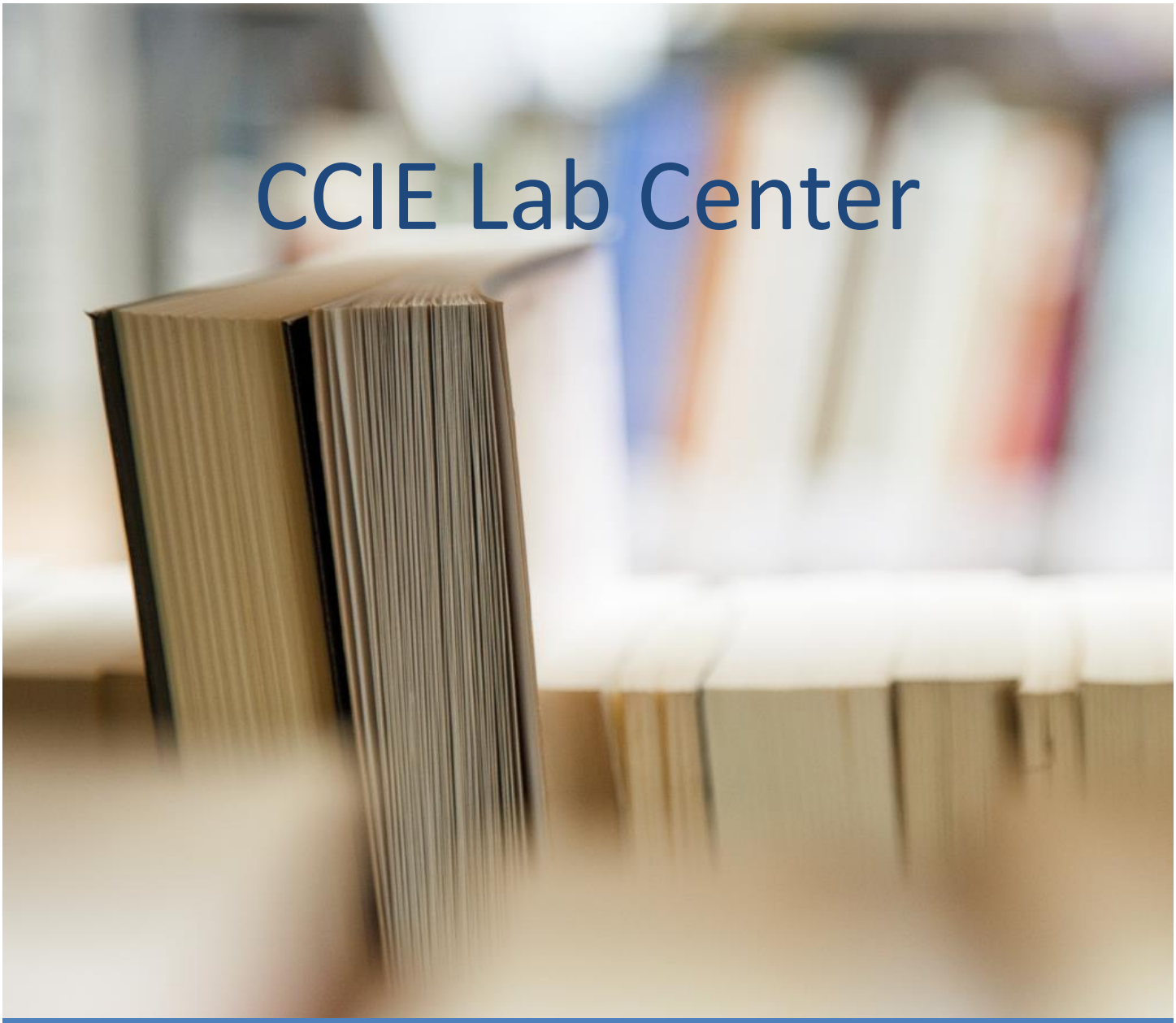
CCIE Lab Center

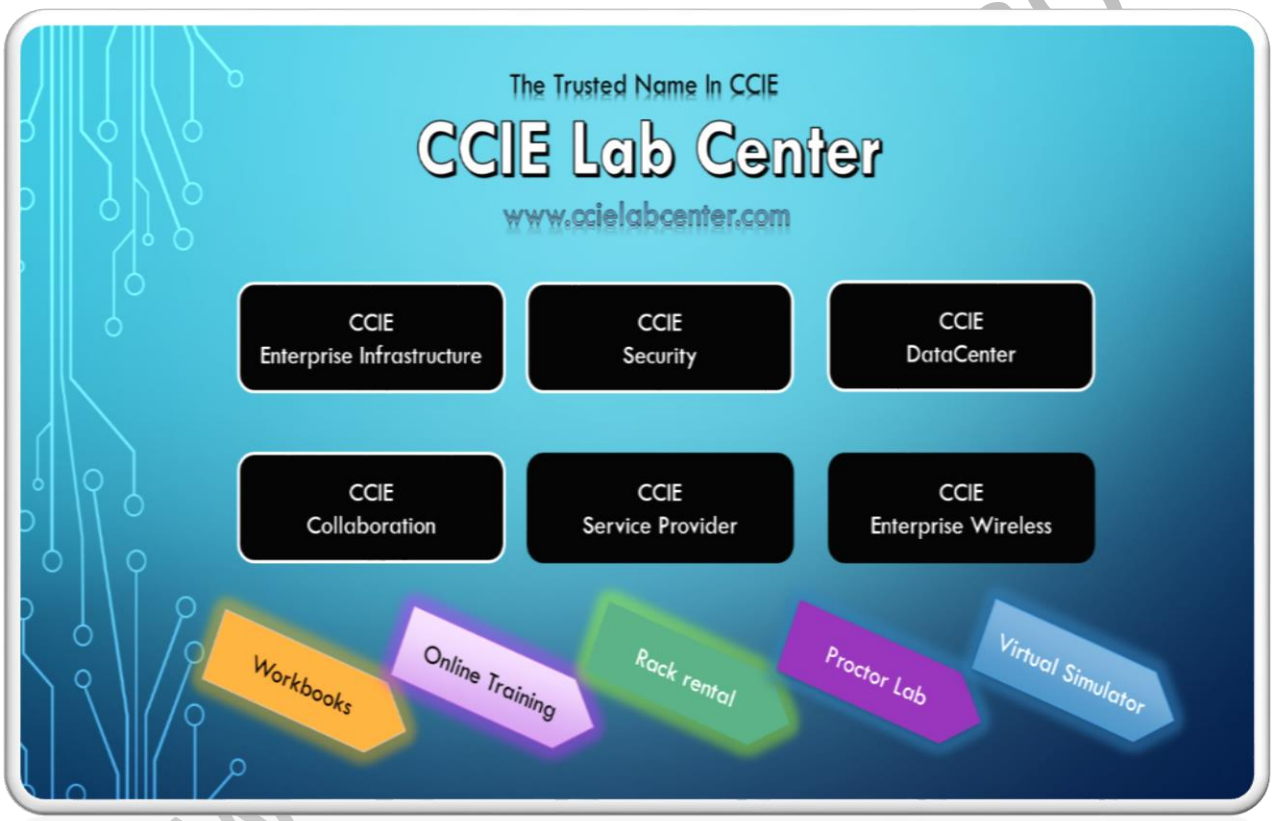


CLC - CCIE Enterprise Infrastructure v1.0: Real Lab v1.0 Demo 2

CLC

CCIE Lab Center

CLC
CCIE Enterprise Infrastructure Real Lab v1.0 Demo 2



www.ccielabcenter.com

CCIE Lab Center

Workbook Description

Author: CCIE Lab Center (CLC)
Focus: Identical
Level: Expert (CCIE)
Stream: CCIE Enterprise Infrastructure
Lab Version: Lab 1.0_Section 1 + 2 Demo Version
Content: Topology, Question, Solution, Verification, Initial Configuration
Format: PDF
Protection: Password

www.ccielabcenter.com

CCIE Lab Center

Table of Contents

0. Lab Details
    - Lab Topology
    - Device Initial Configuration
1. Section 1: Existing Network Review & Tuning
    - 1.1 Introduction
    - 1.2 Layer 2 Technologies in HQ
    - 1.3 First Hop Redundancy Protocol in HQ
    - 1.4 OSPFv2 Between HQ & DC
    - 1.5 DHCP IPv4 Services for HQ
    - 1.6 IPv6 in HQ
    - 1.7 IPv6 EIGRP in HQ
    - 1.8 OSPFv2 in DC
    - 1.9 BGP Between HQ & DC and Service Providers
    - 1.10 Bringing Up VPNv4/VPNv6 in SP1
    - 1.11 Fixing DMVPN Network Between DC and Branches 3 & 4
    - 1.12 Tuning EIGRP on DMVPN and DMVPN Enabled Sites
    - 1.13 IPv4 Networks on Legacy Branches
    - 1.14 Multicast in FADB2
    - 1.15 Extending Connectivity to IAAS
    - 1.16 Enabling Internet access to FADB2
2. Section 2: Implementing Proof of Concept SDX Branches
    - 2.1 Correcting the IP Adresses of Managed Switches in DNA Center
    - 2.2 Completing VN Configuration in DNA Center
    - 2.3 Mapping SDA VNs to SD-WAN VPNs
    - 2.4 Configuring SD-WAN VPN Route Leaking
    - 2.5 Handling Guest Traffic
    - 2.6 Support for Silent Hosts in Branch #2
3. Section 3: Making use of Programmability
    - 3.1 Enabling CLI Access to R30
    - 3.2 Using Guest Shell and Python on r30
    - 3.3 Automated Configuration Backup Script
    - 3.6 The End

