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Project 10 : Advanced OSPF-Based Multi-Site Enterprise Network

- **Network Overview**

The enterprise network consists of **four** sites: Headquarters (HQ), Branch A, Branch B and Remote Office. The network will be interconnected using OSPF with multiple areas, leveraging advanced OSPF features like summarization. Additional configurations include VLANs, inter-VLAN routing, EtherChannel, ACLs, NAT.

- **Network Topology**

1. *Headquarters (HQ): -

***Devices: 2 Routers, 3 Layer 3 Switches –**

***VLANs: - VLAN 10 (Management) - VLAN 20 (Sales) - VLAN 30 (IT) - VLAN 40 (Finance) - VLAN 50 (Guest)**

Inter-VLAN Routing: Using Layer 3 Switches

EtherChannel: Configured between Layer 3 Switches and routers for redundancy

OSPF (area0) Features: Route summarization, passive interfaces and changing reference Bandwidth.

- **2. Branch A: -**

Devices: 1 Router, 2 Layer 2 Switches

-One network With Dynamic ARP Inspection configuration. -

NAT: PAT for internet access

- **3. Branch B: -**

Devices: 1 Router, 1 Layer 2 Switch

- VLANs: - VLAN 120 (Engineering) - VLAN 130 (HR)

- Inter-VLAN Routing: Router-on-a-Stick

- NAT: Static NAT for specific hosts needing external access

- **4. Remote Office:**

- Devices: 1 Router, 1 Layer 2 Switch

- OSPF Area: Area 2

- AAA for secure device management.

- VLANs: - VLAN 140 (Remote Users) - VLAN 150 (Remote IT)

- port security is required (use variety of port security options)

Headquarters (HQ): -

Configuration

1-Multilayer SW

Building configuration...

Current configuration :

4975 bytes

!

version 16.3.2

no service timestamps

log datetime msec

no service timestamps

debug datetime msec

no service password-

encryption

!

hostname HQ-DSW

!

ip dhcp excluded-address

172.16.10.0 172.16.10.50

ip dhcp excluded-address

172.16.20.0 172.16.20.50

ip dhcp excluded-address

172.16.30.0 172.16.30.50

ip dhcp excluded-address

172.16.40.0 172.16.40.50

ip dhcp excluded-address

172.16.50.0 172.16.50.50

!

ip dhcp pool

Management.net

network 172.16.10.0

255.255.255.0

default-router

172.16.10.1

dns-server 8.8.8.8

ip dhcp pool Sales.net

network 172.16.20.0

255.255.255.0

default-router

172.16.20.1

dns-server 8.8.8.8

ip dhcp pool IT.net

network 172.16.30.0

255.255.255.0

default-router

172.16.30.1

dns-server 8.8.8.8

ip dhcp pool Finance.net

network 172.16.40.0

255.255.255.0

default-router

172.16.40.1

dns-server 8.8.8.8

ip dhcp pool Guest.net

network 172.16.50.0

255.255.255.0

default-router

172.16.50.1

dns-server 8.8.8.8

!

no ip cef

ip routing

!

no ipv6 cef

!

ip arp inspection vlan

1,10,20,40,50

!

ip dhcp snooping vlan

1,10,20,30,40,50

no ip dhcp snooping

information option

ip dhcp snooping

!

!

spanning-tree mode pvst

!

interface Port-channel1

switchport mode trunk

!

interface Port-channel2

switchport mode trunk

!

interface

GigabitEthernet1/0/1

no switchport

ip address 192.168.1.3

255.255.255.0

ip ospf priority 0

duplex auto

speed auto

!

interface

GigabitEthernet1/0/2

no switchport

ip address 192.168.2.3

255.255.255.0

duplex auto

speed auto

!

interface

GigabitEthernet1/0/3

switchport mode trunk

channel-protocol lacp

channel-group 1 mode

active

!

interface

GigabitEthernet1/0/4

switchport mode trunk

channel-protocol lacp

channel-group 1 mode

active

!

interface

GigabitEthernet1/0/5

switchport mode trunk

channel-protocol lacp

channel-group 2 mode

active

!

interface

GigabitEthernet1/0/6

switchport mode trunk

channel-protocol lacp

channel-group 2 mode

active

!

interface

GigabitEthernet1/0/7

!

interface

GigabitEthernet1/0/8

!

interface

GigabitEthernet1/0/9

!

interface

GigabitEthernet1/0/10

!

interface

GigabitEthernet1/0/11

!

interface

GigabitEthernet1/0/12

!

interface

GigabitEthernet1/0/13

!

2-HQ-router1

Building configuration...

