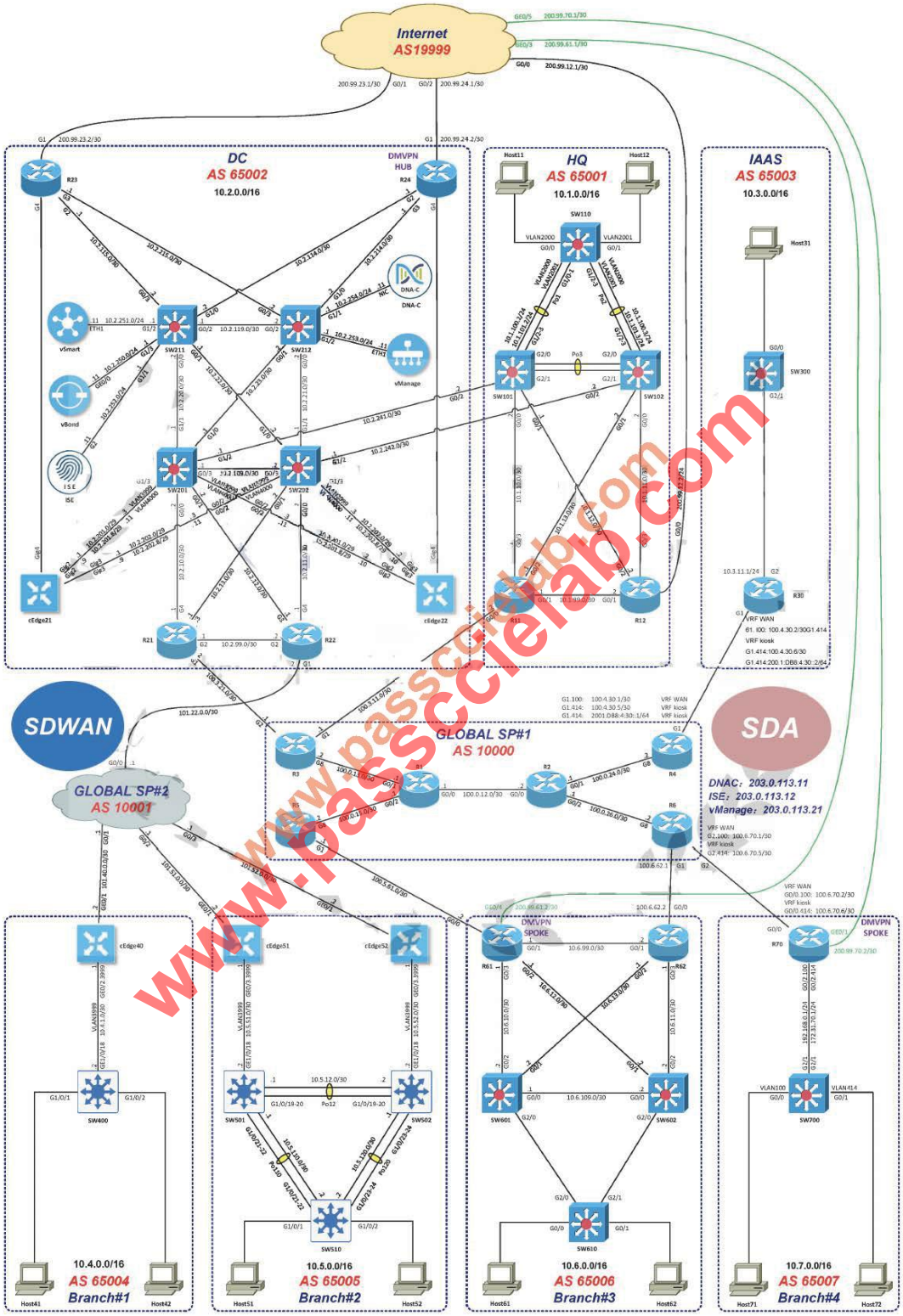
CCIE Enterprise Infrastructure LAB

Module2-DOO V1.1

Ver：1.1

Topology



Device Login Info:

