16F - NET2000 - Intermediate Networking

Case Study

I. Functional Requirements (FR)

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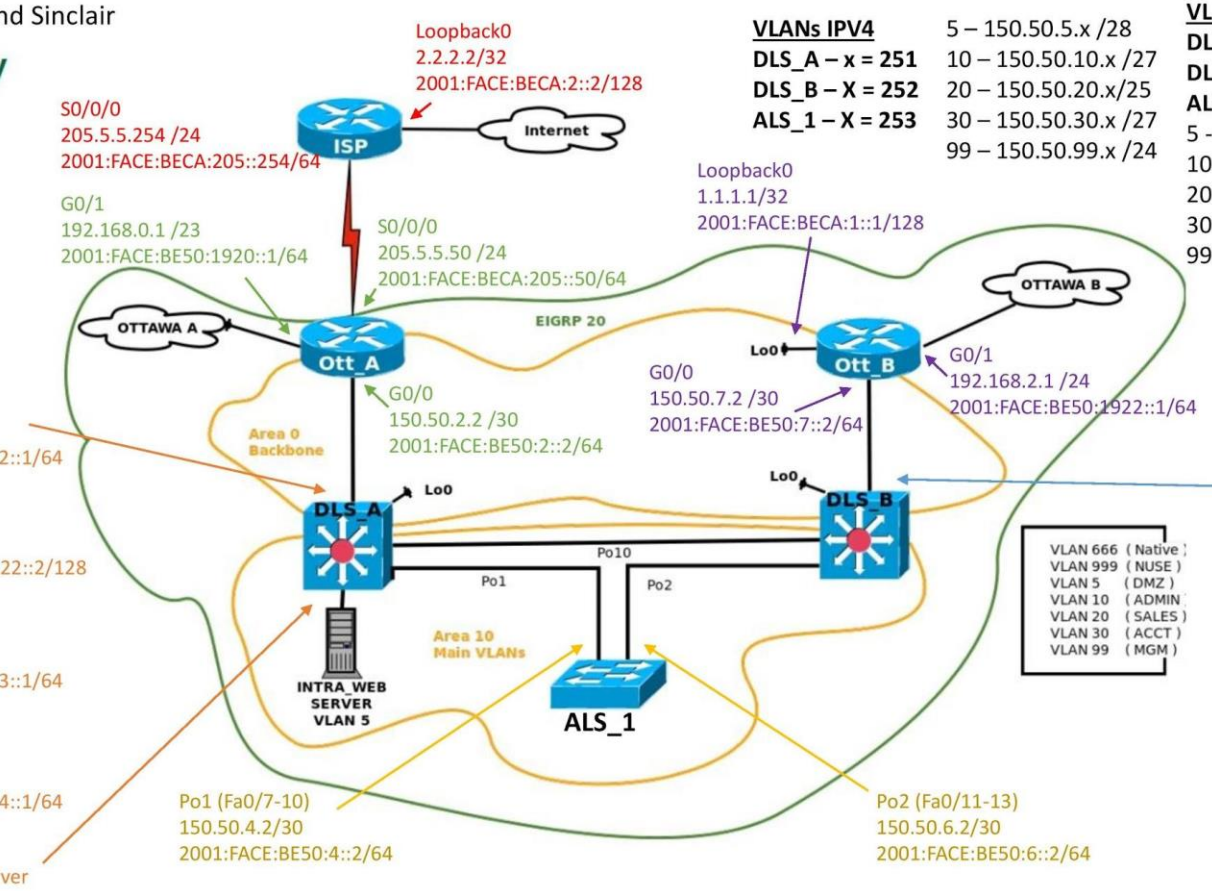

VLANs IPV4

DLS_A – x = 251
DLS_B – X = 252
ALS_1 – X = 253

5 – 150.50.5.x /28
10 – 150.50.10.x /27
20 – 150.50.20.x/25
30 – 150.50.30.x /27
99 – 150.50.99.x /24

VLANs IPV6

DLS_A – xy = A1
DLS_B – xy = B1
ALS_1 – xy = C1

5 - 2001:FACE:BE50:5::xy/64
10 - 2001:FACE:BE50:10::xy/64
20 - 2001:FACE:BE50:20::xy/64
30 - 2001:FACE:BE50:30::xy/64
99 - 2001:FACE:BE50:99::xy/64

1. Addressing requirements

1.1 Addressing for networks

Addressing for OTT_A

- 300 users with growth of 25% for a total of 375 users
    - IPv4 block 192.168.0.0 /23
    - IPv6 block 2001:FACE:BE50:1920::1/64

