼ **B2-MLSWs**

interface Vlan 8
ip address 192.168.108.1 255.255.255.192
ip helper-address 192.168.103.4
ex
interface Vlan 16

ip address 192.168.108.65 255.255.255.192
ip helper-address 192.168.103.4
ex
interface Vlan 25
ip address 192.168.108.129 255.255.255.192
ip helper-address 192.168.103.4
ex
interface Vlan 32
ip address 192.168.108.193 255.255.255.192
ip helper-address 192.168.103.4
ex
interface Vlan 41
ip address 192.168.109.1 255.255.255.192
ip helper-address 192.168.103.4
ex
interface Vlan 49
ip address 192.168.109.65 255.255.255.192
ip helper-address 192.168.103.4
ex
do wr

▼ **B3-MLSWs**

interface Vlan 9
ip address 192.168.105.1 255.255.255.192
ip helper-address 192.168.103.4
ex
interface Vlan 18
ip address 192.168.105.65 255.255.255.192
ip helper-address 192.168.103.4
ex
interface Vlan 27
ip address 192.168.105.129 255.255.255.192
ip helper-address 192.168.103.4
ex
interface Vlan 36
ex
ip address 192.168.105.193 255.255.255.192
ip helper-address 192.168.103.4
ex
interface Vlan 45

ip address 192.168.106.1 255.255.255.192
ip helper-address 192.168.103.4
ex
interface Vlan 54
ip address 192.168.106.65 255.255.255.192
ip helper-address 192.168.103.4

ex

do wr

▼ **B4-MLSWs**

interface Vlan 10
ip address 192.168.106.129 255.255.255.192
ip helper-address 192.168.103.4
ex
interface Vlan 20
ip address 192.168.106.193 255.255.255.192
ip helper-address 192.168.103.4
ex
interface Vlan 30
ip address 192.168.107.1 255.255.255.192
ip helper-address 192.168.103.4
ex
interface Vlan 40
no ip address
ip helper-address 192.168.103.4
ex
interface Vlan 50
mac-address 0001.63d9.9206
ip address 192.168.107.129 255.255.255.192
ex
interface Vlan 61
ex
ip address 192.168.107.193 255.255.255.192
ip helper-address 192.168.103.4

ex

do wr

PAT (NAT) + ACL

WE used NAT to have one public ip address for our enterprise. the type of nat used is PAT which is port address translation.

