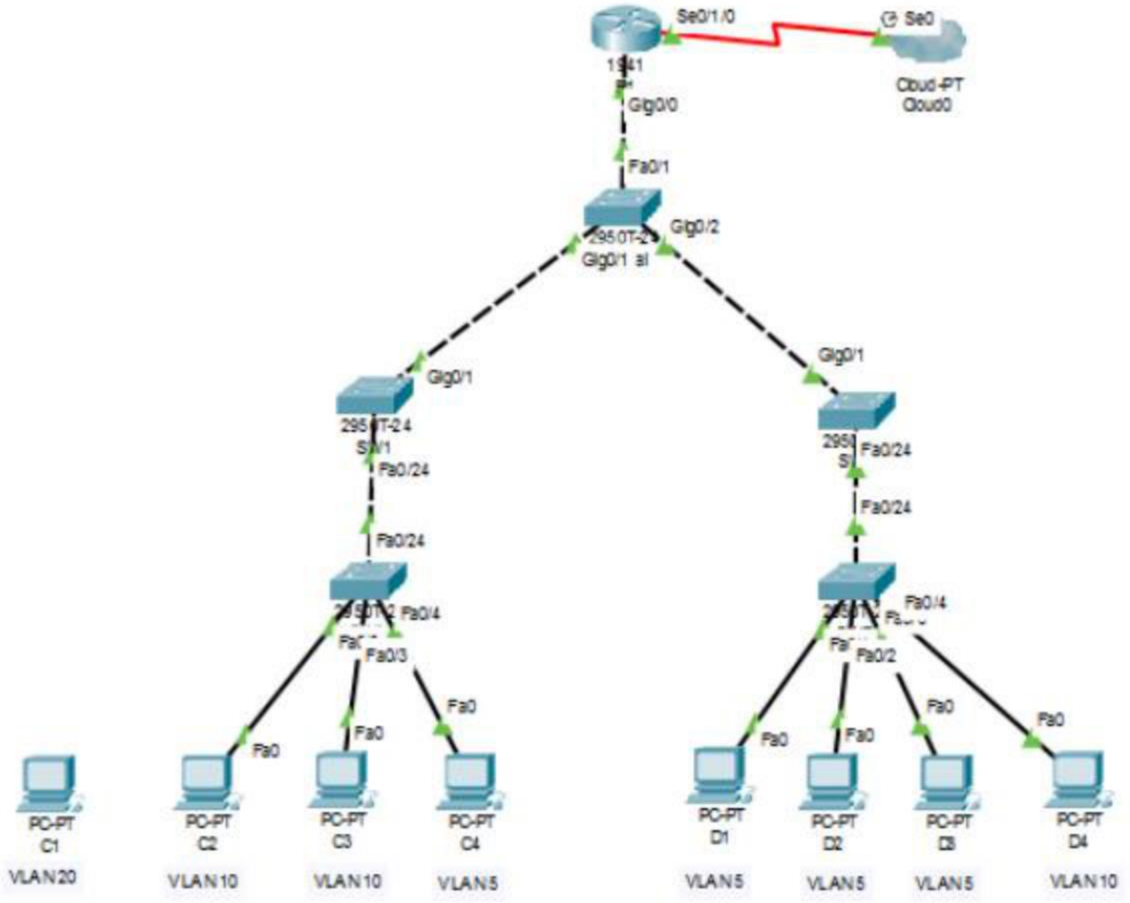
Security In Computing Practical

Practical 8: Layer 2 VLAN Security

Topology:



Addressing Table:

Device	Interface	IP Address	Subnet Mask	Default Gateway
R1	gig0/0			
	se0/1/0	209.165.200.1	255.255.255.0	N/A
C2	NIC	192.168.10.1	255.255.255.0	192.168.10.100
C3	NIC	192.168.10.2	255.255.255.0	192.168.10.100
C4	NIC	192.168.5.1	255.255.255.0	192.168.5.100
D1	NIC	192.168.5.2	255.255.255.0	192.168.5.100
D2	NIC	192.168.5.3	255.255.255.0	192.168.5.100
D3	NIC	192.168.5.4	255.255.255.0	192.168.5.100
D4	NIC	192.168.10.3	255.255.255.0	192.168.10.100

Objectives

- Connect a new redundant link between SW-1 and SW-2.

- Enable trunking and configure security on the new trunk link between SW-1 and SW-2.