Device	OOB IP address	Username	Password	No
DNAc	https://203.0.113.11	admin	CC!E!nfr4	Accessible from any HostXY.
ISE	https://203.0.113.12	admin	CC!E!nfr4	Accessible from any HostXY.
vManage	https://203.0.113.21	admin	CC!E!nfr4	Accessible from any HosyXY.
cEdges		admin	CC!E!nfr4	Accessible via clickable map
HostXY		cisco	cisco	Accessible via clickable map
R30		netadmin	CC!E!nfr4	Not accessible via clickable map. Accessible via NETCONF/RESTCONF from Host31.
SW400		netadmin	CC!E!nfra4	Accessible via clickable map.
SW501		netadmin	CC!E!nfr4	Accessible via clickable map.
SW502		netadmin	CC!E!nfr4	Accessible via clickable map.
SW510		netadmin	CC!E!nfr4	Accessible via clickable map.
TerminalServer		admin	Cisco	Accessible via clickable map.
vBond		admin	CC!E!nfr4	Accessible via clickable map.
vSmart		admin	admin	Accessible via clickable map.

Module Specific Instructions

Read before starting.

Module-specific guidelines

- The lab topology has several end hosts, named hostXY (for example, host11). They are all identical and they can all be used at your full discretion, including accessing the GUI of Cisco DNA Center, vmanage, and Cisco ISE through Firefox, performing IP connectivity tests, generating or capturing traffic, and performing coding Python or C.
- All hostXY devices are configured as DHCP Clients. If it is necessary to force the host to release and renew its DHCP lease, double-click the desktop icon "Reset Port".
- The web-based GUI of Cisco DNA Center, Cisco ISE, and vManage can be accessed only from the hostXY end hosts, using Firefox installed on these end hosts. These servers cannot be accessed directly from the desktop/workstation that you are working from. You must always connect to one of the hostXY and use them as a jump host to access Cisco DNA Center, ISE, and/or vManage. Always ignore any SSL/TLS certificate warnings in Firefox that may be displayed. Refer to the "Device Login into," table under Resources > Tables. for detailed access to these devices.
- R30 (10.3.11.1) can be accessed via RESTCONF and NETCONF from host31.
- Devices in the topology may have more interface, addresses and routes configured than what is shown in the diagrams and comparing tables: Ignore such interfaces, addresses, and routes entirely. Unless a task exactly requires you to use or modify them.
- Changing or removing parts of initial running configuration on devices, as opposed to adding new configuration, is allowed only if the task allows or requires it explicitly, or if there is no other way to accomplish the task.

SECTION1.Exiting Network Review and Tuning

1.1: Introduction

Welcome to the Deploy, Operate, Optimize (DOO) module for XANDER Pharmaceuticals.

The topology you will be working on this module will be similar, but not necessarily identical, to the network that you helped design in the previous module.

It may also include technologies and feature sets not touched upon previously.

1.2: Configure VLANs

Ensure that the VLANs and forwarding are configured on all switches and switchports according to the following table.

Site	VLAN	Switch	Port(s)	802.1Q
HQ	2000	SW101	PO1, PO3	Yes
HQ	2000	SW102	PO2 PO3	Yes
HQ	2000	SW110	P01, P02	Yes
HQ	2000	SW110	GE0/0	NO
HQ	2001	SW101	P01, P03	Yes
HQ	2001	SW102	P02 P03	Yes
HQ	2001	SW110	P01, P02	Yes
HQ	2001	SW110	GE0/1	NO
Branch #3	2000	SW601	GE2/0	Yes
Branch #3	2000	SW602	GE2/0	Yes
Branch #3	2000	SW610	GE2/0-1	Yes
Branch #3	2000	SW610	GE2/0	NO
Branch #3	2001	SW601	GE2/0	Yes
Branch #3	2001	SW602	GE2/0	Yes
Branch #3	2001	SW610	GE2/0-1	Yes
Branch #3	2001	SW610	GE0/1	NO

Solution

SW101 & SW102:

This part of the content will be configured in Q1.3

SW110:

SW110(config)#interface g0/0

SW110(config-if)#switchport mode access

SW110(config-if)#switchport access vlan 2000

SW110(config-if)#no shutdown

SW110(config-if)#exit

SW110(config)#interface g0/1

SW110(config-if)#switchport mode access 2001

SW110(config-if)#no shuldown

SW110(config-if)#exit

SW110(config)#

SW601 & SW602:

SW110(config)#interface g2/0

SW60x(config-if)#switchport trunk encapsulation dot1q

SW60x(config-if)#switchport mode trunk

SW60x(config-if)#no shutdown

SW60x(config-if)#exit

SW60x(config)#

SW610:

SW610(config)#interface range g2/0-1

SW610(config-if-range)#switchport trunk encapsulation dot1q

SW610(config-if-range)#switchport mode trunk

SW610(config-if-range)#switchport trunk allowed vlan 1,2000,2001

SW610(config-if-range)#no shutdown

SW610(config-if-range)#exit

SW60x(config-if)#switchport trunk encapsulation dot1q

SW60x(config-if)#switchport mode trunk

SW60x(config-if)#no shutdown

SW60x(config-if)#exit

SW60x(config)#

```
SW610;

SW610(config)#interface range g2/0-1

SW610(config-if-range)#switchport trunk encapsulation dot1q

SW610(config-if-range)#switchport mode trunk

SW610(config-if-range)#switchport trunk allowed vlan 12000,2001

SW610(config-if-range)#no shutdown

SW610(config-if-range)#exit

SW610(config)#interface g0/0

SW610(config-if)#switchport mode access

SW610(config-if)#switchport access vlan 2000

SW610(config-if)#shutdown

SW610(config-if)#exit


SW610(config)#interface g0/1

SW610(config-if)#switchport mode access

SW610(config-if)#switchport access vlan 2001

SW610(config-if)#no shutdown

SW610(config-if)#exit

SW610(config)#
```


Verification

Verify:

SW601:

```
SW601#show vlan brief

VLAN Name                              Status    Ports
---- --------------------------------- --------- -------------------------------
1    default                           active    Gi0/3, Gi1/0, Gi1/1, Gi1/2
                                                 Gi1/3, Gi2/1, Gi2/2, Gi2/3
1002 fddi-default                      act/unsup
1003 token-ring-default                act/unsup
1004 fddinet-default                   act/unsup
1005 trnet-default                     act/unsup
2000 VLAN2000                          active
2001 VLAN2001                          active
SW601#
SW601#show interface trunk

Port        Mode         Encapsulation  Status        Native vlan
Gi2/0       on           802.1q         trunking      1

Port        Vlans allowed on trunk
Gi2/0       1,2000-2001

Port        Vlans allowed and active in management domain
Gi2/0       1,2000-2001

Port        Vlans in spanning tree forwarding state and not pruned
Gi2/0       1,2000-2001
SW601#
```

SW602:

```
SW602#show vlan brief

VLAN Name                              Status    Ports
---- --------------------------------- --------- -------------------------------
1    default                           active    Gi0/3, Gi1/0, Gi1/1, Gi1/2
                                                 Gi1/3, Gi2/1, Gi2/2, Gi2/3
1002 fddi-default                      act/unsup
1003 token-ring-default                act/unsup
1004 fddinet-default                   act/unsup
1005 trnet-default                     act/unsup
```

```
2000 VLAN2000                         active
2001 VLAN2001                         active
SW602#
SW602#show interface trunk

Port        Mode         Encapsulation  Status        Native vlan
Gi2/0       on           802.1q         trunking      1

Port        Vlans allowed on trunk
Gi2/0       1,2000-2001

Port        Vlans allowed and active in management domain
Gi2/0       1,2000-2001

Port        Vlans in spanning tree forwarding state and not pruned
Gi2/0       1,2000-2001
SW602#
```

SW610:

```
SW610#show vlan brief

VLAN Name                             Status    Ports
---- -------------------------------- --------- -------------------------------
1    default                          active    Gi0/2, Gi0/3, Gi1/0, Gi1/1
                                                Gi1/2, Gi1/3, Gi2/2, Gi2/3
1002 fddi-default                     act/unsup
1003 token-ring-default               act/unsup
1004 fddinet-default                  act/unsup
1005 trnet-default                    act/unsup
2000 VLAN2000                         active    Gi0/0
```

```
Gi2/0       1,2000-2001
SW602#
```

SW610:

```
SW610#show vlan brief

VLAN Name                             Status    Ports
---- -------------------------------- --------- -------------------------------
1    default                          active    Gi0/2, Gi0/3, Gi1/0, Gi1/1
                                                Gi1/2, Gi1/3, Gi2/2, Gi2/3
1002 fddi-default                     act/unsup
1003 token-ring-default               act/unsup
1004 fdd net-default                  act/unsup
1005 trnet-default                    act/unsup
2000 VLAN2000                         active    Gi0/0
2001 VLAN2001                         active    Gi0/1
SW610#
SW610#show interface trunk

Port        Mode         Encapsulation  Status        Native vlan
Gi2/0       on           802.1q         trunking      1
Gi2/1       on           802.1q         trunking      1

Port        Vlans allowed on trunk
Gi2/0       1,2000-2001
Gi2/1       1,2000-2001

Port        Vlans allowed and active in management domain
Gi2/0       1,2000-2001
Gi2/1       1,2000-2001

Port        Vlans in spanning tree forwarding state and not pruned
Gi2/0       1,2000-2001
Gi2/1       1,2000-2001
SW610#
```

1.3: Configure EtherChannel

Ensure that the EtherChannel links are configured on the switches at Headquarters according to the following table.