Current configuration : 1481 bytes

```
!  
version 15.1  
no service timestamps log datetime msec  
no service timestamps debug datetime msec  
no service password-encryption  
!  
hostname HQ-router1  
!  
no ip cef  
no ipv6 cef  
!  
license udi pid CISCO2901/K9 sn FTX1524DT3H-  
!  
  
spanning-tree mode pvst  
!  
interface GigabitEthernet0/0  
ip address 192.168.1.2 255.255.255.0  
duplex auto  
speed auto  
standby 1 ip 192.168.1.1  
standby 1 priority 150
```

```
standby 1 preempt  
!  
interface GigabitEthernet0/1  
no ip address  
duplex auto  
speed auto  
shutdown  
!  
interface Serial0/0/0  
ip address 200.1.2.1 255.255.255.252  
clock rate 2000000  
!  
interface Serial0/0/1  
ip address 200.1.1.1 255.255.255.252  
clock rate 2000000  
!  
interface Serial0/1/0  
ip address 201.1.1.2 255.255.255.252  
clock rate 2000000  
!  
interface Serial0/1/1  
no ip address  
clock rate 2000000  
shutdown  
!  
interface Vlan1  
no ip address  
shutdown  
!  
router ospf 1  
router-id 1.1.1.1  
log-adjacency-changes  
network 200.1.2.0 0.0.0.3 area 2  
network 200.1.1.0 0.0.0.3 area 1  
network 192.168.1.0 0.0.0.255 area 0
```

```
!  
ip nat inside source list 10 interface Serial0/1/0 overload  
ip classless  
ip route 0.0.0.0 0.0.0.0 Serial0/1/0  
!  
ip flow-export version 9  
!  
!  
access-list 10 permit any  
!  
banner motd ^C  
#####  
Welcome  
HQ-router1  
#####  
^C  
!  
logging 192.168.1.60  
line con 0  
!  
line aux 0  
!  
line vty 0  
password cisco  
login  
line vty 1 4  
login  
!  
ntp server 192.168.1.70  
!  
  
end
```

3-HQ-router2

Building configuration...

Current configuration : 1208 bytes

```
!  
version 15.1  
  
no service timestamps log datetime msec  
no service timestamps debug datetime msec  
no service password-encryption  
  
!  
hostname HQ-router2  
  
!  
  
no ip cef  
no ipv6 cef  
license udi pid CISCO2901/K9 sn FTX1524162Q-  
  
!  
spanning-tree mode pvst  
  
!  
interface GigabitEthernet0/0  
ip address 192.168.2.2 255.255.255.0  
ip ospf 1 area 0  
duplex auto  
speed auto  
standby 1 ip 192.168.1.1  
standby 1 preempt  
  
!  
interface GigabitEthernet0/1  
no ip address  
duplex auto
```

```
speed auto
shutdown
!
interface Serial0/0/0
ip address 200.1.4.1 255.255.255.252
ip ospf 1 area 2
!
interface Serial0/0/1
ip address 200.1.3.1 255.255.255.252
ip ospf 1 area 1
clock rate 2000000
!
interface Serial0/1/0
ip address 201.1.2.2 255.255.255.252
clock rate 2000000
interface Serial0/1/1
no ip address
clock rate 2000000
shutdown
!
interface Vlan1
no ip address
shutdown
!
router ospf 1
router-id 2.2.2.2
log-adjacency-changes
!
ip classless
ip flow-export version 9
!
```



```
banner motd ^C
```

```
#####
```

```
Welcome
```

```
HQ-router2
```

```
#####
```

```
^C
```

```
!
```

```
line con 0
```

```
!
```

```
line aux 0
```

```
!
```

```
line vty 0 4
```

```
login
```

```
!
```

```
ntp server 192.168.1.70
```

```
!
```

```
end
```

4-Layer3 SW

Building configuration...

Current configuration : 6963 bytes

!

version 12.2(37)SE1

no service timestamps log
datetime msec

no service timestamps debug
datetime msec

no service password-encryption

!

hostname HQ-ASW2

!

ip arp inspection vlan
1,10,20,40,50

!

spanning-tree mode pvst

!

interface Port-channel2

!

interface FastEthernet0/1

switchport access vlan 10

switchport mode access

switchport port-security

switchport port-security mac-
address sticky

switchport port-security
violation restrict

switchport port-security mac-
address sticky 00D0.BAE3.3942

spanning-tree portfast

!

interface FastEthernet0/2

switchport access vlan 10

switchport mode access

switchport port-security

switchport port-security mac-
address sticky

switchport port-security
violation restrict

switchport port-security mac-
address sticky 0050.0F75.6CD8

spanning-tree portfast

!

interface FastEthernet0/3

switchport access vlan 10

switchport mode access

switchport port-security

switchport port-security mac-
address sticky

switchport port-security
violation restrict

spanning-tree portfast

shutdown

!

interface FastEthernet0/4

switchport access vlan 10

switchport mode access

switchport port-security

switchport port-security mac-
address sticky

switchport port-security
violation restrict

spanning-tree portfast

shutdown

!

interface FastEthernet0/5

switchport access vlan 10

switchport mode access

switchport port-security

switchport port-security mac-
address sticky

switchport port-security
violation restrict

spanning-tree portfast

shutdown

!

interface FastEthernet0/6

switchport access vlan 20

switchport mode access

switchport port-security

switchport port-security mac-
address sticky

switchport port-security
violation restrict

switchport port-security mac-
address sticky 00E0.B09A.BA68

spanning-tree portfast

!

interface FastEthernet0/7

switchport access vlan 20

switchport mode access

switchport port-security

switchport port-security mac-
address sticky

switchport port-security
violation restrict

switchport port-security mac-
address sticky 0040.0BC3.9041

spanning-tree portfast

!

interface FastEthernet0/8

switchport access vlan 20

switchport mode access

switchport port-security

switchport port-security mac-
address sticky

```

switchport port-security
violation restrict

spanning-tree portfast

shutdown
!
interface FastEthernet0/9
switchport access vlan 20

switchport mode access

switchport port-security

switchport port-security mac-
address sticky

switchport port-security
violation restrict

spanning-tree portfast

shutdown
!
interface FastEthernet0/10
switchport access vlan 20

switchport mode access

switchport port-security

switchport port-security mac-
address sticky

switchport port-security
violation restrict

spanning-tree portfast

shutdown
!
interface FastEthernet0/11
switchport access vlan 30

switchport mode access

switchport port-security

switchport port-security mac-
address sticky

switchport port-security
violation restrict

switchport port-security mac-
address sticky 0030.F26B.C6BA

spanning-tree portfast