Addressing for OTT_B

- 120 users with growth of 25% for a total of 150 users
    - IPv4 block 192.168.2.0 /24
    - IPv6 block 2001:FACE:BE50:1922::1/64

1.2 Addressing for VLANs

- VLAN 5 (DMZ) requires 10 users with growth of 25% for a total of 13 users
    - DLS_A IPv4 address and block: 150.50.5.251 /28
    - DLS_B IPv4 address and block: 150.50.5.252 /28
    - ALS_1 IPv4 address and block: 150.50.5.253 /28
    - DLS_A IPv6 address and block: 2001:FACE:BE50:5::A1 /64
    - DLS_B IPv6 address and block: 2001:FACE:BE50:5::B1 /64
    - ALS_1 IPv6 address and block: 2001:FACE:BE50:5::C1 /64

- VLAN 10 (ADMIN) requires 20 users with growth of 25% for a total of 25 users
    - DLS_A IPv4 address and block: 150.50.10.251 /27
    - DLS_B IPv4 address and block: 150.50.10.252 /27
    - ALS_1 IPv4 address and block: 150.50.10.253 /27
    - DLS_A IPv6 address and block: 2001:FACE:BE50:10::A1 /64
    - DLS_B IPv6 address and block: 2001:FACE:BE50:10::B1 /64
    - ALS_1 IPv6 address and block: 2001:FACE:BE50:10::C1 /64

- VLAN 20 (SALES) requires 80 users with growth of 25% for a total of 100 users
    - DLS_A IPv4 address and block: 150.50.20.251 /25
    - DLS_B IPv4 address and block: 150.50.20.252 /25
    - ALS_1 IPv4 address and block: 150.50.20.253 /25
    - DLS_A IPv6 address and block: 2001:FACE:BE50:20::A1 /64
    - DLS_B IPv6 address and block: 2001:FACE:BE50:20::B1 /64
    - ALS_1 IPv6 address and block: 2001:FACE:BE50:20::C1 /64

- VLAN 30 (ACCT) requires 15 users with growth of 25% for a total of 19 users

- DLS_A IPv4 address and block: 150.50.30.251 /27
- DLS_B IPv4 address and block: 150.50.30.252 /27
- ALS_1 IPv4 address and block: 150.50.30.253 /27
- DLS_A IPv6 address and block: 2001:FACE:BE50:30::A1 /64
- DLS_B IPv6 address and block: 2001:FACE:BE50:30::B1 /64
- ALS_1 IPv6 address and block: 2001:FACE:BE50:30::C1 /64

1.3 Addressing for point-to-point links

- Between ISP and OTT_A
  - ISP S0/0/0
    - IPv4 address and block: 205.5.5.254 /24
    - IPv6 address and block: 2001:FACE:BECA:205::254/ 64
  - OTT_A S0/0/0
    - IPv4 address and block: 205.5.5.50 /24
    - IPv6 address and block: 2001:FACE:BECA:205::50/ 64
- Between OTT_A and DLS_A
  - OTT_A G0/0
    - IPv4 address and block: 150.50.2.2 /30
    - IPv6 address and block: 2001:FACE:BE50:2::2/ 64
  - DLS_A F0/1
    - IPv4 address and block: 150.50.2.1 /30
    - IPv6 address and block: 2001:FACE:BE50:2::1/ 64
- Between DLS_A, DLS_B, and ALS_1
  - DLS_A PO10
    - Bundle interfaces F0/3-6
  - DLS_B PO10
    - Bundle interfaces F0/3-6
  - DLS_A PO1
    - Bundle interfaces F0/7-10
  - ALS_1 PO1
    - Bundle interfaces F0/7-10
  - DLS_B PO2

        - Bundle interfaces F0/11-14

    - ALS_1 PO2
        - Bundle interfaces F0/11-14

- Between DLS_B and OTT_B
    - DLS_B F0/1
        - IPv4 address and block: 150.50.7.1 /30
        - IPv6 address and block: 2001:FACE:BE50:7::1/ 64
    - OTT_B G0/0
        - IPv4 address and block: 150.50.7.2 /30
        - IPv6 address and block: 2001:FACE:BE50:7::2/ 64

1.4 Addressing for loopbacks and end-device links

- For ISP
    - Loopback0
        - IPv4 address and block: 2.2.2.2/ 32
        - IPv6 address and block: 2001:FACE:BECA:2::2/ 128
- For DLS_A
    - Loopback0
        - IPv4 address and block: 22.2.2.2/ 32
        - IPv6 address and block: 2001:FACE:BECA:22::2/ 128
    - F0/2 to INTRA_WEB SERVER (in VLAN 5)