EtherChannel ID	Switch A	Switchports	Switch B	Switchports	Type
1	SW101	GE1/2-3	SW110	GE1/0-1	802.3ad
2	SW102	GE1/2-3	SW110	GE1/2-3	802.3ad
3	SW101	GE2/0-1	SW102	GE2/0-1	802.3ad

Ensure the STP features are configured on the switches at Headquarters according to the following requirements:

- **The protocol must support a separate instance for each VLAN.**
- **The protocol must support only three states.**
- **All endpoint-facing ports must bypass the STP forwarding delay, without configuring individual witchports.**
- **SW101 must be the root bridge for VLANs 2000-2001 and default VLAN , with SW102 as the secondary Use the owest possible priority values to achieve this.**
- **SW101 and SW102 must ignore superior BPDUs for the other switches at Headquarters. While uperior BPDUs are received, traffic must not be forwarded on the receiving port.**

Solution

SW101:

```
SW101(config)#spanning-tree mode rapid-pvst
SW101(config)#spanning-tree vlan 12000.2001 priority 0
SW101(config)#spanning-tree portfast edge default
SW101(config)#no interface po1
SW101(config)#no interface po3
SW101(config)#interface range g1/2-3
SW101(config-if-range)#switchport trunk encapsulation dot1q
SW101(config-if-range)#switchport mod trunk
```

SW101(config-if-range)#no shutdown

SW101(config-if-range)#channel-group 1 mode active

SW101(config-if-range)#exit

SW101(config)#interface range g2/0-1

SW101(config-if-range)#switchport trunk encapsulation dot1q

SW101(config-if-range)#SWitchport mod trunk

SW101(config-if-range)#no shutdown

SW101(config-if-range)#channel-group 3 mode active

SW101(config-if-range)#exit

SW101(config-if-range)#inierface range po1, po3

SW101(config-if-range)#spanning-tree guard root

SW101(config-if-range)#exit

SW101(config)#

SW102:

SW102(config)#spanning-tree mode rapid-pvst

SW102(config)#spanning-tree vlan 1,2000,2001 priority 4096

SW102(config)#spanning-tree portfast edge default

SW102(config)#no interface po2

SW102(config)#no interface po3

SW102(config)#interface range g1/2-3

SW102(config-if-range)#switchport trunk encapsulation dot1q

SW102(config-if-range)#switchport mod trunk

SW102(config-if-range)#no shutdown

SW102(config-if-range)#channel-group 2 mode active

SW102(config-if-range)#exit

SW102(config)#interface range g2/0-1

SW102(config-if-range)#switch port trunk encapsulation dot1q

SW102(config-if-range)#switchport mod trunk

SW102(config-if-range)#no shutdown

SW102(config-if-range)#channel-group 3 mode active

SW102(config-if-range)#exit

SW102(config)#interface po2

SW102(config-if-range)#spanning-tree guard root

SW102(config-if-range)#exit

SW102(config)#interface range gi0/3, gi1/0-3

SW102(config-if-range)#spanning - tree guard root

SW102(config-if-range)#exi t

SW102(config)#

SW110:

SW110(config)#spanning-tree mode rapid-pvst

SW110(config)#spanning-tree portfast edge default

SW110(config)#no interface port-channel 1

SW110(config)#no interface port-channel 2

SW110(config)#interface range g1/0-1

SW110(config-if-range)#switchport trunk encapsulation dot1q

SWll'3(config-if-range)//switchport mod trunk

SW110(config-if-range)#no shutdown

SW110(config-if-range)#channel-group 1 mode active

SW110(config-if-range)#exit

SW110(config)#interface range g1/2-3

SW110(config-if-range)#switchport trunk encapsulation dotlq

SW110(contig-rf-range)#switchport mod trunk

SW110(config-if-range)#no shutdown

SW110(config-if-range)#channel-group 2 mode active

SW110(config-if-range)#exit

SW110(config)#

Verification

Verify:

SW101:

```
SW101#show etherchannel summary
Flags:  D - down        P - bundled in port-channel
        I - stand-alone s - suspended
        H - Hot-standby (LACP only)
        R - Layer3      S - Layer2
        U - in use      N - not in use, no aggregation
        f - failed to allocate aggregator

        M - not in use, minimum links not met
        m - not in use, port not aggregated due to minimum links not met
        u - unsuitable for bundling
        w - waiting to be aggregated
        d - default port

        A - formed by Auto LAG


Number of channe-groups in use: 2
Number of aggregators:          2

Group  Port-channel  Protocol    Ports
------+-------------+-----------+-----------------------------------------------

1      Po1(SU)         LACP      Gi1/2(P)    Gi1/3(P)
3      Po3(SU)         LACP      Gi2/0(P)    Gi2/1(P)

SW101#
SW101#show vlan brief
```

```
SW101#
SW101#show vlan brief

VLAN Name                              Status    Ports
---- --------------------------------- --------- -------------------------------
1    default                           active    Gi0/3, Gi1/0, Gi1/1, Gi2/2
                                                 Gi2/3
1002 fddi-default                      act/unsup
1003 token-ring-default                act/unsup
1004 fddinet-default                   act/unsup
1005 trnet-default                     act/unsup
2000 VLAN2000                          active
2001 VLAN2001                          active
SW101#
```

```
SW101#show interface trunk

Port        Mode         Encapsulation  Status        Native vlan
Po1         on           802.1q         trunking      1
Po3         on           802.1q         trunking      1

Port        Vlans allowed on trunk
Po1         1,2000-2001
Po3         1,2000-2001

Port        Vlans allowed and active in management domain
Po1         1,2000-2001
Po3         1,2000-2001

Port        Vlans in spanning tree forwarding state and not pruned
Po1         1,2000-2001
Po3         1,2000-2001
SW101#
SW101#show spanning-tree vlan 2000

VLAN2000
  Spanning tree enabled protocol rstp
  Root ID     Priority    2000
              Address     5000.0011.0000
              This bridge is the root
              Hello Time  2 sec  Max Age 20 sec  Forward Delay 15 sec

  Bridge ID   Priority    2000  (priority 0 sys-id-ext 2000)
              Address     5000.0011.0000
              Hello Time  2 sec  Max Age 20 sec  Forward Delay 15 sec
              Aging Time  300 sec

Interface        Role Sts Cost      Prio.Nbr Type
---------------- ---- --- --------- -------- --------------------------------
Po1              Desg FWD 3         128.65   P2p
Po3              Desg FWD 3         128.66   P2p
```

```
                Address         5000.0011.0000
                This bridge is the root
                Hello Time      2 sec  Max Age 20 sec  Forward Delay 15 sec

  Bridge ID     Priority        2001   (priority 0 sys-id-ext 2001)
                Address         5000.0011.0000
                Hello Time      2 sec  Max Age 20 sec  Forward Delay 15 sec
                Aging Time      300 sec

Interface        Role Sts Cost      Prio.Nbr Type
---------------- ---- --- --------- -------- --------------------------------
Po1              Desg FWD 3         128.65   P2p
Po3              Desg FWD 3         128.66   P2p


SW101#
SW101#show spanning-tree interface po1 active detail
 Port 65 (Port-channel1) of VLAN0001 is designated forwarding
   Port path cost 3, Port priority 128, Port Identifier 128.65.
   Designated root has priority 32769, address 5000.0011.0000
   Designated bridge has priority 32769, address 5000.0011.0000
   Designated port id is 128.65, designated path cost 0
   Timers: message age 0, forward delay 0, hold 0
   Number of transitions to forwarding state: 1
   Link type is point-to-point by default
   Root guard is enabled on the port
   BPDU: sent 618, received 4

 Port 65 (Port-channel1) of VLAN2000 is designated forwarding
   Port path cost 3, Port priority 128, Port Identifier 128.65.
   Designated root has priority 2000, address 5000.0011.0000
```

```
   Timers: message age 0, forward delay 0, hold 0
   Number of transitions to forwarding state: 1
   Link type is point-to-point by default
   Root guard is enabled on the port
   BPDU: sent 618, received 4
SW101#
SW101#show spanning-tree interface po3 active detail
 Port 66 (Port-channel3) of VLAN0001 is designated forwarding
   Port path cost 3, Port priority 128, Port Identifier 128.66.
   Designated root has priority 32769, address 5000.0011.0000
   Designated bridge has priority 32769, address 5000.0011.0000
   Designated port id is 128.66, designated path cost 0
   Timers: message age 0, forward delay 0, hold 0
   Number of transitions to forwarding state: 1
   Link type is point-to-point by default
   Root guard is enabled on the port
   BPDU: sent 705, received 12

 Port 66 (Port-channel3) of VLAN2000 is designated forwarding
   Port path cost 3, Port priority 128, Port Identifier 128.66.
   Designated root has priority 2000, address 5000.0011.0000
   Designated bridge has priority 2000, address 5000.0011.0000
   Designated port id is 128.66, designated path cost 0
   Timers: message age 0, forward delay 0, hold 0
   Number of transitions to forwarding state: 1
   Link type is point-to-point by default
   Root guard is enabled on the port
   BPDU: sent 705, received 12
```

```
Port 66 (Port-channel3) of VLAN2000 is designated forwarding
  Port path cost 3, Port priority 128, Port Identifier 128.66.
  Designated root has priority 2000, address 5000.0011.0000
  Designated bridge has priority 2000, address 5000.0011.0000
  Designated port id is 128.66, designated path cost 0
  Timers: message age 0, forward delay 0, hold 0
  Number of transitions to forwarding state: 1
  Link type is point-to-point by default
  Root guard is enabled on the port
  BPDU: sent 705, received 12

Port 66 (Port-channel3) of VLAN2001 is designated forwarding
  Port path cost 3, Port priority 128, Port Identifier 128.66.
  Designated root has priority 2001, address 5000.0011.0000
  Designated bridge has priority 2001, address 5000.0011.0000
  Designated port id is 128.66, designated path cost 0
  Timers: message age 0, forward delay 0, hold 0
  Number of transitions to forwarding state: 1
  Link type is point-to-point by default
  Root guard is enabled on the port
  BPDU: sent 705, received 12
```