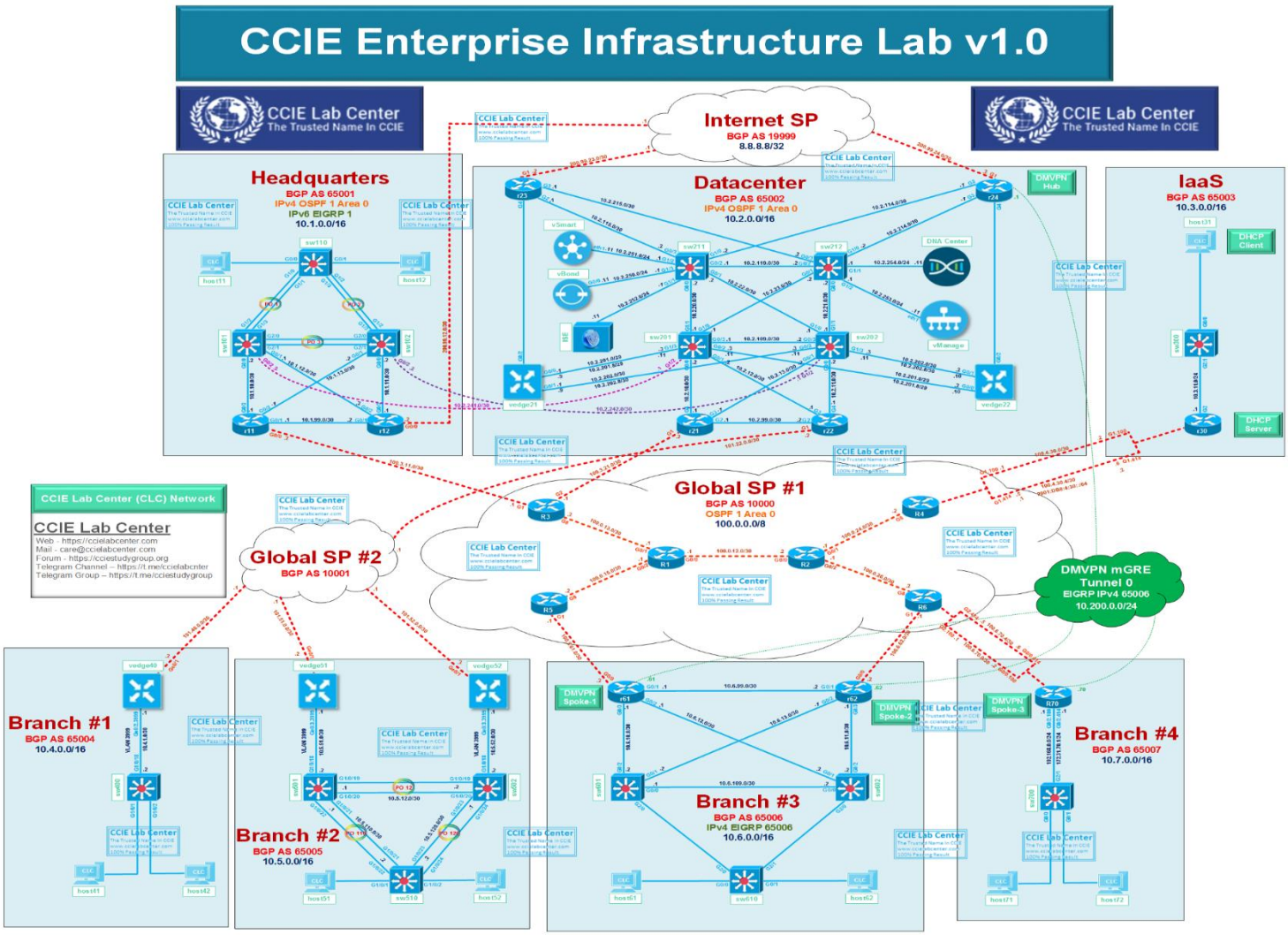
www.ccielabcenter.com

CCIE Lab Center

SECTION 0: Lab Details

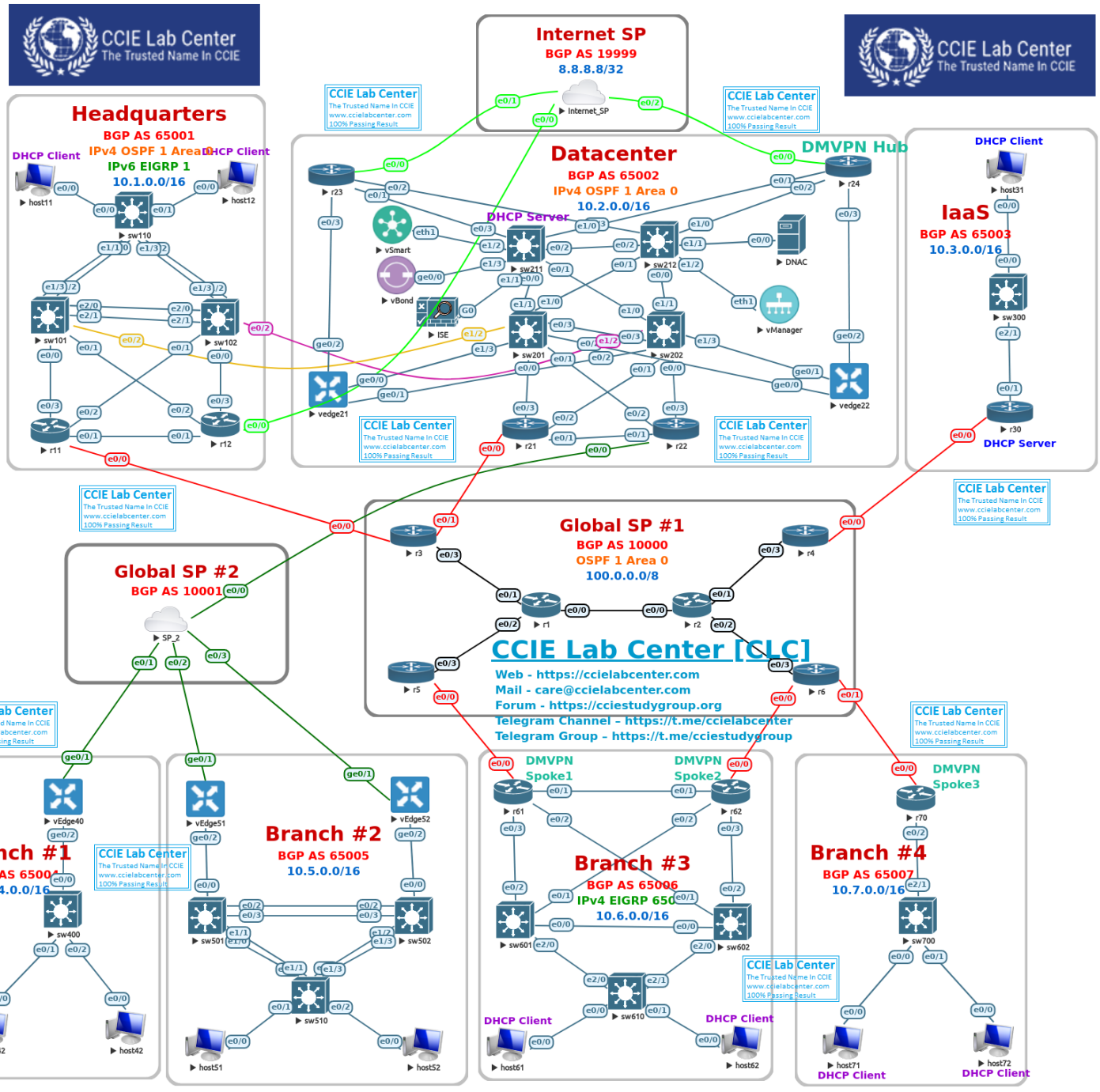
SECTION 0.1: Lab Topoloy

CLC CCIE Enterprise Infrastructure Real Lab 1.0: Diagram 1.1# Main Topology



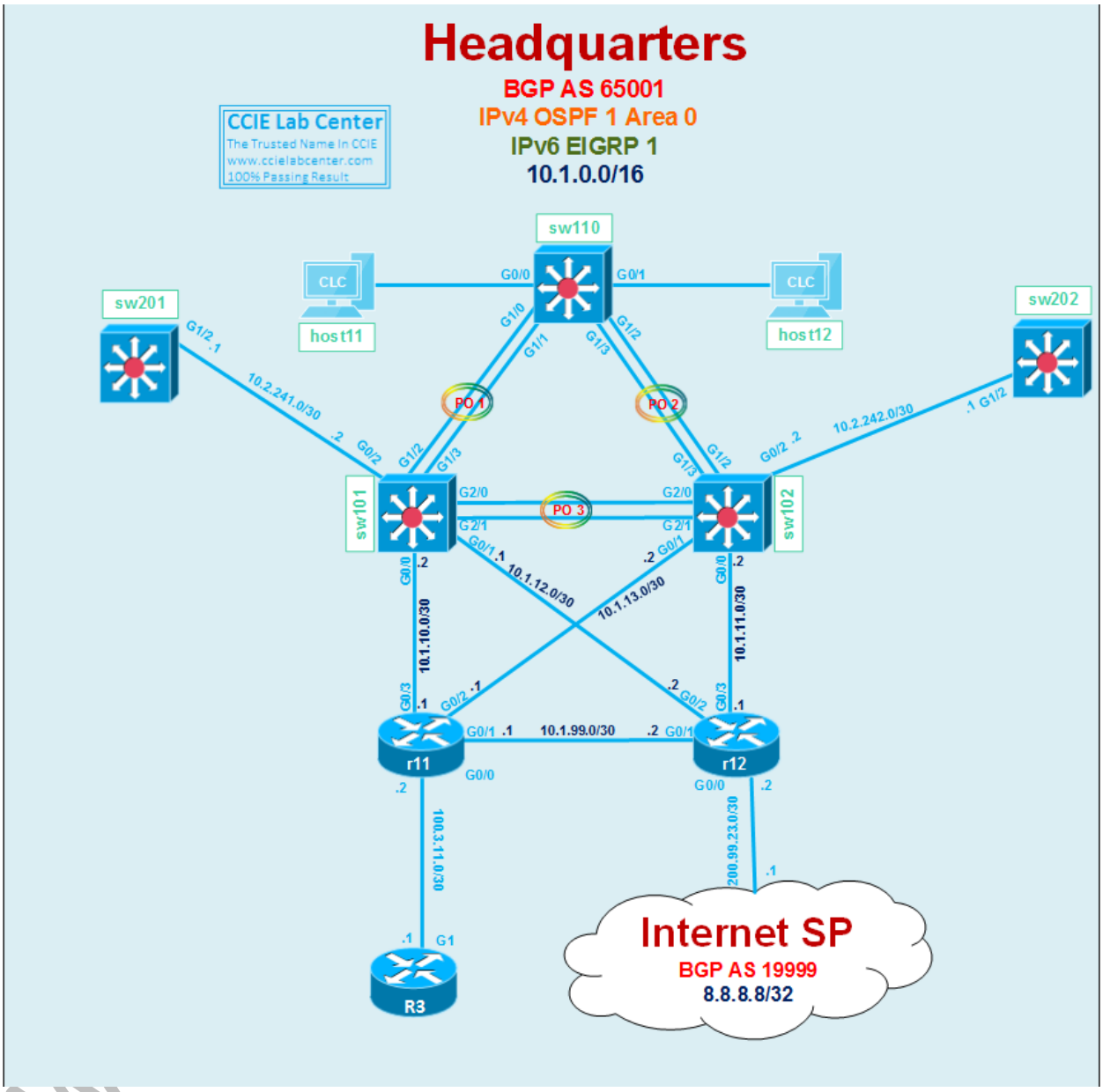
CCIE Lab Center

CLC CCIE Enterprise Infrastructure Real Lab 1.0: Diagram 1.2# Eve-ng Topology

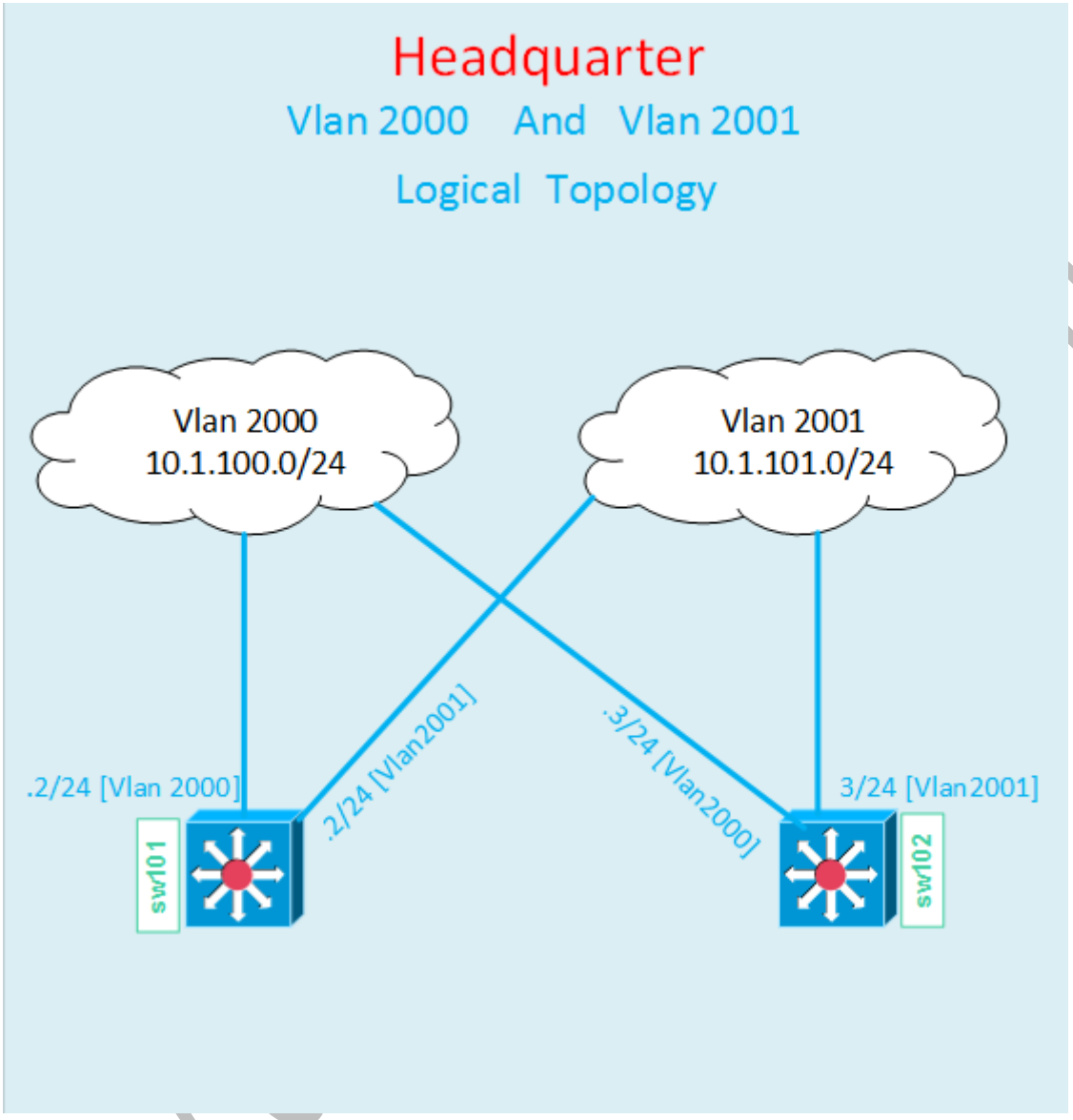


CCIE Lab Center

CLC CCIE Enterprise Infrastructure Real Lab 1.0: Diagram 2# HQ Topology

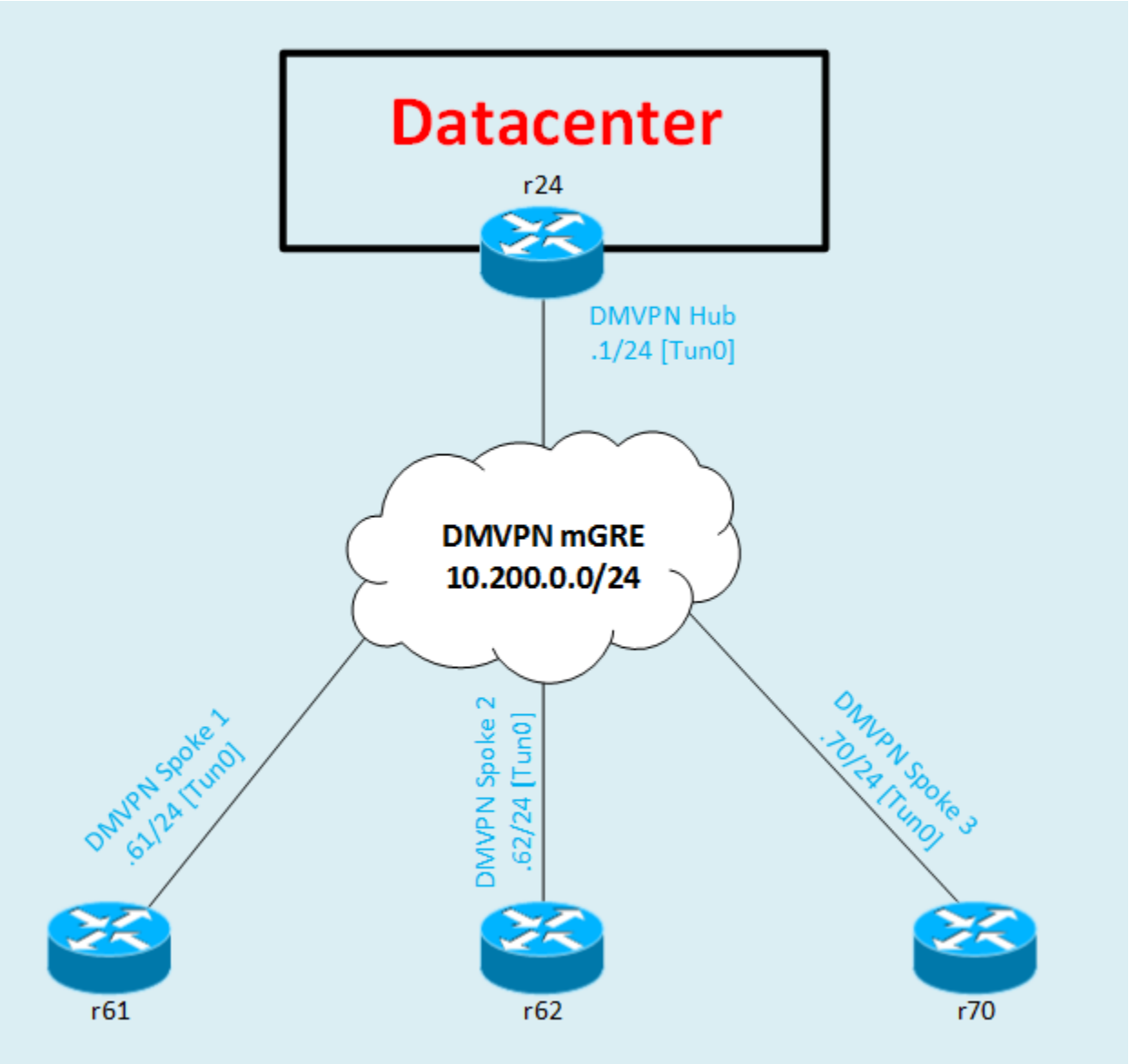


CCIE Lab Center



CCIE Lab Center

CLC CCIE Enterprise Infrastructure Real Lab 1.0: Diagram 11# DMVPN Topology



CCIE Lab Center

SECTION 0.2: Device Initial Configuration

r1

```
hostname r1

no ip domain lookup
ip cef
ipv6 unicast-routing
ipv6 cef

interface Loopback0
 ip address 100.255.254.1 255.255.255.255
 ipv6 address FE80::1 link-local
 ospfv3 1 ipv4 area 0

interface ethernet0/0
 ip address 100.0.12.1 255.255.255.252
 duplex auto
 speed auto
 media-type rj45
 ipv6 address FE80::1 link-local
 mpls ip
 ospfv3 1 ipv4 area 0

interface ethernet0/1
 ip address 100.0.13.1 255.255.255.252
 duplex auto
 speed auto
 media-type rj45
 ipv6 address FE80::1 link-local
 mpls ip
 ospfv3 1 ipv4 area 0

interface ethernet0/2
 ip address 100.0.15.1 255.255.255.252
 duplex auto
 speed auto
 media-type rj45
 ipv6 address FE80::1 link-local
 mpls ip
 ospfv3 1 ipv4 area 0

router ospfv3 1
address-family ipv4 unicast
```

www.ccielabcenter.com

CCIE Lab Center

```
exit-address-family

line con 0
 exec-timeout 0 0
 privilege level 15
 logging synchronous
line vty 0 15
 privilege level 15
 no login
 transport input all
end
```

r11

```
hostname r11

no ip domain lookup
ip cef
ipv6 unicast-routing
ipv6 cef

interface Loopback0
 ip address 10.1.255.11 255.255.255.255
 ip ospf 1 area 0
 ipv6 address 2001:DB8:1:255::11/128
 ipv6 enable

interface ethernet0/0
 ip address 100.3.11.2 255.255.255.252
 ipv6 address FE80::11 link-local

interface ethernet0/1
 ip address 10.1.99.1 255.255.255.252
 ip ospf 1 area 0
 ipv6 address FE80::11 link-local

interface ethernet0/2
 ip address 10.1.13.1 255.255.255.252
 ip ospf 1 area 0
```

www.ccielabcenter.com

CCIE Lab Center

```
 ipv6 address FE80::11 link-local

interface ethernet0/3
 ip address 10.1.10.1 255.255.255.252