▼ **For HQ:**

int se0/1/1

ip nat outside

int se0/1/0

ip nat outside

int range gig0/0-2

ip nat inside

ex

do wr

ip nat inside source list 1 interface se0/1/0 overload

ip nat inside source list 1 interface se0/1/1 overload

do wr

access-list 1 permit 192.168.100.0 0.0.0.63

access-list 1 permit 192.168.100.64 0.0.0.63

access-list 1 permit 192.168.100.128 0.0.0.63

access-list 1 permit 192.168.100.192 0.0.0.63

access-list 1 permit 192.168.101.0 0.0.0.63

access-list 1 permit 192.168.101.128 0.0.0.63

▼ **For branch 1:**

int se0/1/1

ip nat outside

int se0/1/0

ip nat outside

int range gig0/0-2

ip nat inside

ex

do wr

ip nat inside source list 1 interface se0/1/0 overload

ip nat inside source list 1 interface se0/1/1 overload

do wr

access-list 1 permit 192.168.101.128 0.0.0.63

access-list 1 permit 192.168.101.192 0.0.0.63

access-list 1 permit 192.168.102.0 0.0.0.63

access-list 1 permit 192.168.102.64 0.0.0.63

access-list 1 permit 192.168.102.128 0.0.0.63

access-list 1 permit 192.168.102.192 0.0.0.63

▼ **For branch 2**

int se0/1/1

ip nat outside

int se0/1/0

ip nat outside

int range gig0/0-2

ip nat inside

ex

do wr

ip nat inside source list 1 interface se0/1/0 overload

ip nat inside source list 1 interface se0/1/1 overload

do wr

access-list 1 permit 192.168.108.0 0.0.0.63

access-list 1 permit 192.168.108.64 0.0.0.63

access-list 1 permit 192.168.108.128 0.0.0.63

access-list 1 permit 192.168.108.192 0.0.0.63

access-list 1 permit 192.168.109.0 0.0.0.63

access-list 1 permit 192.168.109.64 0.0.0.63

▼ F**or branch 3:**

int se0/3/1

ip nat outside

int se0/1/0

ip nat outside

int range gig0/0-2

ip nat inside

ex

do wr

ip nat inside source list 1 interface se0/1/0 overload

ip nat inside source list 1 interface se0/3/1 overload

do wr

access-list 1 permit 192.168.105.0 0.0.0.63

access-list 1 permit 192.168.105.64 0.0.0.63

access-list 1 permit 192.168.105.128 0.0.0.63

access-list 1 permit 192.168.105.192 0.0.0.63

access-list 1 permit 192.168.106.0 0.0.0.63

access-list 1 permit 192.168.106.64 0.0.0.63

do sh ip nat translations

▼ **For branch 4:**

int se0/3/1

ip nat outside

int se0/1/0

ip nat outside

int range gig0/0-2

ip nat inside

ex

do wr

ip nat inside source list 1 interface se0/1/0 overload

ip nat inside source list 1 interface se0/3/1 overload

do wr

access-list 1 permit 192.168.106.128 0.0.0.63

access-list 1 permit 192.168.106.192 0.0.0.63

access-list 1 permit 192.168.107.0 0.0.0.63

access-list 1 permit 192.168.107.64 0.0.0.63

access-list 1 permit 192.168.107.128 0.0.0.63

access-list 1 permit 192.168.107.192 0.0.0.63

do sh ip nat translations

B. Network Design and Implementation Documentation

Overview

This document outlines the design and implementation of a network solution for a company with one Headquarters (HQ) and four Branches. The design follows a hierarchical model to enhance redundancy and scalability. The network is implemented using Cisco Packet Tracer.

Topology

The network consists of the following components:

1 HQ
4 Branches
Core routers at each site
Two multilayer switches per site
Access switches connecting each department
Wireless network in each department
Email server located in the server room
Dedicated DHCP servers in the server room

Connectivity:

HQ and Branches Connectivity

All routers at HQ and Branches are connected using serial connections to establish reliable communication between sites.

Internet Connectivity

Two Internet Service Providers (ISPs) are connected to HQ and Branch 1,2,3,4 using static, public IP addresses.

Device Configuration

All devices are configured with the following basic settings:

Hostname: Configured to represent the role and location of the device.
Console Password: Secure passwords to control access to the device.
Enable Password: Additional security measure for privileged mode.
Banner Messages: Informative messages displayed on login.
IP Domain Lookup: Disabled to prevent DNS lookups.

IP Addressing

The base network of 192.168.100.0 is used, and subnetting is implemented to allocate IP addresses to each department effectively.

DHCP

DHCP servers in the server room are configured to allocate dynamic IP addresses to devices across the network.
Devices in the server room are assigned static IP addresses.

Routing

OSPF (Open Shortest Path First) is implemented as the routing protocol to advertise routes between routers and multilayer switches.
Default static routing is configured to forward traffic not matching routing table entries using next-hop IP addresses.

Security

SSH (Secure Shell) is configured on all routers and layer three switches to allow secure remote login.

HTTP and Email Services

A simple website is implemented and connected using a DNS solver. Also Email communication is achieved from different end devices to other end devices.

NAT and PAT

PAT (Port Address Translation) is implemented for NAT overload to use the respective outbound router interface IPv4 address.
ACLs (Access Control Lists) are employed to control traffic flow.

Testing

Thorough testing is performed to ensure that all configured components operate as expected.