SW102:

```
SW102#show etherchannel summary
Flags:  D - down        P - bundled in port-channel
        I - stand-alone s - suspended
        H - Hot-standby (LACP only)
        R - Layer3      S - Layer2
        U - in use      N - not in use, no aggregation
        f - failed to allocate aggregator

        M - not in use, minimum links not met
        m - not in use, port not aggregated due to minimum links not met
        u - unsuitable for bundling
        w - waiting to be aggregated
        d - default port

        A - formed by Auto LAG


Number of channel-groups in use: 2
Number of aggregators:           2

Group  Port-channel  Protocol    Ports
------+-------------+-----------+-----------------------------------------------
2      Po2(SU)         LACP      Gi1/2(P)    Gi1/3(P)
3      Po3(SU)         LACP      Gi2/0(P)    Gi2/1(P)

SW102#
SW102#show vlan brief
```

```
Group  Port-channel  Protocol    Ports
------+-------------+-----------+-----------------------------------------------
2      Po2(SU)         LACP      Gi1/2(P)    Gi1/3(P)
3      Po3(SU)         LACP      Gi2/0(P)    Gi2/1(P)

SW102#
SW102#show vlan brief

VLAN Name                             Status    Ports
---- -------------------------------- --------- -------------------------------
1    default                          active    Gi0/3, Gi1/0, Gi1/1, Gi2/2
                                                Gi2/3
1002 fddi-default                     act/unsup
1003 token-ring-default               act/unsup
1004 fddinet-default                  act/unsup
1005 trnet-default                    act/unsup
2000 VLAN2000                         active
2001 VLAN2001                         active
SW102#
```

```
SW102#show interface trunk

Port        Mode         Encapsulation  Status        Native vlan
Po2         on           802.1q         trunking      1
Po3         on           802.1q         trunking      1

Port        Vlans allowed on trunk
Po2         1,2000-2001
Po3         1,2000-2001

Port        Vlans allowed and active in management domain
Po2         1,2000-2001
Po3         1,2000-2001

Port        Vlans in spanning tree forwarding state and not pruned
Po2         1,2000-2001
Po3         1,2000-2001
SW102#
SW102#show spanning-tree vlan 2000

VLAN2000
  Spanning tree enabled protocol rstp
  Root ID     Priority    2000
              Address     5000.0011.0000
              Cost        3
              Port        66 (Port-channel3)
```

```
        Hello Time   2 sec  Max Age 20 sec  Forward Delay 15 sec

Bridge ID  Priority    6096  (priority 4096 sys-id-ext 2000)
           Address     5000.0012.0000
           Hello Time  2 sec  Max Age 20 sec  Forward Delay 15 sec
           Aging Time  300 sec

Interface        Role Sts Cost      Prio.Nbr Type
---------------- ---- --- --------- -------- --------------------------------
Po2              Desg FWD 3         128.65   P2p
Po3              Root FWD 3         128.66   P2p


SW102#
```

```
SW102#show spanning-tree vlan 2001

VLAN2001
  Spanning tree enabled protocol rstp
  Root ID     Priority    2001
              Address     5000.0011.0000
              Cost        3
              Port        66 (Port-channel3)
              Hello Time  2 sec  Max Age 20 sec  Forward Delay 15 sec

  Bridge ID   Priority    6097  (priority 4096 sys-id-ext 2001)
              Address     5000.0012.0000
              Hello Time  2 sec  Max Age 20 sec  Forward Delay 15 sec
              Aging Time  300 sec

Interface        Role Sts Cost      Prio.Nbr Type
```

```
Po2                 Desg FWD 3        128.65   P2p
Po3                 Root FWD 3        128.66   P2p


SW102#
SW102#show spanning-tree interface po2 active detail
 Port 65 (Port-channel2) of VLAN0001 is designated forwarding
    Port path cost 3, Port priority 128, Port Identifier 128.65.
    Designated root has priority 32769, address 5000.0011.0000
    Designated bridge has priority 32769, address 5000.0012.0000
    Designated port id is 128.65, designated path cost 3
    Timers: message age 0, forward delay 0, hold 0
    Number of transitions to forwarding state: 1
    Link type is point-to-point by default
    Root guard is enabled on the port
    BPDU: sent 711, received 4

 Port 65 (Port-channel2) of VLAN2000 is designated forwarding
    Port path cost 3, Port priority 128, Port Identifier 128.65.
    Designated root has priority 2000, address 5000.0011.0000
    Designated bridge has priority 6096, address 5000.0012.0000
    Designated port id is 128.65, designated path cost 3
    Timers: message age 0, forward delay 0, hold 0
    Number of transitions to forwarding state: 1
    Link type is point-to-point by default
    Root guard is enabled on the port
```