 ip ospf 1 area 0
 ipv6 address FE80::11 link-local

router ospf 1

router bgp 65001
 bgp log-neighbor-changes
 no bgp default ipv4-unicast

line con 0
 exec-timeout 0 0
 privilege level 15
 logging synchronous
line vty 0 15
 privilege level 15
 no login
 transport input all
end
```

r62

```
hostname r62

vrf definition WAN
 rd 65006:62

 address-family ipv4
 exit-address-family


router bgp 65006
 network 10.6.255. mask 255.255.255.255

 address-family ipv4 vrf WAN
 exit-address-family
```

www.ccielabcenter.com

CCIE Lab Center

vedge51

```
system
 host-name        vedge51
 system-ip        1.1.6.
```

www.ccielabcenter.com

CCIE Lab Center

Section 1: Existing Network Review & Tuning

SECTION 1.1: Introduction

www.ccielabcenter.com

CCIE Lab Center

SECTION 1.2: Layer 2 Technologies in HQ

QUESTION

Complete and correct the EtherChannel configuration between switches sw101, sw102, sw110 according to these requirements:

1. At the end of task, all EtherChannels between switches sw101, sw102, sw110 must be up and operational including all their physical member links.
2. Do not create new Port-Channel interfaces, reuse those that already exist on the switches.
3. When resolving existing issues, do not change the preconfigured negotiation protocol (if any).
4. On EtherChannels that use a negotiation protocol, tune its mode of operation for the shortest link bundling time possible.

Configure Spanning Tree Protocol on switches sw101, sw102, sw110 according to these requirements:

1. The STP root for VLAN 2000 must be sw101
2. The STP root for VLAN 2001 must be sw102
3. The roots must be elected based on bridge priority
4. On the three switches, have STP perform cost calculations in 32-bit arithmetic
5. On the three switches, use the Rapid STP version and ensure that it can achieve rapid convergence on all interconnections between the switches.
6. On sw110, prevent all current and future access mode interface from being affected by the Proposal/Agreement process.

Solution

On sw101

```
sw101(config)# interface range gigabitEthernet 1/2-3
sw101(config-if-range)#Channel-group 1 mode on
sw101(config-if-range)#exit
sw101(config)#

sw101(config)#interface port-channel 3
sw101(config-if)#lacp fast-switchover
sw101(config-if)#exit
sw101(config)#

sw101(config)#spanning-tree mode rapid-pvst