```

```

!
interface FastEthernet0/12
switchport access vlan 30

switchport mode access

switchport port-security

switchport port-security mac-
address sticky

switchport port-security
violation restrict

switchport port-security mac-
address sticky 0002.17BC.7B45

spanning-tree portfast
!
interface FastEthernet0/13
switchport access vlan 30

switchport mode access

switchport port-security

switchport port-security mac-
address sticky

switchport port-security
violation restrict

spanning-tree portfast

shutdown
!
interface FastEthernet0/14
switchport access vlan 30

switchport mode access

switchport port-security

switchport port-security mac-
address sticky

switchport port-security
violation restrict

spanning-tree portfast

shutdown
!
interface FastEthernet0/15
switchport access vlan 30

switchport mode access

```

```

switchport port-security

switchport port-security mac-
address sticky

switchport port-security
violation restrict

spanning-tree portfast

shutdown
!
interface FastEthernet0/16
switchport access vlan 40

switchport mode access

switchport port-security

switchport port-security mac-
address sticky

switchport port-security
violation restrict

switchport port-security mac-
address sticky 0001.4344.ADD5

spanning-tree portfast
!
interface FastEthernet0/17
switchport access vlan 40

switchport mode access

switchport port-security

switchport port-security mac-
address sticky

switchport port-security
violation restrict

switchport port-security mac-
address sticky 0050.0F04.7513

spanning-tree portfast
!
interface FastEthernet0/18
switchport access vlan 40

switchport mode access

switchport port-security

switchport port-security mac-
address sticky

```

switchport port-security	!	channel-group 2 mode passive
violation restrict		
spanning-tree portfast	interface FastEthernet0/22	!
shutdown	switchport access vlan 50	interface GigabitEthernet0/2
!	switchport mode access	ip arp inspection trust
interface FastEthernet0/19	switchport port-security	channel-protocol lacp
switchport access vlan 40	switchport port-security mac-	channel-group 2 mode passive
switchport mode access	address sticky	!
switchport port-security	switchport port-security	interface Vlan1
switchport port-security mac-	violation restrict	ip address 192.168.3.3
address sticky	switchport port-security mac-	255.255.255.0
switchport port-security	address sticky 0030.A372.1D18	!
violation restrict	spanning-tree portfast	ip default-gateway 192.168.3.1
spanning-tree portfast	!	ip classless
shutdown	interface FastEthernet0/23	!
!	switchport access vlan 50	ip flow-export version 9
interface FastEthernet0/20	switchport mode access	!
switchport access vlan 40	switchport port-security	banner motd ^C
switchport mode access	switchport port-security mac-	#####
switchport port-security	address sticky	###
switchport port-security mac-	switchport port-security	Welcome
address sticky	violation restrict	HQ-ASW2
switchport port-security	spanning-tree portfast	#####
violation restrict	shutdown	###
spanning-tree portfast	!	
shutdown	interface FastEthernet0/24	logging 192.168.3.60
!	switchport access vlan 50	line con 0
interface FastEthernet0/21	switchport mode access	!
switchport access vlan 50	switchport port-security	line aux 0
switchport mode access	switchport port-security mac-	!
switchport port-security	address sticky	line vty 0
switchport port-security mac-	switchport port-security	password cisco
address sticky	violation restrict	login
switchport port-security	spanning-tree portfast	line vty 1 4
violation restrict	shutdown	login
switchport port-security mac-	!	!
address sticky 0001.9626.43C1	interface GigabitEthernet0/1	ntp server 192.168.3.70
spanning-tree portfast	ip arp inspection trust	
	channel-protocol lacp	

Branch A: -

1-branch A-Router

Building configuration...	ip dhcp pool SW2.NET	ip address 192.168.100.1 255.255.255.0
	network 192.168.110.0 255.255.255.0	ip nat inside
Current configuration : 1676 bytes	default-router 192.168.110.1	duplex auto
!	dns-server 8.8.8.8	speed auto
version 15.1	!	!
no service timestamps log datetime msec	no ip cef	interface Serial0/0/0
no service timestamps debug datetime msec	no ipv6 cef	ip address 200.1.5.2 255.255.255.252
no service password- encryption	!	ip nat inside
!	license udi pid CISCO2901/K9 sn FTX152493K0-	clock rate 2000000
hostname baranch-A- router	!	!
!	spanning-tree mode pvst	interface Serial0/0/1
ip dhcp excluded-address 192.168.100.0 192.168.100.50	!	ip address 200.1.1.2 255.255.255.252
ip dhcp excluded-address 192.168.110.0 192.168.110.50	!	!
!	interface GigabitEthernet0/0	interface Serial0/1/0
ip dhcp pool SW1.NET	ip address 192.168.110.1 255.255.255.0	ip address 200.1.3.2 255.255.255.252
network 192.168.100.0 255.255.255.0	ip nat inside	!
default-router 192.168.100.1	duplex auto	interface Serial0/1/1
dns-server 8.8.8.8	speed auto	no ip address
	!	clock rate 2000000
	interface GigabitEthernet0/1	shutdown
		!
		interface Vlan1

no ip address	ip flow-export version 9	line aux 0
shutdown	access-list 1 permit any	!
!	!	line vty 0
router ospf 1	banner motd ^C	password cisco
router-id 4.4.4.4	#####	login
log-adjacency-changes	#	line vty 1 4
network 0.0.0.0	Welcome	login
255.255.255.255 area 1	baranch-A-router	!
!	#####	ntp server 192.168.3.70
ip classless	#	!
ip route 0.0.0.0 0.0.0.0	!	end
Serial0/0/1	logging 192.168.3.60	
ip route 0.0.0.0 0.0.0.0	line con 0	
Serial0/1/0 5	!	
!		