- Create a new management VLAN (VLAN 20) and attach a management PC to that VLAN.

- Implement an ACL to prevent outside users from accessing the management VLAN

Scenario

A company’s network is currently set up using two separate VLANs: VLAN 5 and VLAN 10. In addition, all trunk ports are configured with native VLAN 15.

Part 1: Configure Switch/Router

Step 1: Configure secret

Execute command on all switches/router

```
SW/R1(config)# enable secret enpa55
```

Step 2: Configure console password

Execute command on all switches/router

```
SW/R1(config)# line console 0
SW/R1(config-line)# password conpa55
SW/R1(config-line)# login
```

Step 3: Configure SSH login

Execute command on all switches/router

```
SW/R1(config)# ip domain-name ccnasecurity.com
SW/R1(config)# username admin secret adminpa55
SW/R1(config)# line vty 0 4
```

```
SW/R1(config-line)# login local

SW/R1(config-line)# crypto key generate rsa

How many bits in the modulus [512]: 1024
```

Part 2: Create VLAN and assign access mode and trunk mode to interfaces

Step 1: Check existing VLAN

Execute command on all switches

```
SW# show vlan brief
```

Step 2: Create new VLAN

Execute command on all switches

```
SW(config)# vlan 5

SW(config-vlan) # exit

SW(config)# vlan 10

SW(config-vlan) # exit

SW(config)# vlan 15

SW(config-vlan) # exit
```

Step 3: Check the new VLAN

Execute command on all switches

```
SW# show vlan brief
```

Step 4: Assign access mode to VLAN switch interfaces

Execute command on switches SWA/SWB

```
SWA(config)# int fa0/2

SWA(config -if)# switchport mode access

SWA(config -if)# switchport access vlan 10
SWA(config)# int fa0/3
SWA(config -if)# switchport mode access
SWA(config -if)# switchport access vlan 10
SWA(config)# int fa0/4
SWA(config -if)# switchport mode access
SWA(config -if)# switchport access vlan 5

SWB(config)# int fa0/1
SWB(config -if)# switchport mode access
SWB(config -if)# switchport access vlan 5
SWB(config)# int fa0/2

SWB(config -if)# switchport mode access
SWB(config -if)# switchport access vlan 5
SWB(config)# int fa0/3
SWB(config -if)# switchport mode access
SWB(config -if)# switchport access vlan 5
SWB(config)# int fa0/4
SWB(config -if)# switchport mode access
SWB(config -if)# switchport access vlan 10
```

Step 5: Check the access mode allocations

```
SWA# show vlan brief
SWB# show vlan brief
```

Step 6: Assign trunk mode to other switch interfaces

```
SWA(config)# int fa0/24
SWA(config -if)# switchport mode trunk
SWA(config -if)# switchport trunk native vlan 15

SWB(config)# int fa0/24
SWB(config -if)# switchport mode trunk
SWB(config -if)# switchport trunk native vlan 15

SW1(config)# int fa0/24
SW1(config -if)# switchport mode trunk
SW1(config -if)# switchport trunk native vlan 15
SW1(config)# int gig0/1
SW1(config -if)# switchport mode trunk
SW1(config -if)# switchport trunk native vlan 15

SW2(config)# int fa0/24
SW2(config -if)# switchport mode trunk
SW2(config -if)# switchport trunk native vlan 15
SW2(config)# int gig0/1
SW2(config -if)# switchport mode trunk
SW2(config -if)# switchport trunk native vlan 15

Central(config)# int range gig0/1-2
Central(config –if-range)# switchport mode trunk
Central(config –if-range)# switchport trunk native vlan 15
Central(config)# int fa0/1
Central(config –if)# switchport mode trunk
Central(config –if)# switchport trunk native vlan 15
```

Step 7: Check the trunk mode allocations

```
Central# show int trunk

SW1/2# show int trunk

SWA/B# show int trunk
```

Step 8: Create sub-interfaces on router to support VLAN

```
R1(config)# int gig0/0.1
R1(config - subif)# encapsulation dot1q 5
R1(config - subif)# ip address 192.168.5.100 255.255.255.0

R1(config)# int gig0/0.2
R1(config - subif)# encapsulation dot1q 10

R1(config - subif)# ip address 192.168.10.100 255.255.255.0

R1(config)# int gig0/0.15
R1(config - subif)# encapsulation dot1q 15
R1(config - subif)# ip address 192.168.15.100 255.255.255.0
```

Part 3: Verify Connectivity

Step 1: Verify connectivity between C2 (VLAN 10) and C3 (VLAN 10).

```
C2> ping 192.168.10.2
```

(Successful)

Step 2: Verify connectivity between C2 (VLAN 10) and D1 (VLAN 5).

```
PC2> ping 192.168.5.2
```

(Successful)

Part 4: Create a Redundant Link between SW-1 and SW-2

Step 1: Connect SW-1 and SW-2.