sw101(config)#spanning-tree vlan 2000 priority 0
```

www.ccielabcenter.com

CCIE Lab Center

```
sw101(config)#spanning-tree pathcost method long
```

On sw102

```
sw102(config)#interface range gigabitEthernet 1/2-3
sw102(config-if-range)#channel-group 2 mode active
sw102(config-if-range)#exit
sw102(config)#

sw102(config)#interface port-channel 2
sw102(config-if)#lacp fast-switchover
sw102(config-if)#exit
sw102(config)#

sw102(config)#interface port-channel 3
sw102(config-if)#lacp fast-switchover
sw102(config-if)#exit
sw102(config)#

sw102(config)#Spanning-tree mode rapid-pvst
sw102(config)#spanning-tree vlan 2001 priority 0
sw102(config)#spanning-tree pathcost method long
```

On sw110

```
sw110(config)#interface port-channel 2
sw110(config-if)#lacp fast-switchover
sw110(config-if)#exit
sw110(config)#

sw110(config)#spanning-tree mode rapid-pvst
sw110(config)#spanning-tree portfast edge default
sw110(config)#spanning-tree pathcost method long
sw110(config)#
```

Verification

www.ccielabcenter.com

CCIE Lab Center

On sw101

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

Group  Port-channel  Protocol    Ports
------+-------------+-----------+-----------------------------------------------
1      Po1(SU)           -        Gi1/2(P)    Gi1/3(P)
3      Po3(SU)         LACP       Gi2/0(P)    Gi2/1(P)

sw101#
```

sw101

```
sw101#show spanning-tree summary
Switch is in rapid-pvst mode
Root bridge for: VLAN2000
Extended system ID                        is enabled
Portfast Default                          is disabled
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 long
UplinkFast                                is disabled
BackboneFast                              is disabled

Name                   Blocking Listening Learning Forwarding STP Active
---------------------- -------- --------- -------- ---------- ----------
VLAN0001                     1         0        0          6          7
VLAN2000                     0         0        0          2          2
VLAN2001                     1         0        0          1          2
---------------------- -------- --------- -------- ---------- ----------
3 vlans                      2         0        0          9         11
sw101#
```

CCIE Lab Center

On sw102

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#
```