2-branch A-SW1

Building configuration...

Current configuration : 5945 bytes

```
!  
version 15.0  
  
no service timestamps log  
datetime msec  
  
no service timestamps debug  
datetime msec  
  
no service password-encryption  
  
!  
hostname baranch-A-SW1  
  
!  
ip arp inspection vlan 1  
  
!  
ip dhcp snooping vlan 1  
  
no ip dhcp snooping  
information option  
  
ip dhcp snooping  
  
!  
spanning-tree mode pvst  
spanning-tree extend system-id  
  
!  
interface FastEthernet0/1  
  
switchport mode access  
  
switchport port-security  
  
switchport port-security mac-  
address sticky  
  
switchport port-security  
violation restrict  
  
switchport port-security mac-  
address sticky 0002.16C5.A923  
  
spanning-tree portfast  
  
!  
interface FastEthernet0/2
```

```
switchport mode access  
  
switchport port-security  
  
switchport port-security mac-  
address sticky  
  
switchport port-security  
violation restrict  
  
switchport port-security mac-  
address sticky 0001.6449.66CE  
  
spanning-tree portfast  
  
!  
interface FastEthernet0/3  
  
switchport mode access  
  
switchport port-security  
  
switchport port-security mac-  
address sticky  
  
switchport port-security  
violation restrict  
  
switchport port-security mac-  
address sticky 0040.0B8D.02C2  
  
spanning-tree portfast  
  
!  
interface FastEthernet0/4  
  
switchport mode access  
  
switchport port-security  
  
switchport port-security mac-  
address sticky  
  
switchport port-security  
violation restrict  
  
switchport port-security mac-  
address sticky 0050.0F8A.2506  
  
spanning-tree portfast  
  
!  
interface FastEthernet0/5  
  
switchport mode access  
  
switchport port-security  
  
switchport port-security mac-  
address sticky
```

```
switchport port-security  
violation restrict  
  
switchport port-security mac-  
address sticky 0001.C75D.A644  
  
spanning-tree portfast  
  
!  
interface FastEthernet0/6  
  
switchport mode access  
  
switchport port-security  
  
switchport port-security mac-  
address sticky  
  
switchport port-security  
violation restrict  
  
spanning-tree portfast  
  
shutdown  
  
!  
interface FastEthernet0/7  
  
switchport mode access  
  
switchport port-security  
  
switchport port-security mac-  
address sticky  
  
switchport port-security  
violation restrict  
  
spanning-tree portfast  
  
shutdown  
  
!  
interface FastEthernet0/8  
  
switchport mode access  
  
switchport port-security  
  
switchport port-security mac-  
address sticky  
  
switchport port-security  
violation restrict  
  
spanning-tree portfast  
  
shutdown  
  
!
```

interface FastEthernet0/9	shutdown	switchport port-security
switchport mode access	!	violation restrict
switchport port-security	interface FastEthernet0/13	spanning-tree portfast
switchport port-security mac-	switchport mode access	shutdown
address sticky	switchport port-security	!
switchport port-security	switchport port-security mac-	interface FastEthernet0/17
violation restrict	address sticky	switchport mode access
spanning-tree portfast	switchport port-security	switchport port-security
shutdown	violation restrict	switchport port-security mac-
!	spanning-tree portfast	address sticky
interface FastEthernet0/10	shutdown	switchport port-security
switchport mode access	!	violation restrict
switchport port-security	interface FastEthernet0/14	spanning-tree portfast
switchport port-security mac-	switchport mode access	shutdown
address sticky	switchport port-security	!
switchport port-security	switchport port-security mac-	interface FastEthernet0/18
violation restrict	address sticky	switchport mode access
spanning-tree portfast	switchport port-security	switchport port-security
shutdown	violation restrict	switchport port-security mac-
!	spanning-tree portfast	address sticky
interface FastEthernet0/11	shutdown	switchport port-security
switchport mode access	!	violation restrict
switchport port-security	interface FastEthernet0/15	spanning-tree portfast
switchport port-security mac-	switchport mode access	shutdown
address sticky	switchport port-security	!
switchport port-security	switchport port-security mac-	interface FastEthernet0/19
violation restrict	address sticky	switchport mode access
spanning-tree portfast	switchport port-security	switchport port-security
shutdown	violation restrict	switchport port-security mac-
!	spanning-tree portfast	address sticky
interface FastEthernet0/12	shutdown	switchport port-security
switchport mode access	!	violation restrict
switchport port-security	interface FastEthernet0/16	spanning-tree portfast
switchport port-security mac-	switchport mode access	shutdown
address sticky	switchport port-security	!
switchport port-security	switchport port-security mac-	interface FastEthernet0/20
violation restrict	address sticky	switchport mode access
spanning-tree portfast		switchport port-security