SW110:

```
SW110#show etherchannel summary
Flags:   D - down        P - bundled in port-channel
         I - stand-alone s - suspended
         H - Hot-standby (LACP only)
         R - Layer3      S - Layer2
         U - in use      N - not in use, no aggregation
         f - failed to allocate aggregator

         M - not in use, minimum links not met
         m - not in use, port not aggregated due to minimum links not met
         u - unsuitable for bundling
         w - waiting to be aggregated
         d - default port

Number of channel-groups in use: 2
Number of aggregators:           2

Group  Port-channel  Protocol    Ports
------+-------------+-----------+-----------------------------------------------
1      Po1(SU)         LACP      Gi1/0(P)    Gi1/1(P)
2      Po2(SU)         LACP      Gi1/2(P)    Gi1/3(P)

SW110#
```

```
SW110#show vlan brief

VLAN Name                              Status    Ports
---- --------------------------------- --------- -------------------------------
1    default                           active    Gi0/2, Gi0/3
1002 fddi-default                      act/unsup
1003 token-ring-default                act/unsup
1004 fddinet-default                   act/unsup
1005 trnet-default                     act/unsup
2000 VLAN2000                          active    Gi0/0
2001 VLAN2001                          active    Gi0/1
SW110#
SW110#show interface trunk

Port        Mode         Encapsulation  Status        Native vlan
Po1         on           802.1q         trunking      1
Po2         on           802.1q         trunking      1

Port        Vlans allowed on trunk
Po1         1,2000-2001
Po2         1,2000-2001

Port        Vlans allowed and active in management domain
Po1         1,2000-2001
Po2         1,2000-2001

Port        Vlans in spanning tree forwarding state and not pruned
Po1         1,2000-2001
Po2         none
SW110#
SW110#show spanning-tree summary
Switch is in rapid-pvst mode
Root bridge for: none
Extended system ID                     is enabled
Portfast Default                       is edge
Portfast Edge BPDU Guard Default       is disabled
Portfast Edge BPDU Filter Default      is disabled
Loopguard Default                      is disabled
PVST Simulation Default                is enabled but inactive in rapid-pvst mode
Bridge Assurance                       is enabled
EtherChannel misconfig guard           is enabled
Configured Pathcost method used is short
UplinkFast                             is disabled
```

```
BackboneFast                    is disabled

Name                 Blocking Listening Learning Forwarding STP Active
-------------------- -------- --------- -------- ---------- ----------
VLAN0001                    1         0        0          3          4
VLAN2000                    1         0        0          2          3
VLAN2001                    1         0        0          2          3
-------------------- -------- --------- -------- ---------- ----------
3 vlans                     3         0        0          7         10
SW110#
SW110#show spanning-tree vlan 2000

VLAN2000
  Spanning tree enabled protocol rstp
  Root ID     Priority    2000
              Address     5000.0011.0000
              Cost        3
              Port        65 (Port-channel1)
              Hello Time  2 sec  Max Age 20 sec  Forward Delay 15 sec

  Bridge ID   Priority    34768  (priority 32768 sys-id-ext 2000)
              Address     5000.0013.0000
              Hello Time  2 sec  Max Age 20 sec  Forward Delay 15 sec
              Aging Time  300 sec

              Hello Time  2 sec  Max Age 20 sec  Forward Delay 15 sec
              Aging Time  300 sec

Interface        Role Sts Cost      Prio.Nbr Type
---------------- ---- --- --------- -------- --------------------------------
Gi0/0            Desg FWD 4         128.1    P2p Edge
Po1              Root FWD 3         128.65   P2p
Po2              Altn BLK 3         128.66   P2p


SW110#
SW110#show spanning-tree vlan 2001

VLAN2001
  Spanning tree enabled protocol rstp
  Root ID     Priority    2001
              Address     5000.0011.0000
              Cost        3
              Port        65 (Port-channel1)
              Hello Time  2 sec  Max Age 20 sec  Forward Delay 15 sec

  Bridge ID   Priority    34769  (priority 32768 sys-id-ext 2001)
```

```
                Address         5000.0013.0000
                Hello Time      2 sec  Max Age 20 sec  Forward Delay 15 sec
                Aging Time      300 sec

Interface           Role  Sts Cost      Prio.Nbr Type
------------------- ---- --- --------- -------- --------------------------------
Gi0/1               Desg  FWD 4         128.2    P2p Edge
Po1                 Root  FWD 3         128.65   P2p
Po2                 Altn  BLK 3         128.66   P2p


SW110#
```