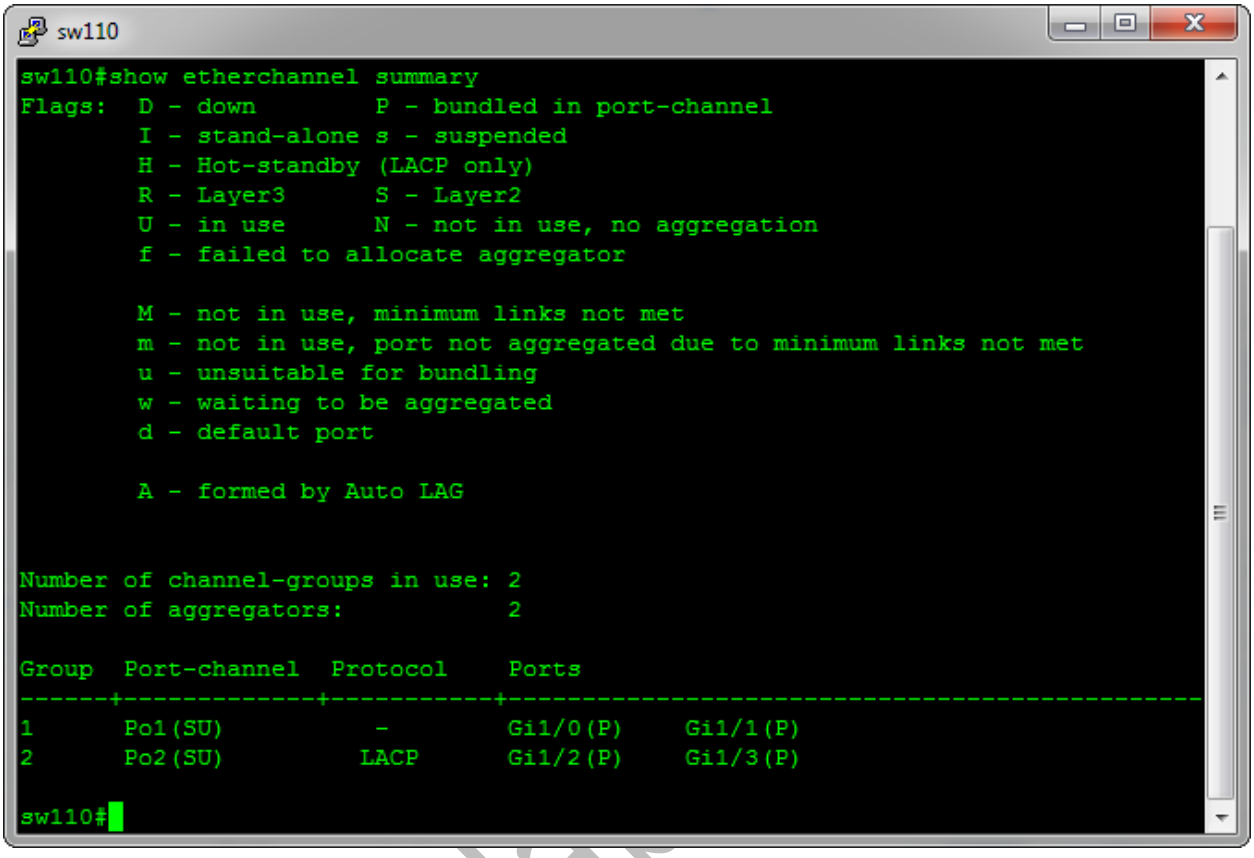
sw102

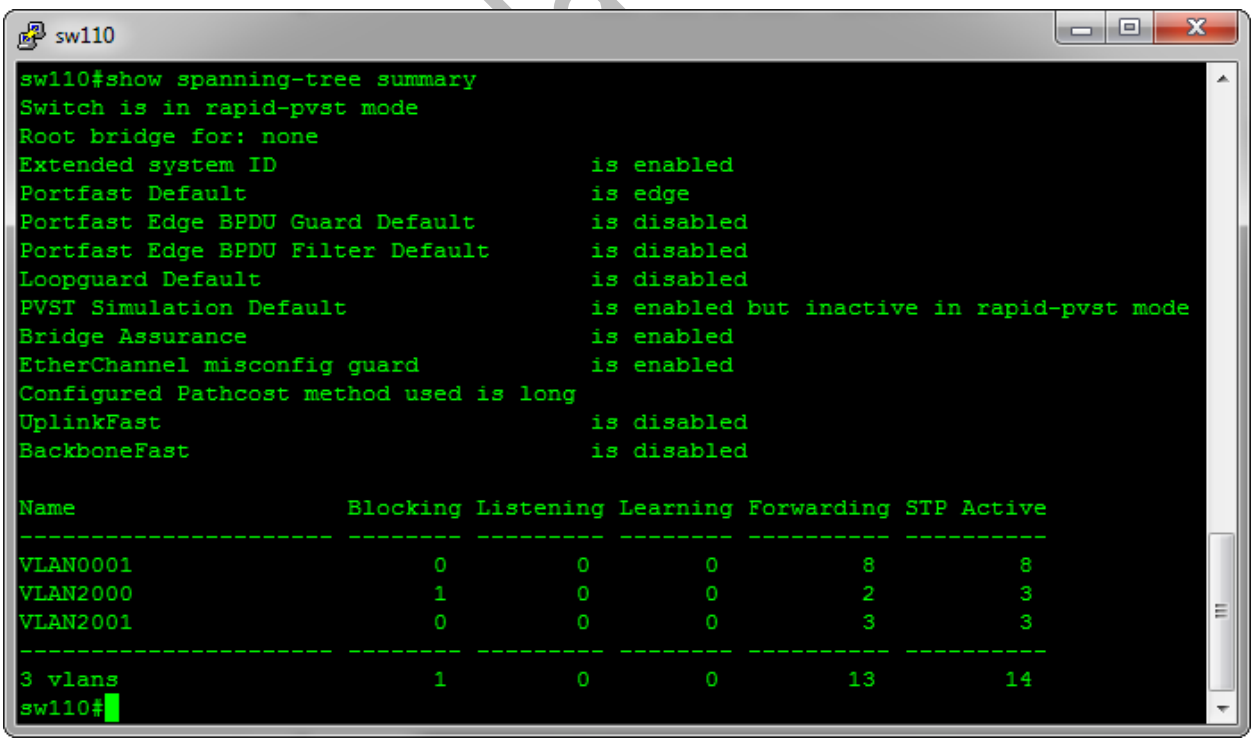
```
sw102#show spanning-tree summary
Switch is in rapid-pvst mode
Root bridge for: VLAN0001, VLAN2001
Extended system ID                        is enabled
Portfast Default                          is disabled
Portfast Edge BPDU Guard Default          is disabled
Portfast Edge BPDU Filter Default         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 long
UplinkFast                                is disabled
BackboneFast                              is disabled

Name                   Blocking Listening Learning Forwarding STP Active
---------------------- -------- --------- -------- ---------- ----------
VLAN0001                     0         0        0          7          7
VLAN2000                     0         0        0          2          2
VLAN2001                     0         0        0          2          2
---------------------- -------- --------- -------- ---------- ----------
3 vlans                      0         0        0         11         11
sw102#
```

CCIE Lab Center

On sw110





CCIE Lab Center

SECTION 1.3: First Hop Redundancy Protocol in HQ

QUESTION

For IPv4, implement an FHRP mechanism on sw101 and sw102 for VLANs 2000 and 2001 according to these requirements:

1. Use group number 100 for VLAN 2000 and group number 101 for VLAN 2001.
2. Use the first available IPv4 address in the subnet for the address of the virtual router.
3. For VLAN 2000 - SW101 must be the preferred gateway & for VLAN 2001 - SW102 must be the preferred gateway. Do not rely on the IPv4 addresses of the switches as role tiebreakers. The role must be determined by an explicit configuration solely on the intended preferred gateway.
4. Each preferred gateway must monitor the reachability of both routers r11 and r12 using the loopback IPv4 address of the routers by an ICMP Echo. The reachability is to be verified every 5 seconds with a timeout of 400 msec. A router must be declared unreachable as soon as it does not respond to three probes in a row. If both r11 and r12 are declared unreachable from a preferred gateway, the other switch must be allowed to assume the gateway role.
5. Use the FHRP protocol that allows the virtual IPv4 address to match the IPv4 address of a member router.

Solution

On sw101

```
sw101(config)#ip sla 1
sw101(config-ip-sla)#icmp-echo 10.1.255.11 source-interface Vlan2000
sw101(config-ip-sla-echo)#threshold 400
sw101(config-ip-sla-echo)#timeout 400
sw101(config-ip-sla-echo)#frequency 5
sw101(config-ip-sla-echo)#exit
sw101(config)#

sw101(config)#ip sla schedule 1 start-time now life forever

sw101(config)#ip sla 2
sw101(config-ip-sla)#icmp-echo 10.1.255.12 source-interface Vlan2000
sw101(config-ip-sla-echo)#threshold 400
sw101(config-ip-sla-echo)#timeout 400
sw101(config-ip-sla-echo)#frequency 5
sw101(config-ip-sla-echo)#exit
sw101(config)#
```

www.ccielabcenter.com

CCIE Lab Center

```
sw101(config)#ip sla schedule 2 start-time now  life forever

sw101(config)#track 1 ip sla 1 reachability
sw101(config-track)#delay down 10 up 10
sw101(config-track)#exit
sw101(config)#

sw101(config-track)#track 2 ip sla 2 reachability
sw101(config-track)#delay down 10 up 10
sw101(config-track)#exit
sw101(config)#

sw101(config)#interface Vlan2000
sw101(config-if)# ip address 10.1.100.2 255.255.255.0
sw101(config-if)# vrrp 100 ip 10.1.100.1
sw101(config-if)# vrrp 100 priority 120
sw101(config-if)# vrrp 100 track 1 decrement 11
sw101(config-if)# vrrp 100 track 2 decrement 11
sw101(config-if)#exit
sw101(config)#

sw101(config)#interface Vlan2001
sw101(config-if)# ip address 10.1.101.2 255.255.255.0
sw101(config-if)# vrrp 101 ip 10.1.101.1
sw101(config-if)#exit
sw101(config)#
```

On sw102

```
sw102(config)#ip sla 1
sw102(config-ip-sla)#icmp-echo 10.1.255.11 source-interface Vlan2001
sw102(config-ip-sla-echo)#threshold 400
sw102(config-ip-sla-echo)#timeout 400
sw102(config-ip-sla-echo)#frequency 5
sw102(config-ip-sla-echo)#exit
sw102(config)#

sw102(config)#ip sla schedule 1 start-time now life forever

sw102(config)#ip sla 2
sw102(config-ip-sla)#icmp-echo 10.1.255.12 source-interface Vlan2001
sw102(config-ip-sla-echo)#threshold 400
sw102(config-ip-sla-echo)#timeout 400
sw102(config-ip-sla-echo)#frequency 5
sw102(config-ip-sla-echo)#exit
```

www.ccielabcenter.com

CCIE Lab Center

```
sw102(config)#

sw102(config)#ip sla schedule 2 start-time now  life forever

sw102(config)#track 1 ip sla 1 reachability
sw102(config-track)#delay down 10 up 10
sw102(config-track)#exit
sw102(config)#

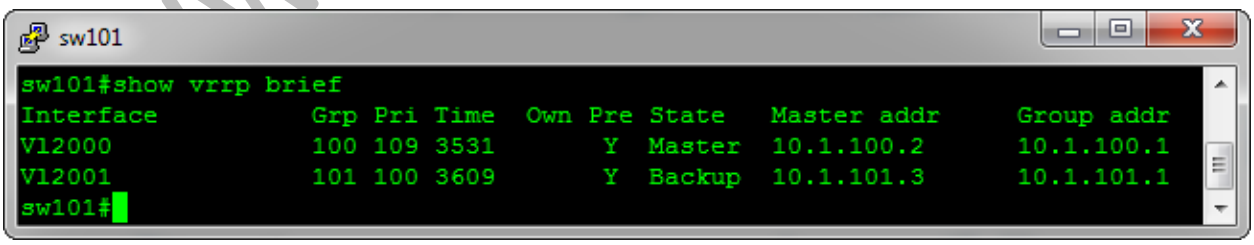
sw102(config-track)#track 2 ip sla 2 reachability
sw102(config-track)#delay down 10 up 10
sw102(config-track)#exit
sw102(config)#

sw102(config)#interface Vlan2000
sw102(config-if)#ip address 10.1.100.3 255.255.255.0
sw102(config-if)#vrrp 100 ip 10.1.100.1
sw102(config-if)#exit
sw102(config)#

sw102(config)#interface Vlan2001
sw102(config-if)#ip address 10.1.101.3 255.255.255.0
sw102(config-if)#vrrp 101 ip 10.1.101.1
sw102(config-if)#vrrp 101 priority 120
sw102(config-if)#vrrp 101 track 1 decrement 11
sw102(config-if)#vrrp 101 track 2 decrement 11
sw102(config-if)#exit
sw102(config)#
```