switchport port-security mac-address sticky	interface FastEthernet0/23	ip address 192.168.100.2 255.255.255.0
switchport port-security violation restrict	switchport mode access	!
spanning-tree portfast	switchport port-security	ip default-gateway 192.168.100.1
shutdown	switchport port-security mac-address sticky	!
!	switchport port-security violation restrict	banner motd ^C
interface FastEthernet0/21	spanning-tree portfast	#####
switchport mode access	shutdown	Welcome
switchport port-security	!	baranch-A-SW1
switchport port-security mac-address sticky	interface FastEthernet0/24	#####
switchport port-security violation restrict	switchport mode access	^C
spanning-tree portfast	switchport port-security	logging 192.168.3.60
shutdown	switchport port-security mac-address sticky	line con 0
!	switchport port-security violation restrict	!
interface FastEthernet0/22	spanning-tree portfast	line vty 0
switchport mode access	shutdown	password cisco
switchport port-security	!	login
switchport port-security mac-address sticky	interface GigabitEthernet0/1	line vty 1 4
switchport port-security violation restrict	ip arp inspection trust	login
spanning-tree portfast	ip dhcp snooping trust	line vty 5 15
shutdown	!	login
!	interface GigabitEthernet0/2	ntp server 192.168.3.70
	!	!
	interface Vlan1	end

2-branch A-SW2

Building configuration...	no service timestamps debug datetime msec	no ip dhcp snooping information option
Current configuration : 5953 bytes	no service password-encryption	ip dhcp snooping
!	!	!
version 15.0	hostname baranch-A-SW2	spanning-tree mode pvst
no service timestamps log datetime msec	ip arp inspection vlan 1	spanning-tree extend system-id
	!	!
	ip dhcp snooping vlan 1	interface FastEthernet0/1

switchport mode access	switchport port-security mac-address sticky 000B.BE4C.4756	switchport port-security mac-address sticky
switchport port-security	spanning-tree portfast	switchport port-security violation restrict
switchport port-security mac-address sticky	!	spanning-tree portfast
switchport port-security violation restrict	interface FastEthernet0/5	shutdown
switchport port-security mac-address sticky 0000.0C0A.A1EA	switchport mode access	!
spanning-tree portfast	switchport port-security	interface FastEthernet0/9
!	switchport port-security mac-address sticky	switchport mode access
interface FastEthernet0/2	switchport port-security violation restrict	switchport port-security
switchport mode access	switchport port-security mac-address sticky 000C.85CA.83BB	switchport port-security mac-address sticky
switchport port-security	spanning-tree portfast	switchport port-security violation restrict
switchport port-security mac-address sticky	!	spanning-tree portfast
switchport port-security violation restrict	interface FastEthernet0/6	shutdown
switchport port-security mac-address sticky 00E0.A3DB.B9B0	switchport mode access	!
spanning-tree portfast	switchport port-security	interface FastEthernet0/10
!	switchport port-security mac-address sticky	switchport mode access
interface FastEthernet0/3	switchport port-security violation restrict	switchport port-security
switchport mode access	spanning-tree portfast	switchport port-security mac-address sticky
switchport port-security	shutdown	switchport port-security violation restrict
switchport port-security mac-address sticky	!	spanning-tree portfast
switchport port-security violation restrict	interface FastEthernet0/7	shutdown
switchport port-security mac-address sticky 0009.7CB3.7A62	switchport mode access	!
spanning-tree portfast	switchport port-security	interface FastEthernet0/11
!	switchport port-security mac-address sticky	switchport mode access
interface FastEthernet0/4	switchport port-security violation restrict	switchport port-security
switchport mode access	spanning-tree portfast	switchport port-security mac-address sticky
switchport port-security	shutdown	switchport port-security violation restrict
switchport port-security mac-address sticky	!	spanning-tree portfast
switchport port-security violation restrict	interface FastEthernet0/8	shutdown
	switchport mode access	!
	switchport port-security	interface FastEthernet0/12

switchport mode access	!	spanning-tree portfast
switchport port-security	interface FastEthernet0/16	shutdown
switchport port-security mac-address sticky	switchport mode access	!
switchport port-security violation restrict	switchport port-security	interface FastEthernet0/20
spanning-tree portfast	switchport port-security mac-address sticky	switchport mode access
shutdown	switchport port-security violation restrict	switchport port-security
!	spanning-tree portfast	switchport port-security mac-address sticky
interface FastEthernet0/13	shutdown	switchport port-security violation restrict
switchport mode access	!	spanning-tree portfast
switchport port-security	interface FastEthernet0/17	shutdown
switchport port-security mac-address sticky	switchport mode access	!
switchport port-security violation restrict	switchport port-security	interface FastEthernet0/21
spanning-tree portfast	switchport port-security mac-address sticky	switchport mode access
shutdown	switchport port-security violation restrict	switchport port-security
!	spanning-tree portfast	switchport port-security mac-address sticky
interface FastEthernet0/14	shutdown	switchport port-security violation restrict
switchport mode access	!	spanning-tree portfast
switchport port-security	interface FastEthernet0/18	shutdown
switchport port-security mac-address sticky	switchport mode access	!
switchport port-security violation restrict	switchport port-security	interface FastEthernet0/22
spanning-tree portfast	switchport port-security mac-address sticky	switchport mode access
shutdown	switchport port-security violation restrict	switchport port-security
!	spanning-tree portfast	switchport port-security mac-address sticky
interface FastEthernet0/15	shutdown	switchport port-security violation restrict
switchport mode access	!	spanning-tree portfast
switchport port-security	interface FastEthernet0/19	shutdown
switchport port-security mac-address sticky	switchport mode access	!
switchport port-security violation restrict	switchport port-security	interface FastEthernet0/23
spanning-tree portfast	switchport port-security mac-address sticky	switchport mode access
shutdown	switchport port-security violation restrict	switchport port-security
		switchport port-security mac-address sticky

```
switchport port-security
violation restrict

spanning-tree portfast

shutdown

!

interface FastEthernet0/24

switchport mode access

switchport port-security

switchport port-security mac-
address sticky

switchport port-security
violation restrict

spanning-tree portfast

shutdown

!

interface GigabitEthernet0/1

ip arp inspection trust
```

```
ip dhcp snooping trust

!

interface GigabitEthernet0/2

!

interface Vlan1

ip address 192.168.110.2
255.255.255.0

!

ip default-gateway
192.168.110.1

!

banner motd ^C

#####
##

welcome

baranch-A-SW2

#####
#
```

```
logging 192.168.3.60

line con 0

!

line vty 0

password cisco

login

line vty 1 4

login

line vty 5 15

login

!

ntp server 192.168.3.70
```