1.4: Configure Network Services

Ensure that network services are configured at Headquarters accordingly to the following table.

VLAN	Subnet	Default Gateway	DHCP Server
2000	10.1.100.0/24	10.1.100.1	10.2.255.211
2001	10.1.101.0/24	10.1.101.1	10.2.255.211

Ensure that first-hop gateways for these VLANs are configured according to the following requirements:

- **Use a protocol that sends Hello messages by using a multicast address of 224.0.0.102 and supports up to 4,096 groups.**
- **Group numbers for each VLAN must match the respective VLAN ID.**
- **SW101 must be active and have a priority of 10 above the default.**
- **SW102 must be standby and have the default priority.Both first-hop gateway switches must transition to active if their priority becomes superior.**
- **Both first-hop gateway switches must generate ARPs for the VLAN by using the MAC address of their respective interfaces.**
- **DHCP requests must pass through two first-hop switches**

Solution

Solution: The new version does not require any changes to the solution.

SW101：

SW101(config)#ip dhcp relay information trust-all

SW101(config -if)#ip dhcp relay information option

SW101(config-if)#interface vlan 2000

SW101(config-if)#standby version 2

SW101(config-if)#standby use-bia

SW101(config-if)#standby 2000 ip 10.1.100.1

SW101(config-if)#standby 2000 priority 110

SW101(config-if)#standby 2000 preempt

SW101(config-if)#ip helper-address 10.2255.211

SW101(config-if)#no shutdown

SW101(config-if)#exit

SW101(config)#interface vlan 2001

SW101(config-if)#standby version 2

SW101(config-if)#standby use-bia

SW101(config-if)#standby 2001 ip 10.1.101.1

SW101(config-if)#standby 2001 priority 110

SW101(config-if)#interface vlan 2000

SW101(config-if)#standby version 2

SW101(config-if)#standby use-bia

SW101(config-if)#standby 2000 ip 10.1.100.1

SW101(config-if)#standby 2000 priority 110

SW101(config-if)# standby 2000 preempt

SW101(config-if)#ip helper-address 10.2255.211

SW101(config-if)#no shutdown

SW101(config-if)#exit

SW101(config)#interface vlan 2001

SW101(config-if)#standby version 2