Verification

On sw101



www.ccielabcenter.com

CCIE Lab Center

sw101

```
sw101#show track
Track 1
  IP SLA 1 reachability
  Reachability is Up
    2 changes, last change 11:18:30
  Latest operation return code: OK
  Latest RTT (millisecs) 15
  Tracked by:
    VRRP Vlan2000 100
Track 2
  IP SLA 2 reachability
  Reachability is Up
    4 changes, last change 08:53:42
  Latest operation return code: OK
  Latest RTT (millisecs) 5
  Tracked by:
    VRRP Vlan2000 100
sw101#
```

sw101

```
sw101#show ip sla statistics
IPSLAs Latest Operation Statistics

IPSLA operation id: 1
        Latest RTT: 9 milliseconds
Latest operation start time: 22:51:51 UTC Sun Feb 21 2021
Latest operation return code: OK
Number of successes: 366
Number of failures: 0
Operation time to live: Forever



IPSLA operation id: 2
        Latest RTT: 4 milliseconds
Latest operation start time: 22:51:54 UTC Sun Feb 21 2021
Latest operation return code: OK
Number of successes: 143
Number of failures: 0
Operation time to live: Forever


sw101#
```

CCIE Lab Center

sw101

```
sw101#show track 1
Track 1
  IP SLA 1 reachability
  Reachability is Up
    2 changes, last change 00:09:03
  Delay up 10 secs, down 10 secs
  Latest operation return code: OK
  Latest RTT (millisecs) 8
  Tracked by:
    VRRP Vlan2000 100
sw101#
sw101#show track 2
Track 2
  IP SLA 2 reachability
  Reachability is Up
    2 changes, last change 00:09:52
  Delay up 10 secs, down 10 secs
  Latest operation return code: OK
  Latest RTT (millisecs) 6
  Tracked by:
    VRRP Vlan2000 100
sw101#
```

On SW102

sw102

```
sw102# show vrrp brief
Interface          Grp Pri Time  Own Pre State   Master addr     Group addr
Vl2000             100 100 3609      Y  Backup  10.1.100.2      10.1.100.1
Vl2001             101 109 3531      Y  Master  10.1.101.3      10.1.101.1
sw102#
```

www.ccielabcenter.com

CCIE Lab Center

sw102

```
sw102#show track
Track 1
  IP SLA 1 reachability
  Reachability is Up
    2 changes, last change 11:25:44
  Latest operation return code: OK
  Latest RTT (millisecs) 6
  Tracked by:
    VRRP Vlan2001 101
Track 2
  IP SLA 2 reachability
  Reachability is Up
    4 changes, last change 08:59:32
  Latest operation return code: OK
  Latest RTT (millisecs) 1
  Tracked by:
    VRRP Vlan2001 101
sw102#
```

sw102

```
sw102#show ip sla statistics
IPSLAs Latest Operation Statistics

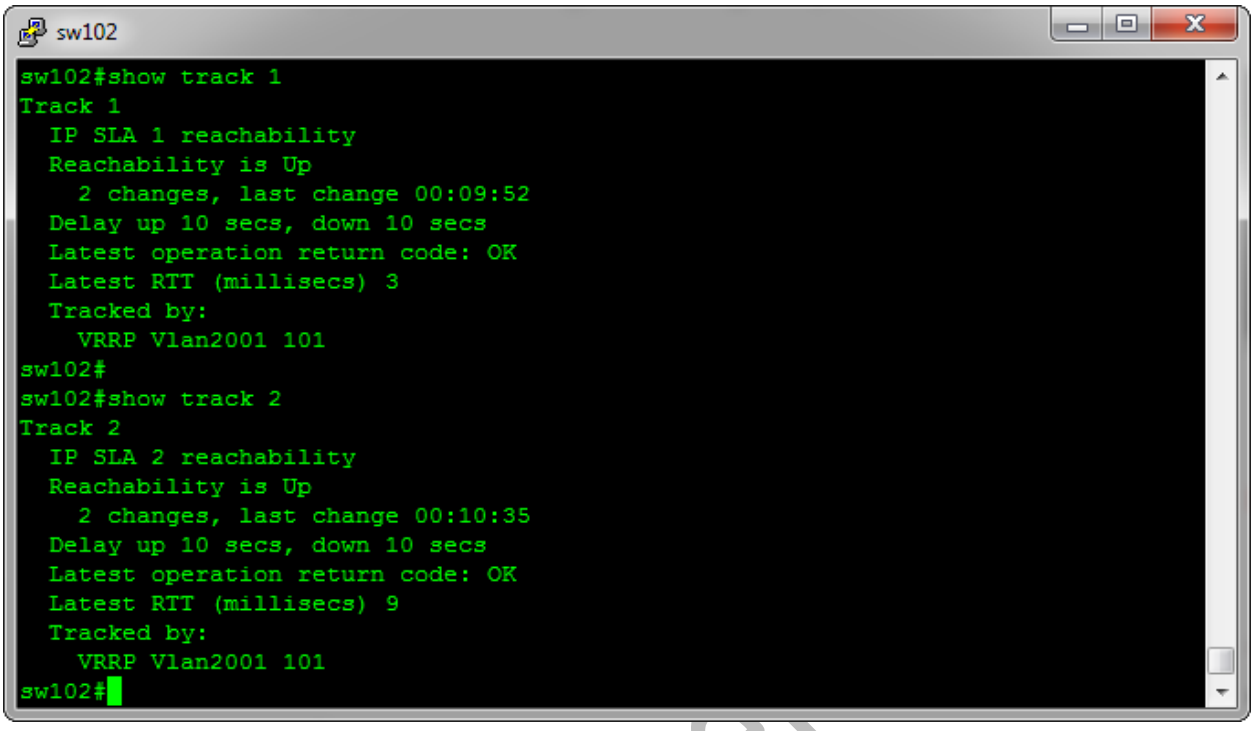
IPSLA operation id: 1
        Latest RTT: 6 milliseconds
Latest operation start time: 22:59:27 UTC Sun Feb 21 2021
Latest operation return code: OK
Number of successes: 455
Number of failures: 0
Operation time to live: Forever



IPSLA operation id: 2
        Latest RTT: 4 milliseconds
Latest operation start time: 22:59:27 UTC Sun Feb 21 2021
Latest operation return code: OK
Number of successes: 455
Number of failures: 0
Operation time to live: Forever


sw102#
```

CCIE Lab Center



You will get the exact above outputs after completing section 1.4

www.ccielabcenter

CCIE Lab Center

SECTION 1.4: OSPFv2 between HQ and DC

QUESTION

Complete and correct the OSPF configuration on the switches sw101, sw102, sw201 and sw202 according to these requirements:

1. Enable OSPFv2 on the redundant interconnections between the DC and HQ sites. Make sure that OSPF establishes adjacencies on these interconnections and exchange routing information between the DC and HQ sites
2. Protect the authencity and integrity of the OSPFv2 sessions on the redundant interconnections between DC and HQ with the SHA-384 mechanism. Use key ID 1 and a shared secret of “cci3” (without quotes)
3. Improve the detection of unreachable OSPFv2 neighbors on the redundant interconnections between DC and HQ so that OSPF can detect the loss of a neighbor within 300 msec, with the probes being sent every 100 msec. It is not allowed to modify OSPF timers to accomplish this requirements.

Solution

On sw101

```
sw101(config)#key chain ccie
sw101(config-keychain)#key 1
sw101(config-keychain-key)#key-string cci3
sw101(config-keychain-key)#cryptographic-algorithm hmac-sha-384
sw101(config-keychain-key)#exit
sw101(config-keychain)#exit
sw101(config)#

sw101(config)#interface gigabitEthernet 0/2
sw101(config-if)#ip ospf authentication key-chain ccie
sw101(config-if)#ip ospf bfd
sw101(config-if)#bfd interval 100 min_rx 100 multiplier 3
sw101(config-if)#exit
sw101(config)#

sw101(config)#router ospf 1
sw101(config-router)#network 10.1.0.0 0.0.255.255 area 0
sw101(config-router)#exit
sw101(config)#
```

www.ccielabcenter.com

CCIE Lab Center

On sw102

```
sw102(config)#key chain ccie
sw102(config-keychain)#key 1
sw102(config-keychain-key)#key-string cci3
sw102(config-keychain-key)#cryptographic-algorithm hmac-sha-384
sw102(config-keychain-key)#exit
sw102(config-keychain)#exit
sw102(config)#

sw102(config)#interface gigabitEthernet 0/2
sw102(config-if)#ip ospf authentication key-chain ccie
sw102(config-if)#ip ospf bfd
sw102(config-if)#bfd interval 100 min_rx 100 multiplier 3
sw102(config-if)#exit
sw102(config)#

sw102(config)#router ospf 1
sw102(config-router)#network 10.1.0.0 0.0.255.255 area 0
sw102(config-router)#exit
sw102(config)#
```