end

. Branch B: -

Configuration

1-branch B-router

Building configuration...	no ip cef	ip access-group valns-block in
	no ipv6 cef	!
Current configuration : 2265 bytes	!	interface GigabitEthernet0/1
!	license udi pid CISCO2901/K9 sn FTX15246VBP-	no ip address
version 15.1	!	duplex auto
no service timestamps log datetime msec	spanning-tree mode pvst	speed auto
no service timestamps debug datetime msec	!	shutdown
no service password-encryption	interface GigabitEthernet0/0	!
!	no ip address	interface Serial0/0/0
hostname baranch-B-router	duplex auto	no ip address
!	speed auto	clock rate 2000000
ip dhcp excluded-address 192.168.120.0 192.168.120.50	!	shutdown
ip dhcp excluded-address 192.168.130.0 192.168.130.50	interface GigabitEthernet0/0.1	!
!	encapsulation dot1Q 1 native	interface Serial0/0/1
ip dhcp pool Engineering.net	ip address 20.0.0.1 255.0.0.0	ip address 200.1.5.1 255.255.255.252
network 192.168.120.0 255.255.255.0	ip access-group vlans-block in	!
default-router 192.168.120.1	!	interface Serial0/1/0
dns-server 8.8.8.8	interface GigabitEthernet0/0.120	no ip address
ip dhcp pool HR.net	encapsulation dot1Q 120	clock rate 2000000
network 192.168.130.0 255.255.255.0	ip address 192.168.120.1 255.255.255.0	shutdown
default-router 192.168.130.1	ip access-group valns-block in	!
dns-server 8.8.8.8	!	interface Serial0/1/1
!	interface GigabitEthernet0/0.130	no ip address
	encapsulation dot1Q 130	clock rate 2000000
	ip address 192.168.130.1 255.255.255.0	shutdown
		!
		interface Vlan1

```
no ip address
shutdown
!
router ospf 1
router-id 3.3.3.3
log-adjacency-changes
network 0.0.0.0
255.255.255.255 area 1
!
ip nat inside source static
192.168.130.51 200.1.5.1
ip nat inside source static
192.168.120.51 200.1.5.1
ip classless
ip route 0.0.0.0 0.0.0.0
Serial0/0/1
!
ip flow-export version 9
```

```
!
access-list 1 permit any
ip access-list extended valns-
block
deny ip 192.168.120.0 0.0.0.255
192.168.130.0 0.0.0.255
deny ip 192.168.130.0 0.0.0.255
192.168.120.0 0.0.0.255
permit ip any any
!
banner motd ^C
#####
#####
welcome
baranch-B-router
#####
#####
^C
```

```
logging 192.168.3.60
line con 0
!
line aux 0
!
line vty 0
password cisco
login
line vty 1 4
login
ntp server 192.168.3.70
!
end
```

1-branch B-SW

Building configuration...

Current configuration : 5943 bytes

!

version 15.0

no service timestamps log
datetime msec

no service timestamps debug
datetime msec

no service password-encryption

!

hostname branch-B-SW

!

ip arp inspection vlan 1,120,130

!

ip dhcp snooping vlan 1,120,130

no ip dhcp snooping
information option

ip dhcp snooping

!

spanning-tree mode pvst

spanning-tree extend system-id

!

interface FastEthernet0/1

switchport access vlan 120

switchport mode access

switchport port-security

switchport port-security mac-
address sticky

switchport port-security
violation restrict

switchport port-security mac-
address sticky 00D0.9735.CE09

spanning-tree portfast

!

interface FastEthernet0/2

switchport access vlan 120

switchport mode access

switchport port-security

switchport port-security mac-
address sticky

switchport port-security
violation restrict

switchport port-security mac-
address sticky 0001.9654.B799

spanning-tree portfast

!

interface FastEthernet0/3

switchport access vlan 120

switchport mode access

switchport port-security

switchport port-security mac-
address sticky

switchport port-security
violation restrict

spanning-tree portfast

shutdown

!

interface FastEthernet0/4

switchport access vlan 120

switchport mode access

switchport port-security

switchport port-security mac-
address sticky

switchport port-security
violation restrict

spanning-tree portfast

shutdown

!

interface FastEthernet0/5

switchport access vlan 120

switchport mode access

switchport port-security

switchport port-security mac-
address sticky

switchport port-security
violation restrict

spanning-tree portfast

shutdown

!

interface FastEthernet0/6

switchport access vlan 120

switchport mode access

switchport port-security

switchport port-security mac-
address sticky

switchport port-security
violation restrict

spanning-tree portfast

shutdown

!