Using a crossover cable, connect port Fa0/23 on SW-1 to port Fa0/23

on SW-2.

Step 2: Enable trunking, including all trunk security mechanisms on the link between SW-1 and SW-2.

```
(Execute command on SW- 1 and SW-2) SW1/2(config)# int
fa0/23 SW1/2(config-if)# switchport mode trunk
SW1/2(config-if)# switchport trunk native vlan 15
SW1/2(config-if)# switchport nonegotiate
```

Part 5: Enable VLAN 20 as a Management VLAN

Step 1: Enable a management VLAN (VLAN 20) on SW-A.

```
SW-A(config)# vlan 20
SW-A(config-vlan)# exit
SW-A(config)# int vlan 20
SW-A(config-if)# ip address 192.168.20.1 255.255.255.0
```

Step 2: Enable the same management VLAN on all other switches

(Execute command on SW-B, SW-1, SW-2, and Central)

```
SW(config)# vlan 20
SW(config-vlan)# exit
```

Create an interface VLAN 20 on all switches and assign an IP address within the 192.168.20.0/24 network.

```
SW-B(config)# int vlan 20
SW-B(config-if)# ip address 192.168.20.2 255.255.255.0
```

```
SW-1(config)#int vlan 20

SW-1(config-if)#ip address 192.168.20.3 255.255.255.0


SW-2(config)#int vlan 20

SW-2(config-if)#ip address 192.168.20.4 255.255.255.0


Central(config)# int vlan 20

Central(config-if)# ip address 192.168.20.5 255.255.255.0
```

Step 3: Connect and configure the management PC.

Connect the management PC using copper straight-through to SW-A port Fa0/1 and ensure that it is assigned an available IP address 192.168.20.50

Step 4: On SW-A, ensure the management PC is part of VLAN 20.

```
SW-A(config)# int fa0/1

SW-A(config)# switchport mode access

SW-A(config-if)# switchport access vlan 20
```

Step 5: Verify connectivity of the management PC to all switches.

```
C1> ping 192.168.20.1 (SW-A)

(Successful)

C1> ping 192.168.20.2 (SW-B)

(Successful)

C1> ping 192.168.20.3 (SW-1)

(Successful)

C1> ping 192.168.20.4 (SW-2)
```

(Successful)

```
C1> ping 192.168.20.5 (Central)
```

(Successful)

Part 6: Enable the Management PC to Access Router R1

Step 1: Enable a new subinterface on router R1.

```
R1(config)# int gig0/0.3
R1(config-subif)# encapsulation dot1q 20
R1(config-subif)# ip address 192.168.20.100 255.255.255.0
```

Step 2: Set default gateway in management PC.

C1 – 192.168.20.100

Step 3: Verify connectivity between the management PC and R1.

```
C1> ping 192.168.20.100
```

(Successful)

Step 4: Enable security.

```
R1(config)# access-list 101 deny ip any 192.168.20.0 0.0.0.255 R1(config)#
access-list 101 permit ip any any

R1(config)# access-list 102 permit ip host 192.168.20.50 any
```

Step 5: Apply ACL on correct interfaces R1(config)#

```
int gig0/0.1 R1(config-subif)# ip access-group 101 in
R1(config-subif)# int gig0/0.2 R1(config-subif)# ip
access-group 101 in R1(config-subif)# line vty 0 4
```

```
R1(config-line)# access-class 102 in
```

Step 6: Verify connectivity between the management PC and SW-A, SW-B and R1

```
C1> ping 192.168.20.1 (SW-A)
```

(Successful)

```
C1> ping 192.168.20.2 (SW-B)
```

(Successful)

```
C1> ping 192.168.20.100 (R1)
```

(Successful)

Step 7: Verify connectivity between the D1 and management PC.

```
D1>ping 192.168.20.50
```

(Unsuccessful – Destination host unreachable)