On sw201

```
sw201(config)#key chain ccie
sw201(config-keychain)#key 1
sw201(config-keychain-key)#key-string cci3
sw201(config-keychain-key)#cryptographic-algorithm hmac-sha-384
sw201(config-keychain-key)#exit
sw201(config-keychain)#exit
sw201(config)#

sw201(config)#interface gigabitEthernet 1/2
sw201(config-if)#ip ospf authentication key-chain ccie
sw201(config-if)#ip ospf bfd
sw201(config-if)#bfd interval 100 min_rx 100 multiplier 3
sw201(config-if)#exit
sw201(config)#

sw201(config)#router ospf 1
sw201(config-router)#no passive-interface GigabitEthernet1/2
sw201(config-router)#exit
sw201(config)#
```

www.ccielabcenter.com

CCIE Lab Center

On sw202

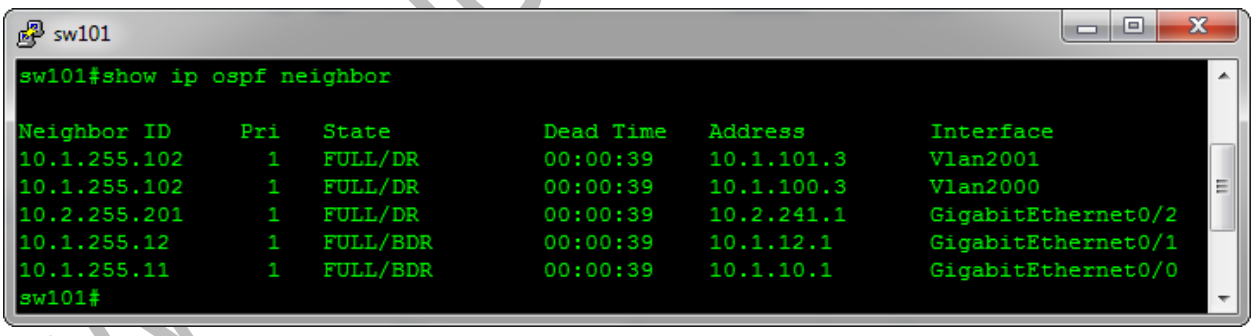
```
sw202(config)#key chain ccie
sw202(config-keychain)#key 1
sw202(config-keychain-key)#key-string cci3
sw202(config-keychain-key)#cryptographic-algorithm hmac-sha-384
sw202(config-keychain-key)#exit
sw202(config-keychain)#exit
sw202(config)#

sw202(config)#interface gigabitEthernet 1/2
sw202(config-if)#ip ospf authentication key-chain ccie
sw202(config-if)#ip ospf bfd
sw202(config-if)#bfd interval 100 min_rx 100 multiplier 3
sw202(config-if)#exit
sw202(config)#

sw202(config)#router ospf 1
sw202(config-router)#no passive-interface GigabitEthernet1/2
sw202(config-router)#exit
sw202(config)#
```

Verification

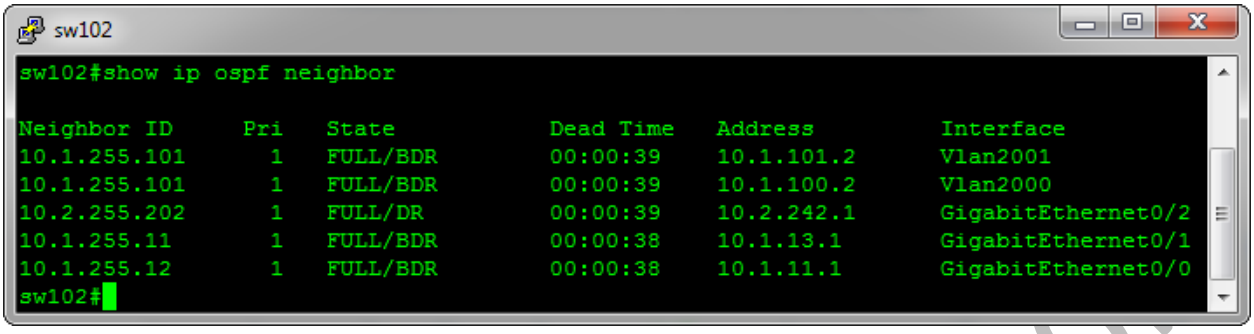
On sw101



www.ccielabcenter.com

CCIE Lab Center

On sw102



On sw201



On sw202



CCIE Lab Center

SECTION 1.5: DHCP IPv4 Service for HQ

QUESTION

Enable hosts in HQ VLAN 2000 and VLAN 2001 to obtain their IP configuration via DHCP according to these requirements.

1. On SW211, create IPv4 DHCP pools named hq_2000 and hq_2001 for HQ VLANs 2000 and 2001 respectively. In each subnet assign addresses from .101 up to .254 inclusively and the appropriate gateway to clients.
2. Enable DHCP Snooping on sw110 in VLANs 2000 and 2001 to protect against DHCP related attacks.
3. Place host11 into VLAN 2000
4. Place host12 into VLAN 2001
5. Perform the necessary configuration on switches sw101, sw102, sw110 to enable hosts in VLANs 2000 and 2001 to obtain IPv4 configuration through DHCP. The DHCP server running at sw211 in the DC must be referred to by its loopback IPv4 address 10.2.255.211. Do not disable the Option 82 insertion, and do not enable DHCP Snooping on other switches.
6. Verify that host11 and host12 have the IP connectivity to the Cisco DNA Center, vManage, ISE running in the DC using their internal (in Band Connectivity) address.

Solution

On sw211

```
sw211(config)#ip dhcp pool hq_2000
sw211(dhcp-config)#network 10.1.100.1 255.255.255.0
sw211(dhcp-config)#default-router 10.1.100.1
sw211(dhcp-config)#exit
sw211(config)#

sw211(config)#ip dhcp pool hq_2001
sw211(dhcp-config)#network 10.1.101.1 255.255.255.0
sw211(dhcp-config)#default-router 10.1.101.1
sw211(dhcp-config)#exit
sw211(config)#

sw211(config)#ip dhcp excluded-address 10.1.100.1 10.1.100.100
sw211(config)#ip dhcp excluded-address 10.1.100.255
sw211(config)#ip dhcp excluded-address 10.1.101.1 10.1.101.100
sw211(config)#ip dhcp excluded-address 10.1.101.255
```

www.ccielabcenter.com

CCIE Lab Center

On sw101

```
sw101(config)#interface range vlan 2000-2001
sw101(config-if-range)#ip helper-address 10.2.255.211
sw101(config-if-range)#exit
sw101(config)#
```

On sw102

```
sw102(config)#interface range vlan 2000-2001
sw102(config-if-range)#ip helper-address 10.2.255.211
sw102(config-if-range)#exit
sw102(config)#
```

On sw110

```
sw110(config)#ip dhcp snooping
sw110(config)#ip dhcp snooping vlan 2000-2001

sw110(config)#interface Port-channel1
sw110(config-if)#ip dhcp snooping trust
sw110(config-if)#exit
sw110(config)#

sw110(config)#interface Port-channel2
sw110(config-if)#ip dhcp snooping trust
sw110(config-if)#exit
sw110(config)#

sw110(config)#interface gigabitEthernet0/0
sw110(config-if)#ip dhcp snooping trust
sw110(config-if)#exit
sw110(config)#

sw110(config)#interface gigabitEthernet0/1
sw110(config-if)#ip dhcp snooping trust
sw110(config-if)#exit
sw110(config)#

sw110(config)#interface gigabitEthernet 0/0
sw110(config-if)#switchport mode access
sw110(config-if)#switchport access vlan 2000
sw110(config-if)#exit
sw110(config)#

sw110(config)#interface gigabitEthernet 0/1
sw110(config-if)#switchport mode access
```

www.ccielabcenter.com

CCIE Lab Center

```
sw110(config-if)#switchport access vlan 2001
sw110(config-if)#exit
sw110(config)#
```

Verification

On host11

```
host11
host11#show ip interface brief
Interface                  IP-Address      OK? Method Status                Protocol
Ethernet0/0                10.1.100.101    YES DHCP   up                    up
Ethernet0/1                unassigned      YES unset  administratively down down
Ethernet0/2                unassigned      YES unset  administratively down down
Ethernet0/3                unassigned      YES unset  administratively down down
host11#
```

```
host11
host11#ping  10.2.253.11
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 10.2.253.11, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 44/55/68 ms
host11#
```

On host12

```
host12
host12#show ip interface brief
Interface                  IP-Address      OK? Method Status                Protocol
Ethernet0/0                10.1.101.101    YES DHCP   up                    up
Ethernet0/1                unassigned      YES unset  administratively down down
Ethernet0/2                unassigned      YES unset  administratively down down
Ethernet0/3                unassigned      YES unset  administratively down down
host12#
```

```
host12
host12#ping 10.2.253.11
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 10.2.253.11, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 37/48/56 ms
host12#
```

CCIE Lab Center

SECTION 1.6: IPv6 in HQ (1 Points)

QUESTION

Implement IPv6 on sw101 and sw102 for switch virtual interfaces (SVI's) Vlan2000 and Vlan2001 according to these requirements:

1. SW101
   - Interface VLAN 2000: 2001:DB8:1:100::1/64
   - Interface VLAN 2001: 2001:DB8:1:101::1/64
2. SW102
   - Interface VLAN 2000: 2001:DB8:1:100::2/64
   - Interface VLAN 2001: 2001:DB8:1:101::2/64

Solution

On sw101

```
sw101(config)#interface vlan 2000
sw101(config-if)#ipv6 address 2001:DB8:1:100::1/64
sw101(config-if)#ipv6 nd router-preference high
sw101(config-if)#ipv6 nd ra interval msec 1000
sw101(config)#
```