interface FastEthernet0/7

switchport access vlan 120

switchport mode access

switchport port-security

switchport port-security mac-
address sticky

switchport port-security
violation restrict

spanning-tree portfast

shutdown

!

interface FastEthernet0/8

switchport access vlan 120

switchport mode access

switchport port-security

```
switchport port-security mac-  
address sticky  
  
switchport port-security  
violation restrict  
  
spanning-tree portfast  
  
shutdown  
  
!  
  
interface FastEthernet0/9  
  
switchport access vlan 120  
  
switchport mode access  
  
switchport port-security  
  
switchport port-security mac-  
address sticky  
  
switchport port-security  
violation restrict  
  
spanning-tree portfast  
  
shutdown  
  
!  
  
interface FastEthernet0/10  
  
switchport access vlan 120  
  
switchport mode access  
  
switchport port-security  
  
switchport port-security mac-  
address sticky  
  
switchport port-security  
violation restrict  
  
spanning-tree portfast  
  
shutdown  
  
!  
  
interface FastEthernet0/11  
  
switchport access vlan 130  
  
switchport mode access  
  
switchport port-security  
  
switchport port-security mac-  
address sticky  
  
switchport port-security  
violation restrict  
  
switchport port-security mac-  
address sticky 00D0.BC89.8B63
```

```
spanning-tree portfast  
  
!  
  
interface FastEthernet0/12  
  
switchport access vlan 130  
  
switchport mode access  
  
switchport port-security  
  
switchport port-security mac-  
address sticky  
  
switchport port-security  
violation restrict  
  
switchport port-security mac-  
address sticky 00E0.B008.D10D  
  
spanning-tree portfast  
  
!  
  
interface FastEthernet0/13  
  
switchport access vlan 130  
  
switchport mode access  
  
switchport port-security  
  
switchport port-security mac-  
address sticky  
  
switchport port-security  
violation restrict  
  
spanning-tree portfast  
  
shutdown  
  
!  
  
interface FastEthernet0/14  
  
switchport access vlan 130  
  
switchport mode access  
  
switchport port-security  
  
switchport port-security mac-  
address sticky  
  
switchport port-security  
violation restrict  
  
spanning-tree portfast  
  
shutdown  
  
!  
  
interface FastEthernet0/15  
  
switchport access vlan 130
```

```
switchport mode access  
  
switchport port-security  
  
switchport port-security mac-  
address sticky  
  
switchport port-security  
violation restrict  
  
spanning-tree portfast  
  
shutdown  
  
!  
  
interface FastEthernet0/16  
  
switchport access vlan 130  
  
switchport mode access  
  
switchport port-security  
  
switchport port-security mac-  
address sticky  
  
switchport port-security  
violation restrict  
  
spanning-tree portfast  
  
shutdown  
  
!  
  
interface FastEthernet0/17  
  
switchport access vlan 130  
  
switchport mode access  
  
switchport port-security  
  
switchport port-security mac-  
address sticky  
  
switchport port-security  
violation restrict  
  
spanning-tree portfast  
  
shutdown  
  
!  
  
interface FastEthernet0/18  
  
switchport access vlan 130  
  
switchport mode access  
  
switchport port-security  
  
switchport port-security mac-  
address sticky
```



```
switchport port-security
violation restrict

spanning-tree portfast

shutdown

!

interface FastEthernet0/19

switchport access vlan 130

switchport mode access

switchport port-security

switchport port-security mac-
address sticky

switchport port-security
violation restrict

spanning-tree portfast

shutdown

!

interface FastEthernet0/20

switchport access vlan 130

switchport mode access

switchport port-security

switchport port-security mac-
address sticky

switchport port-security
violation restrict

spanning-tree portfast

shutdown

!
```

```
interface FastEthernet0/21

spanning-tree portfast

shutdown

!

interface FastEthernet0/22

spanning-tree portfast

shutdown

!

interface FastEthernet0/23

spanning-tree portfast

shutdown

!

interface FastEthernet0/24

spanning-tree portfast

shutdown

!

interface GigabitEthernet0/1

ip arp inspection trust

ip dhcp snooping trust

switchport mode trunk

!

interface GigabitEthernet0/2

!

interface Vlan1

ip address 20.0.0.2 255.0.0.0
```

```
!

ip default-gateway 20.0.0.1

!

banner motd ^C

#####
#####

welcome

branch-B-SW

#####
#####

^C

logging 192.168.3.60

line con 0

!

line vty 0

password cisco

login

line vty 1 4

login

line vty 5 15

login

!

ntp server 192.168.3.70

!

end
```

Remote Office:

Configrution

1-Remote Office-Router

Building configuration...

Current configuration : 1575 bytes

!

version 15.1

no service timestamps log datetime msec

no service timestamps debug datetime msec

no service password-encryption

!

hostname R_REMOTEOFFICE

!

ip dhcp excluded-address 192.168.140.10
192.168.140.50

ip dhcp excluded-address 192.168.150.10
192.168.150.50

!

ip dhcp pool users

ip dhcp pool 140

network 192.168.140.0 255.255.255.0

default-router 192.168.140.1

dns-server 8.8.8.8

ip dhcp pool 150

network 192.168.150.0 255.255.255.0

default-router 192.168.150.1

dns-server 8.8.8.8

!

no ip cef

no ipv6 cef

!

license udi pid CISCO2901/K9 sn FTX1524779C-

!

spanning-tree mode pvst

!

interface GigabitEthernet0/0

no ip address

duplex auto

speed auto

!