- For DLS_B
    - Loopback0
        - IPv4 address and block: 11.1.1.1 /32
        - IPv6 address and block: 2001:FACE:BECA:11::1/ 128
- For OTT_B
    - Loopback0
        - IPv4 address and block: 1.1.1.1 /32
        - IPv6 address and block: 2001:FACE:BECA:1::1/ 128

2. Routing

2.1 OSPFv3 in area 0

- OSPFv3 for IPv6 is used to route dynamically between OTT_A. OTT_B, DLS A and DLS B in area 0
    - Routing updates must be disabled from being sent across unnecessary interfaces

    - Routes must be summarized in order to reduce routing table sizes
    - Hello timers modified to ensure fast network convergence, bandwidth modified for correct metric calculation
    - Implement MD5 on all interfaces in area 0
    - Place DR in appropriate place

2.2 OSPFv3 in area 10

- OSPFv3 for IPv6 is used to route dynamically between DLS A, DLS B, ALS 1 and the Intra Web Server in area 10
    - Routing updates must be disabled from being sent across unnecessary interfaces
    - Routes must be summarized in order to reduce routing table sizes
    - Hello timers modified to ensure fast network convergence, bandwidth modified for correct metric calculation
    - Implement MD5 on all interfaces in area 10
    - Place DR in appropriate place

2.3 EIGRP for IPv4

- EIGRP for IPv4 is used to route dynamically through all internal LANs
    - Routing updates must be disabled from being sent across unnecessary interfaces
    - Routes must be summarized in order to reduce routing table sizes
    - Hello timers modified to ensure fast network convergence, bandwidth modified for correct metric calculation
    - Implement MD5 on all EIGRP interfaces

2.4 Static and Default Routes

- Entire system must be able to access the internet, verify reachability by pinging loopback in ISP
    - Static routes needed to ISP
    - Default route needed back into internal network
    - Routes redistributed from OTT_A to rest of network.

- F0/1 on DLS A and DLS B are to be routed ports

2.5 DHCP

- Configured on both layer 3 switches, DLS A and DLS B
- First 10% of all ip addresses in LAN reserved for DHCP usage
    - Includes 150.50.0.0 and 192.168.0.00 ranges
- Addresses to be split evenly between DLS A and DLS B
    - First half of addresses provided by DLS A and last half provided by DLS B
- DLS B to be DHCP server for OTTAWA B

    - This includes addresses in 192.168.0.0 range
- DHCP security measures implemented
    - DHCP snooping enabled
        - Mac address verification
- Prevent against IP address spoofing
    - Using ACLs, permitting IPv4 addresses 150.50.2.0-150.50.99.255 and 192.168.0.0-192.168.1.255
    - For IPv6 permit 2001:FACE:BE::/40

2.6 FHRP

- Configure redundant gateway for every VLAN in IPv4
    - DLS_A will be configured as standby with priority 110
    - DLS_B will be configured as standby with priority 100
    - Virtual gateway for…
        - VLAN 5: 150.50.5.200
        - VLAN 10: 150.50.10.200
        - VLAN 20: 150.50.20.200
        - VLAN 30: 150.50.30.200
        - VLAN 99: 150.50.99.200
    - Configure standby preempt on DLS_A and DLS_B
    - Configure standby track on DLS_A and DLS_B's PO10 interface

3. Network Switching

3.1 Etherchannels

- DLS A and DLS B connected to each other via Etherchannel Po10 using native vlan 666
- DLS A and ALS 1 connected to each other via Etherchannel Po1 using native vlan 666
- DLS B and ALS 1 connected to each other via Etherchannel Po2 using native vlan 666
- All switches connected together by Etherchannel will be trunking on vlan 666 with only vlans 5, 10, 20, 30 and 99 allowed on trunk

3.2 Configuring Switchports

- DLS_A's F0/2 to INTRA_WEB SERVER will be a switchport with access to vlan 5 (DMZ)
- Unused ports shutdown and accessing vlan 999 NUSE
    - On DLS_A: F0/11-24, G0/1-2

    - On DLS_B: F0/2, F0/7-10, F0/15-24, G0/1-2
    - On ALS_1: F0/3-6, F0/15-24, G0/1-2

3.3 Configuring STP Security

- Configure spanning tree for all VLANs in all switches
    - Configure BPDU guard and portfast on interfaces connecting to end devices
        - F0/2 on DLS_A

3.4 Configuring Default Gateways for ALS_1's VLANs

- VLANs need to send traffic in the most balanced manner possible. Use Virtual Gateways for load balancing
    - Every VLAN in ALS_1 will have their own respective virtual gateways configured in HSRP