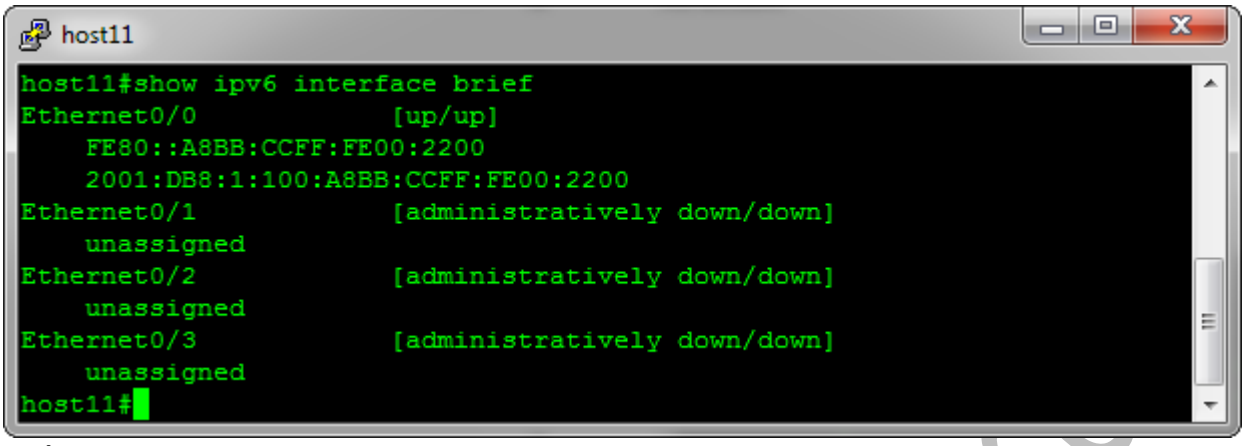
omit.....

Verification

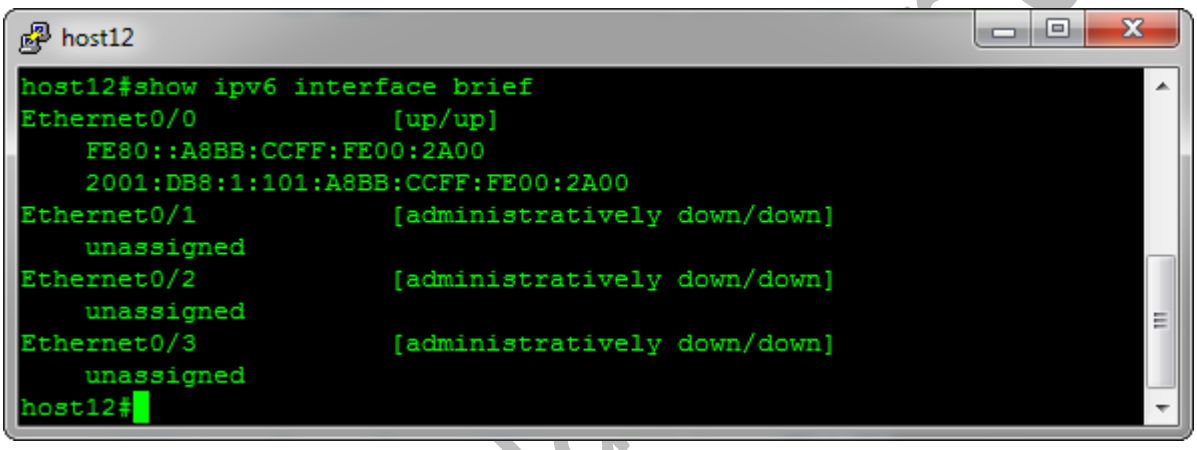
On host11

www.ccielabcenter.com

CCIE Lab Center



On host12



www.ccielabcenter.com

CCIE Lab Center

SECTION 1.7: IPv6 EIGRP in HQ

QUESTION

In HQ enable EIGRP for IPv6 on r11, r12, sw101 and sw102 according to these requirements:

1. Use process name “ccie” (without the quotes) and AS number 65001.
2. Do not configure any additional IPv6 addresses

Solution

On r11

```
r11(config)#router eigrp ccie
r11(config-router)#address-family ipv6 unicast autonomous-system 65001

r11(config-router-af)#af-interface default
```

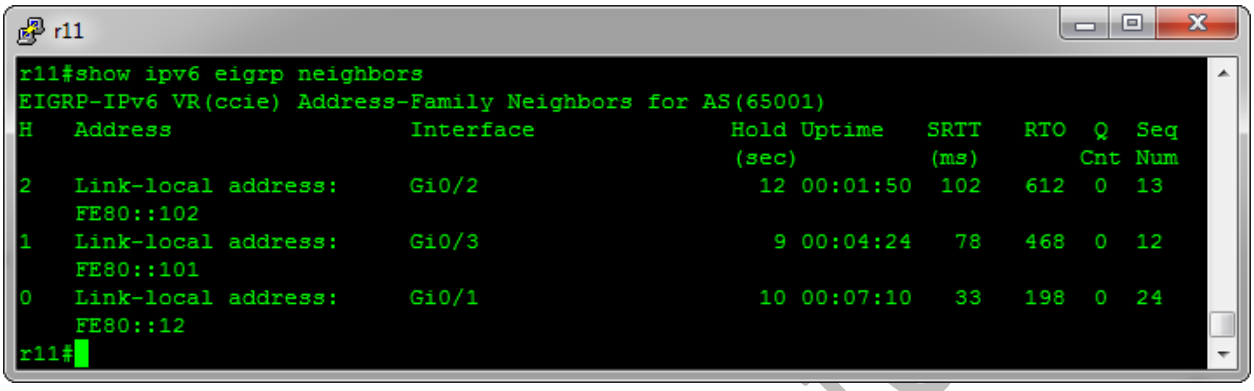
omit……

www.ccielabcenter.com

CCIE Lab Center

Verification

On r11



omit.....

www.ccielabcenter

CCIE Lab Center

SECTION 1.8: OSPFv2 in DC

QUESTION

Configure devices in the DC according to these requirements:

1. Switches sw201 and sw202 must establish a stable OSPF adjacency in the Full state with

omit……

Solution

On sw201

sw201(config)#interface vlan 3999

omit……

www.ccielabcenter.com

CCIE Lab Center

SECTION 1.9: BGP between HQ - DC and Service Providers

QUESTION

www.ccielabcenter.com

CCIE Lab Center

SECTION 1.10: Bringing up VPNv4/VPNv6 in SP#1

QUESTION

www.ccielabcenter.com

CCIE Lab Center

SECTION 1.11: Fixing Broken DMVPN between DC and Branches #3 & #4

QUESTION

www.ccielabcenter.com

CCIE Lab Center

SECTION 1.12: Tuning EIGRP on DMVPN and DMVPN-enabled Sites

QUESTION

Optimize the DMVPN operation according to these requirements:

Configure sw601 and sw602 at Branch#3 according to these requirements:

www.ccielabcenter.com

CCIE Lab Center

SECTION 1.13: IPv4 Networks on Legacy Branches

QUESTION

On sw211 in DC, complete the DHCP server configuration according to these requirements:

www.ccielabcenter.com

CCIE Lab Center

SECTION 1.14: Multicast in

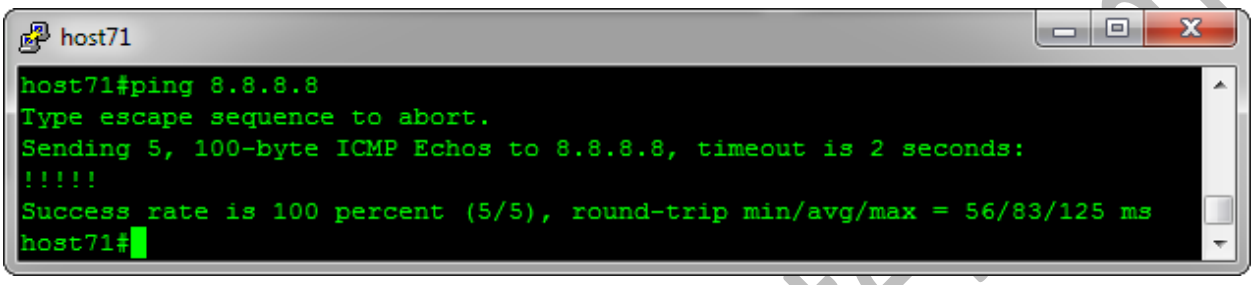
www.ccielabcenter.com

CCIE Lab Center

SECTION 1.15: Extending connectivity

Extend the IPv6 connectivity

On host71 & r24



www.ccielabcenter.com

CCIE Lab Center

Section 2: Implementing Proof of Concept SDX Branches

SECTION 2.1: Correcting the IP Adresses of Managed Switches in DNA Center

www.ccielabcenter.com

CCIE Lab Center

SECTION 2.2: Completing VN Configuration in DNA Center

www.ccielabcenter.com

CCIE Lab Center

SECTION 2.3: Mapping SDA VNs to SD-WAN VPNs

www.ccielabcenter.com

CCIE Lab Center

SECTION 2.4: Configuring SD-WAN VPN Route Leaking

www.ccielabcenter.com

CCIE Lab Center

SECTION 2.5: Handling Guest Traffic

www.ccielabcenter.com

CCIE Lab Center

SECTION 2.6: Support for Silent Hosts in Branch #2

www.ccielabcenter.com

CCIE Lab Center

Section 3: Making use of Programmability

SECTION 3.4: The End

CLC CCIE Enterprise Infrastructure Lab v1.0

**********The End**********

100% Real | 100% Pass
Visit ccielabcenter.com