interface GigabitEthernet0/0.10

encapsulation dot1Q 10

no ip address

!

interface GigabitEthernet0/0.140

encapsulation dot1Q 140

ip address 192.168.140.1 255.255.255.0

!

interface GigabitEthernet0/0.150

encapsulation dot1Q 150

ip address 192.168.150.1 255.255.255.0

!

interface GigabitEthernet0/1

no ip address

duplex auto

speed auto

shutdown

!

interface Serial0/0/0

ip address 200.1.2.2 255.255.255.0

!

interface Serial0/0/1

ip address 200.1.4.2 255.255.255.0

!

interface Serial0/1/0

no ip address

clock rate 2000000

shutdown

!

interface Serial0/1/1

no ip address

clock rate 2000000

shutdown

!

interface Vlan1

no ip address

shutdown

!

router ospf 1

router-id 3.3.3.3

log-adjacency-changes

network 0.0.0.0 255.255.255.255 area 2

!

ip classless

!

ip flow-export version 9

line con 0

!

line aux 0

!

line vty 0 4

login

end

2-Remote Office-SW

Building configuration...

Current configuration : 4783 bytes

```
!  
version 15.0  
  
no service timestamps log datetime msec  
no service timestamps debug datetime msec  
no service password-encryption  
  
!  
hostname Switch  
  
!  
spanning-tree mode pvst  
spanning-tree extend system-id  
  
!  
interface FastEthernet0/1  
switchport access vlan 140  
switchport mode access  
switchport port-security  
switchport port-security mac-address sticky  
switchport port-security violation restrict  
switchport port-security mac-address sticky  
00D0.D32E.012E  
  
!  
interface FastEthernet0/2  
switchport access vlan 140  
switchport mode access  
switchport port-security  
switchport port-security mac-address sticky  
switchport port-security violation restrict  
switchport port-security mac-address sticky  
0090.0CC8.8E31  
  
!  
interface FastEthernet0/3  
switchport access vlan 140
```

```
switchport mode access  
  
switchport port-security  
switchport port-security mac-address sticky  
switchport port-security violation restrict  
  
!  
interface FastEthernet0/4  
switchport access vlan 140  
switchport mode access  
switchport port-security  
switchport port-security mac-address sticky  
switchport port-security violation restrict  
  
!  
interface FastEthernet0/5  
switchport access vlan 140  
switchport mode access  
switchport port-security  
switchport port-security mac-address sticky  
switchport port-security violation restrict  
  
!  
interface FastEthernet0/6  
switchport access vlan 140  
switchport mode access  
switchport port-security  
switchport port-security mac-address sticky  
switchport port-security violation restrict  
  
!  
interface FastEthernet0/7  
switchport access vlan 140  
switchport mode access  
switchport port-security  
switchport port-security mac-address sticky  
switchport port-security violation restrict  
  
!
```

```
interface FastEthernet0/8
switchport access vlan 140
switchport mode access
switchport port-security
switchport port-security mac-address sticky
switchport port-security violation restrict
!
interface FastEthernet0/9
switchport access vlan 140
switchport mode access
switchport port-security
switchport port-security mac-address sticky
switchport port-security violation restrict
!
interface FastEthernet0/10
switchport access vlan 140
switchport mode access
switchport port-security
switchport port-security mac-address sticky
switchport port-security violation restrict
!
interface FastEthernet0/11
switchport access vlan 150
switchport mode access
switchport port-security
switchport port-security mac-address sticky
switchport port-security violation restrict
switchport port-security mac-address sticky
00D0.BAD2.462C
!
interface FastEthernet0/12
switchport access vlan 150
switchport mode access
switchport port-security
switchport port-security mac-address sticky
```

```
switchport port-security violation restrict
switchport port-security mac-address sticky
00E0.A342.4EB0
!
interface FastEthernet0/13
switchport access vlan 150
switchport mode access
switchport port-security
switchport port-security mac-address sticky
switchport port-security violation restrict
!
interface FastEthernet0/14
switchport access vlan 150
switchport mode access
switchport port-security
switchport port-security mac-address sticky
switchport port-security violation restrict
!
interface FastEthernet0/15
switchport access vlan 150
switchport mode access
switchport port-security
switchport port-security mac-address sticky
switchport port-security violation restrict
!
interface FastEthernet0/16
switchport access vlan 150
switchport mode access
switchport port-security
switchport port-security mac-address sticky
switchport port-security violation restrict
!
interface FastEthernet0/17
switchport access vlan 150
switchport mode access
```

switchport port-security	!
switchport port-security mac-address sticky	interface FastEthernet0/22
switchport port-security violation restrict	shutdown
!	!
interface FastEthernet0/18	interface FastEthernet0/23
switchport access vlan 150	shutdown
switchport mode access	!
switchport port-security	interface FastEthernet0/24
switchport port-security mac-address sticky	shutdown
switchport port-security violation restrict	!
!	interface GigabitEthernet0/1
interface FastEthernet0/19	switchport mode trunk
switchport access vlan 150	!
switchport mode access	interface GigabitEthernet0/2
switchport port-security	!
switchport port-security mac-address sticky	interface Vlan1
switchport port-security violation restrict	no ip address
!	shutdown
interface FastEthernet0/20	line con 0
switchport access vlan 150	!
switchport mode access	line vty 0 4
switchport port-security	login
switchport port-security mac-address sticky	line vty 5 15
switchport port-security violation restrict	login
!	!
interface FastEthernet0/21	end
shutdown	